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Interventions for smoking cessation in hospitalised patients (Review)

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Interventions for smoking cessation in hospitalised patients.
Cochrane Database of Systematic Reviews 2024, Issue 5. Art. No.: CD001837.
DOI: 10.1002/14651858.CD001837.pub4.

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[Intervention Review]

Interventions for smoking cessation in hospitalised patients

Joanna M Streck[1,2], Nancy A Rigotti[2], Jonathan Livingstone-Banks[3], Hilary A Tindle[4], Carole Clair[5], Marcus R Munafò[6], Cecely Sterling-Maisel[7], Jamie Hartmann-Boyce[3,8]

[1]Department of Psychiatry, Massachusetts General Hospital/Harvard Medical School, Boston, Massachusetts (MA), USA. [2]Tobacco Research and Treatment Center, Division of General Internal Medicine, Department of Medicine, Massachusetts General Hospital / Harvard Medical School, Boston, Massachusetts, USA. [3]Nuffield Department of Primary Care Health Sciences, University of Oxford, Oxford, UK. [4]Medicine, Vanderbilt University Medical Center, Nashville, TN, USA. [5]Center for Primary Care and Public Health, University of Lausanne, Lausanne, Switzerland. [6]School of Experimental Psychology and MRC Integrative Epidemiology Unit, University of Bristol, Bristol, UK. [7]Department of Psychiatry, Massachusetts General Hospital, Boston, Massachusetts, USA. [8]Department of Health Promotion and Policy, University of Massachusetts, Amherst, MA, USA

Contact: Nancy A Rigotti, nrigotti@partners.org.

Editorial group: Cochrane Tobacco Addiction Group.
Publication status and date: New search for studies and content updated (conclusions changed), published in Issue 5, 2024.

Citation: Streck JM, Rigotti NA, Livingstone-Banks J, Tindle HA, Clair C, Munafò MR, Sterling-Maisel C, Hartmann-Boyce J. Interventions for smoking cessation in hospitalised patients. *Cochrane Database of Systematic Reviews* 2024, Issue 5. Art. No.: CD001837. DOI: 10.1002/14651858.CD001837.pub4.

ABSTRACT

Background

In 2020, 32.6% of the world's population used tobacco. Smoking contributes to many illnesses that require hospitalisation. A hospital admission may prompt a quit attempt. Initiating smoking cessation treatment, such as pharmacotherapy and/or counselling, in hospitals may be an effective preventive health strategy. Pharmacotherapies work to reduce withdrawal/craving and counselling provides behavioural skills for quitting smoking. This review updates the evidence on interventions for smoking cessation in hospitalised patients, to understand the most effective smoking cessation treatment methods for hospitalised smokers.

Objectives

To assess the effects of any type of smoking cessation programme for patients admitted to an acute care hospital.

Search methods

We used standard, extensive Cochrane search methods. The latest search date was 7 September 2022.

Selection criteria

We included randomised and quasi-randomised studies of behavioural, pharmacological or multicomponent interventions to help patients admitted to hospital quit. Interventions had to start in the hospital (including at discharge), and people had to have smoked within the last month. We excluded studies in psychiatric, substance and rehabilitation centres, as well as studies that did not measure abstinence at six months or longer.

Data collection and analysis

We used standard Cochrane methods. Our primary outcome was abstinence from smoking assessed at least six months after discharge or the start of the intervention. We used the most rigorous definition of abstinence, preferring biochemically-validated rates where reported. We used GRADE to assess the certainty of the evidence.

Main results

We included 82 studies (74 RCTs) that included 42,273 participants in the review (71 studies, 37,237 participants included in the meta-analyses); 36 studies are new to this update. We rated 10 studies as being at low risk of bias overall (low risk in all domains assessed), 48 at high risk of bias overall (high risk in at least one domain), and the remaining 24 at unclear risk.

Cessation counselling versus no counselling, grouped by intensity of intervention

Hospitalised patients who received smoking cessation counselling that began in the hospital and continued for more than a month after discharge had higher quit rates than patients who received no counselling in the hospital or following hospitalisation (risk ratio (RR) 1.36, 95% confidence interval (CI) 1.24 to 1.49; 28 studies, 8234 participants; high-certainty evidence). In absolute terms, this might account for an additional 76 quitters in every 1000 participants (95% CI 51 to 103). The evidence was uncertain (very low-certainty) about the effects of counselling interventions of less intensity or shorter duration (in-hospital only counselling ≤ 15 minutes: RR 1.52, 95% CI 0.80 to 2.89; 2 studies, 1417 participants; and in-hospital contact plus follow-up counselling support for ≤ 1 month: RR 1.04, 95% CI 0.90 to 1.20; 7 studies, 4627 participants) versus no counselling. There was moderate-certainty evidence, limited by imprecision, that smoking cessation counselling for at least 15 minutes in the hospital without post-discharge support led to higher quit rates than no counselling in the hospital (RR 1.27, 95% CI 1.02 to 1.58; 12 studies, 4432 participants).

Pharmacotherapy versus placebo or no pharmacotherapy

Nicotine replacement therapy helped more patients to quit than placebo or no pharmacotherapy (RR 1.33, 95% CI 1.05 to 1.67; 8 studies, 3838 participants; high-certainty evidence). In absolute terms, this might equate to an additional 62 quitters per 1000 participants (95% CI 9 to 126). There was moderate-certainty evidence, limited by imprecision (as CI encompassed the possibility of no difference), that varenicline helped more hospitalised patients to quit than placebo or no pharmacotherapy (RR 1.29, 95% CI 0.96 to 1.75; 4 studies, 829 participants). Evidence for bupropion was low-certainty; the point estimate indicated a modest benefit at best, but CIs were wide and incorporated clinically significant harm and clinically significant benefit (RR 1.11, 95% CI 0.86 to 1.43, 4 studies, 872 participants).

Hospital-only intervention versus intervention that continues after hospital discharge

Patients offered both smoking cessation counselling and pharmacotherapy after discharge had higher quit rates than patients offered counselling in hospital but not offered post-discharge support (RR 1.23, 95% CI 1.09 to 1.38; 7 studies, 5610 participants; high-certainty evidence). In absolute terms, this might equate to an additional 34 quitters per 1000 participants (95% CI 13 to 55). Post-discharge interventions offering real-time counselling without pharmacotherapy (RR 1.23, 95% CI 0.95 to 1.60, 8 studies, 2299 participants; low certainty-evidence) and those offering unscheduled counselling without pharmacotherapy (RR 0.97, 95% CI 0.83 to 1.14; 2 studies, 1598 participants; very low-certainty evidence) may have little to no effect on quit rates compared to control.

Telephone quitlines versus control

To provide post-discharge support, hospitals may refer patients to community-based telephone quitlines. Both comparisons relating to these interventions had wide CIs encompassing both possible harm and possible benefit, and were judged to be of very low certainty due to imprecision, inconsistency, and risk of bias (post-discharge telephone counselling versus quitline referral: RR 1.23, 95% CI 1.00 to 1.51; 3 studies, 3260 participants; quitline referral versus control: RR 1.17, 95% CI 0.70 to 1.96; 2 studies, 1870 participants).

Authors' conclusions

Offering hospitalised patients smoking cessation counselling beginning in hospital and continuing for over one month after discharge increases quit rates, compared to no hospital intervention. Counselling provided only in hospital, without post-discharge support, may have a modest impact on quit rates, but evidence is less certain. When all patients receive counselling in the hospital, high-certainty evidence indicates that providing both counselling and pharmacotherapy after discharge increases quit rates compared to no post-discharge intervention. Starting nicotine replacement or varenicline in hospitalised patients helps more patients to quit smoking than a placebo or no medication, though evidence for varenicline is only moderate-certainty due to imprecision. There is less evidence of benefit for bupropion in this setting. Some of our evidence was limited by imprecision (bupropion versus placebo and varenicline versus placebo), risk of bias, and inconsistency related to heterogeneity.

Future research is needed to identify effective strategies to implement, disseminate, and sustain interventions, and to ensure cessation counselling and pharmacotherapy initiated in the hospital is sustained after discharge.

PLAIN LANGUAGE SUMMARY

Interventions started during hospitalisation to help people to stop smoking

Key messages

- When people who smoke are admitted to a hospital, they can be helped to quit smoking if they receive stop-smoking counselling that begins in hospital and continues for at least a month after they return home, compared to no counselling.

- Medications, such as nicotine patches and varenicline, in combination with counselling also help people quit smoking post-discharge. These treatments work better than not starting counselling or medication during a hospitalisation.

- Evidence supports hospitals and hospital clinicians offering in-hospital and post-discharge cessation support to patients, and demonstrates that patients may benefit from beginning their quit-smoking journey prior to, or upon, hospital discharge, in order to stay quit post-discharge.

What did we want to find out?

We wanted to find out what interventions are helpful to support hospitalised people who smoke in quitting cigarette smoking. Our main goal was to find out which treatments can help hospitalised patients stop smoking for at least six months. This is important because smoking contributes to many health problems, including cancers, heart disease, and lung disease. People who smoke and are admitted to a hospital to treat a medical illness, especially an illness that is related to smoking, might be more receptive to advice to quit smoking. The smoke-free hospital environment may also help them to try out not smoking and to start treatment to remain smoke-free after leaving the hospital.

What did we do?

We searched for studies that looked at stop smoking interventions (medications versus no medications or dummy pill and/or counselling versus no counselling) that began during a medical hospitalisation. Smoking cessation medications generally work to reduce withdrawal symptoms and stave off cravings; NRT by providing low levels of nicotine without the poisonous chemicals, and drugs such varenicline and bupropion, which do not contain nicotine, by directly targeting the reward and pleasure/addictive centres in the brain. Providing these treatments before someone is discharged from the hospital allows them to get a headstart on quitting smoking, as their hospitalisation is smoke-free. We looked for randomised controlled trials or quasi-randomised controlled trials, in which the treatments people received were decided at random or semi-random. Randomised studies typically give the most reliable and robust evidence about the effects of a treatment.

What did we find?

We found 82 studies of smoking cessation interventions that began in the hospital with 42,273 participants. These studies compared counselling (versus no counselling) and/or medications such as nicotine replacement therapy, varenicline, and bupropion (versus no medication or placebo). The studies took place across 17 countries (Australia, Belgium, Brazil, Canada, China, Denmark, France, Ireland, Israel, Japan, the Netherlands, Norway, South Korea, Spain, Tunisia, United Kingdom, and the United States).

Main results

People are more likely to stop smoking for at least six months if they receive stop-smoking counselling that begins in hospital and continues for more than a month after discharge than if they receive no counselling (28 studies, 8234 people). Shorter and less intensive counselling was less effective. People are also more likely to stop smoking for at least six months if nicotine replacement therapy (NRT) is started in the hospital (8 studies, 3838 people), or if varenicline is started in the hospital (4 studies, 829 people), than if they do not receive medication or if they receive a placebo medication. There was minimal evidence for bupropion's effectiveness in helping individuals quit smoking at six months. People who receive counselling in the hospital are more likely to quit smoking after discharge when using a combination of counselling and medication than when receiving neither (7 studies, 5610 people). Finally, there was insufficient evidence of quitlines' effectiveness for providing support after hospital discharge.

What are the limitations of the evidence?

Our results are based on numerous studies. However, we need more studies to confirm some of our findings, including buproprion and varenicline and lower-intensity counselling. We also need more studies to test whether digital interventions work - these interventions are promising as they might have greater reach at a lower cost. Some of our studies also had issues with their design and conduct, which made us less certain about our findings. These results could change when more evidence becomes available.

How up to date is this evidence?

The evidence is up to date to September 2022.

Summary of findings 1. Smoking cessation counselling compared to no smoking cessation counselling, grouped by intensity of intervention

Smoking cessation counselling compared to no smoking cessation counselling, grouped by intensity of intervention

Patient or population: individuals who smoke cigarettes and are admitted to a hospital for medical or surgical care
Setting: USA, South Korea, Netherlands, Brazil, Canada, UK, Ireland, Belgium, Australia, Denmark, Spain, Japan, Norway
Intervention: smoking cessation **counselling** that is initiated in the hospital and may or may not continue after hospital discharge
Comparison: no smoking cessation **counselling**

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with no **smoking cessation** counselling	Risk with **smoking cessation** counselling				
Quit at longest follow-up (6 + months) - intensity 1 vs 0	Study population		RR 1.52 (0.80 to 2.89)	1417 (2 RCTs)	⊕⊖⊖⊖ Very low[a,b]	Intensity 1 = one brief, in-hospital contact (e.g. advice to quit) lasting ≤ 15 minutes with no post-discharge contact
	98 per 1000	149 per 1000 (78 to 283)				
Quit at longest follow-up (6 + months) - intensity 2 vs 0	Study population		RR 1.27 (1.02 to 1.58)	4432 (12 RCTs)	⊕⊕⊕⊖ Moderate[b]	Intensity 2 = one or more in-hospital contacts that include counselling and last in total > 15 minutes with no post-discharge contact
	170 per 1000	216 per 1000 (173 to 269)				
Quit at longest follow-up (6 + months) - intensity 3 vs 0	Study population		RR 1.04 (0.90 to 1.20)	4627 (7 RCTs)	⊕⊖⊖⊖ Very low[c,d]	Intensity 3 = any hospital contact plus follow-up contacts for ≤ 1 month after discharge
	134 per 1000	139 per 1000 (121 to 161)				
Quit at longest follow-up (6 + months) - intensity 4 vs 0	Study population		RR 1.36 (1.24 to 1.49)	8234 (28 RCTs)	⊕⊕⊕⊕ High	Intensity 4 = any hospital contact plus follow-up contacts for > 1 month after discharge
	211 per 1000	287 per 1000 (262 to 314)				

*__The risk in the intervention group__ (and its 95% CI) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: confidence interval; **RCT:** randomised controlled trial; **RR:** risk ratio; **vs**: versus

GRADE Working Group grades of evidence

High certainty: we are very confident that the true effect lies close to that of the estimate of the effect
Moderate certainty: we are moderately confident in the effect estimate; the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different
Low certainty: our confidence in the effect estimate is limited; the true effect may be substantially different from the estimate of the effect
Very low certainty: we have very little confidence in the effect estimate; the true effect is likely to be substantially different from the estimate of effect

[a]Downgraded two levels because of inconsistency: I^2 = 74%
[b]Downgraded one level because of imprecision: CI incorporates clinically significant benefit as well as no difference (based on thresholds from Hartmann-Boyce 2021)
[c]Downgraded two levels because of risk of bias: four out of seven studies at high risk
[d]Downgraded two levels because of imprecision: CI incorporates clinically significant benefit as well as clinically significant harm (based on thresholds from Hartmann-Boyce 2021)

Summary of findings 2. Pharmacotherapy plus counselling versus no pharmacotherapy or placebo plus counselling

Pharmacotherapy plus counselling versus no pharmacotherapy or placebo plus counselling

Patient or population: smoking cessation in hospitalised patients
Setting: UK, USA, Spain, Australia, Canada, Israel, France
Intervention: pharmacotherapy plus counselling
Comparison: placebo or no pharmacotherapy plus counselling

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with placebo or no pharmacotherapy plus counselling	Risk with pharmacotherapy plus counselling				
Quit at longest follow-up (6 + months) - NRT vs placebo or no NRT	Study population		RR 1.33 (1.05 to 1.67)	3838 (8 RCTs)	⊕⊕⊕⊕ High	
	188 per 1000	250 per 1000 (197 to 314)				
Quit at longest follow-up (6 + months) - bupropion vs placebo or no bupropion	Study population		RR 1.11 (0.86 to 1.43)	872 (4 RCTs)	⊕⊕⊖⊖ Low[a]	
	218 per 1000	242 per 1000 (187 to 312)				
Quit at longest follow-up (6 + months) - varenicline vs placebo or no varenicline	Study population		RR 1.29 (0.96 to 1.75)	829 (4 RCTs)	⊕⊕⊕⊖ Moderate[b]	
	215 per 1000	277 per 1000 (206 to 376)				

***The risk in the intervention group** (and its 95% CI) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: confidence interval; **NRT:** Nicotine replacement therapy; **RCT:** randomised controlled trial; **RR:** risk ratio; **vs**: versus

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate; the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different
Low certainty: our confidence in the effect estimate is limited; the true effect may be substantially different from the estimate of the effect
Very low certainty: we have very little confidence in the effect estimate; the true effect is likely to be substantially different from the estimate of effect

[a]Downgraded two levels because of imprecision: CI incorporates clinically significant benefit and clinically significant harm (based on thresholds from Hartmann-Boyce 2021)
[b]Downgraded one level due to imprecision: CI incorporates clinically significant benefit as well as no clinically significant difference (based on thresholds from Hartmann-Boyce 2021)

Summary of findings 3. Hospital-only intervention versus intervention that continues after hospital discharge

Hospital-only intervention versus intervention that continues after hospital discharge

Patient or population: smoking cessation in hospitalised patients
Setting: Spain, USA, Canada, Denmark, Korea, Australia
Intervention: intervention that begins in hospital and continues post-discharge
Comparison: hospital-only intervention

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with hospital-only intervention	Risk with intervention that begins in hospital and continues post-discharge				
Behavioural support - asynchronous**	Study population		RR 0.97 (0.83 to 1.14)	1598 (2 RCTs)	⊕⊖⊖⊖ Very low[a,b]	
	271 per 1000	263 per 1000 (225 to 309)				
Behavioural support - synchronous**	Study population		RR 1.23 (0.95 to 1.60)	2299 (8 RCTs)	⊕⊕⊖⊖ Low[c, d]	
	235 per 1000	289 per 1000 (223 to 376)				
Pharmacotherapy + behavioural support vs neither	Study population		RR 1.23 (1.09 to 1.38)	5610 (7 RCTs)	⊕⊕⊕⊕ High	
	144 per 1000	178 per 1000 (157 to 199)				

*The risk in the intervention group (and its 95% CI) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).
**First two rows are behavioural support only with synchronous interventions representing live interventions in real time and asynchronous interventions representing interventions not in real time, such as pre-recorded intervention content.

CI: confidence interval; **RCT:** randomised controlled trial; **RR:** risk ratio; **vs**: versus

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate; the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited; the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate; the true effect is likely to be substantially different from the estimate of effect.

[a]Downgraded two levels because of risk of bias: both studies at high risk of bias
[b]Downgraded two levels because of imprecision: CI incorporated both clinically significant benefit and clinically significant harm (based on thresholds from Hartmann-Boyce 2021)
[c]Downgraded one level because of inconsistency: I^2 = 54% and studies differed in direction of effect
[d]Downgraded one level because of imprecision: CI incorporated no clinically significant difference as well as clinically significant benefit (based on thresholds from Hartmann-Boyce 2021)

Summary of findings 4. Telephone quitline referral versus no treatment or usual care

Quitline studies compared to not treatment or hospital-based counselling

Patient or population: smoking cessation in hospitalised patients
Setting: USA
Intervention: quitline studies
Comparison: control or hospital-based counselling

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with control	Risk with quitline studies				
Quitline referral vs control	Study population		RR 1.17 (0.70 to 1.96)	1870 (2 RCTs)	⊕⊖⊖⊖ Very low[a,b]	
	166 per 1000	194 per 1000 (116 to 325)				
Health system telephone counselling vs quitline	Study population		RR 1.23 (1.00 to 1.51)	3260 (3 RCTs)	⊕⊖⊖⊖ Very low[c,d]	
	140 per 1000	172 per 1000 (140 to 212)				

*__The risk in the intervention group__ (and its 95% CI) is based on the assumed risk in the comparison group and the __relative effect__ of the intervention (and its 95% CI).
CI: confidence interval; **RCT:** randomised controlled trial; **RR:** risk ratio; **vs:** versus.

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect
Moderate certainty: we are moderately confident in the effect estimate; the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different
Low certainty: our confidence in the effect estimate is limited; the true effect may be substantially different from the estimate of the effect
Very low certainty: we have very little confidence in the effect estimate; the true effect is likely to be substantially different from the estimate of effect

[a]Downgraded one level because of inconsistency: $I^2 = 71\%$
[b]Downgraded two levels because of imprecision: CI incorporates clinically significant benefit and clinically significant harm (based on thresholds from Hartmann-Boyce 2021)
[c]Downgraded two levels because of risk of bias: removing study at high risk changed direction of effect
[d] Downgraded one level because of imprecision: CI incorporates clinically significant benefit and no difference (based on thresholds from Hartmann-Boyce 2021)

BACKGROUND

In this review, the terms 'smoking' and 'smoking cessation' refer to the use of combustible tobacco cigarettes. This review does not address nicotine use other than combustible tobacco products' use, nor does it address non-tobacco substance use (e.g. alcohol, opioids, cannabis). The term 'hospitalisation' refers to a medical hospitalisation. This review does not cover psychiatric hospitalisations, hospitalisations in a rehabilitation centre, or any other non-medical or surgical hospitalisations. Additionally, this review only covers adult tobacco smoking and does not include studies on individuals younger than age 18.

Description of the condition

Cigarette smoking is the leading preventable cause of morbidity and premature mortality worldwide and a leading cause of health inequities (USDHHS 2020). Globally, in 2020, the adult smoking prevalence was estimated at 32.6%. According to Dai 2021, 1.18 billion people globally regularly smoke tobacco, causing 7.0 million deaths in 2020. Stopping smoking reduces an individual's risk of developing and dying of tobacco-related diseases such as cardiovascular disease, respiratory disease, and many cancers (USDHHS 2020). Many individuals who smoke have difficulty when trying to quit because it requires them to overcome both a physical dependence on nicotine and a longstanding rewarding behaviour pattern (Rigotti 2022). Effective tobacco cessation treatments include pharmacotherapies, such as nicotine replacement products, varenicline and bupropion, and behavioural support delivered in person or by telephone or other remote means (USPSTF 2021). While many patients who smoke seek to stop and make attempts to quit, only a minority of them use these effective treatment modalities, and only a minority of them are successful. Healthcare systems are a key channel through which proven tobacco cessation treatments can be delivered to a population. Interventions can be provided in the context of both ambulatory and inpatient care. This review examines evidence of the effectiveness of smoking cessation interventions that are initiated for patients in hospitals.

Description of the intervention

A number of studies have evaluated smoking cessation services provided or initiated in hospital (Rigotti 2012; Shoesmith 2021). The interventions have included behavioural counselling of different forms and intensity (including post-hospitalisation contacts), Food and Drug Administration (FDA)-approved pharmacological therapies (such as nicotine replacement therapy [NRT], bupropion and varenicline), and combinations of counselling and pharmacotherapy (Rigotti 2022; USDHHS 2020). These smoking cessation interventions could be delivered by various practitioners or staff, such as physicians, nurses, psychologists, social workers and other behavioural health staff, or smoking cessation counsellors (e.g. tobacco treatment specialists). Interventions could be delivered using various modalities, such as face-to-face and in-person, remotely by telephone or videoconference, or delivered using digital or web-based devices (e.g. mobile applications). The intervention could include advice to quit, more intensive behavioural therapy, or smoking cessation pharmacotherapy (Rigotti 2022; USDHHS 2020). An intervention starting in the hospital could offer continued contact after hospital discharge or not. Alternatively, studies could provide similar treatment in the hospital and randomly assign participants to different post-discharge interventions. Post-discharge interventions could be delivered by staff based in the hospital or healthcare setting or by referral to community-based resources. Generally, hospital-initated interventions compare counselling to no counselling and/or pharmacotherapy versus placebo or no pharmacotherapy (USDHHS 2020).

The aim of this review was to evaluate the effects of smoking cessation interventions initiated during a hospital stay. We also aimed to explore whether the effects of the interventions differed by medical diagnosis, as this may have implications for treatment planning, and any potential individual differences in effects for hospitalised patients who smoke.

How the intervention might work

Smoking contributes to many health problems leading to hospitalisation, particularly cardiovascular disease, respiratory illness and many cancers. Hospitalisation, especially for a tobacco-related illness, may increase an individual's perceived vulnerability to the health risks of smoking, boost the salience of smoking cessation advice, and increase receptivity to smoking cessation assistance that is offered during hospitalisation, thereby creating a 'teachable moment' that prompts a quit attempt. Illness also brings individuals who smoke to the healthcare setting, where they have contact with health professionals who can provide a smoking cessation message or intervention. Most hospitals restrict or prohibit smoking by patients to protect patients and staff from secondhand smoke exposure. This smoke-free environment may also provide an opportunity for individuals who smoke to trial tobacco abstinence away from the usual environmental cues to smoke. For these reasons, providing (or at least initiating) tobacco use disorder treatments in hospitals may be an effective preventive health strategy. Smoking cessation interventions for hospitalised smokers are interventions that are initiated during hospitalisation. In some cases, the intervention extends after discharge from the hospital. Interventions may include behavioural support counselling paradigms and/or pharmacotherapies, such as nicotine replacement therapy (NRT), varenicline, or bupropion. Briefly, behavioural counselling approaches provide patients with evidence-based skills and tools (e.g. coping with craving) to help them quit smoking. In terms of pharmacological treatments, we focus on FDA-approved pharmacotherapies. Pharmacotherapies generally help individuals quit smoking by reducing their nicotine withdrawal levels and desire to smoke. Often, pharmacotherapies are provided with the addition of counselling (Rigotti 2022; USDHHS, 2020). Details on mechanisms of action specific to these interventions (e.g. mechanisms of action for stop-smoking pharmacotherapies) can be found in companion Cochrane Reviews (e.g. Hartmann-Boyce 2018; Hartmann-Boyce 2021; Hajizadeh 2023; Livingstone-Banks 2023; Matkin 2019; Stead 2013).

Why it is important to do this review

Many individuals who smoke are hospitalised each year for smoking-related disease (USDHHS, 2020). People who smoke, healthcare providers and managers, and policymakers need to know which interventions can best help people who smoke to quit and how these can be most effectively delivered in the context of hospitalisation. This review assesses the effectiveness of interventions to achieve abstinence from combustible tobacco products, because the largest health benefits are achieved from stopping smoking completely. This review was first published in

2001 and was updated in 2003, 2007 and 2012. It is important to update this review to understand the most effective smoking cessation treatment methods for hospitalised smokers, especially in light of the volume of new studies published since our last review, including those testing novel intervention methods and forms of intervention delivery (e.g. mobile health delivery).

OBJECTIVES

Primary objective

To assess the effects of any type of smoking cessation programme for patients admitted to an acute care hospital. Our hypotheses were as follows.

- Systematic behavioural intervention (brief advice, individual counselling, provision of self-help materials, group therapy) increases quit rates more than usual care, and intensive intervention increases quit rates more than brief intervention.
- Adding pharmacotherapy (such as NRT, varenicline, or bupropion) to a behavioural intervention increases quit rates more than placebo or no medication, and combining pharmacotherapy with a behavioural intervention increases quit rates more than either alone.
- Interventions that occur both in hospital and after discharge increase quit rates more than interventions limited to the hospital stay, and longer post-discharge follow-up increases quit rates more than short follow-up.

Secondary objectives

- To explore the possibility that the effects of interventions differed for patients with different categories of diseases that led to hospital admission.
- To assess whether intervention effects varied between studies that offered interventions only to patients who were ready to quit smoking or offered interventions to all patients regardless of readiness to quit.

METHODS

Criteria for considering studies for this review

Types of studies

Randomised or quasi-randomised studies, in which the allocation sequence is not truly random (for example, studies where participant allocation is determined by participant date of hospital admission) were included, as well as studies with factorial designs.

Types of participants

Participants were patients (aged 18 years and older) who were admitted to an acute care hospital and who were currently smoking (defined as having smoked within one month of hospital admission). We excluded studies of secondary prevention or cardiac rehabilitation that did not recruit on the basis of smoking history, and studies conducted on patients hospitalised in facilities that primarily treated psychiatric disorders or substance use (including inpatient tobacco addiction programmes).

Types of interventions

We included any intervention that was initiated during hospitalisation or upon discharge that aimed to increase motivation to quit, to assist a quit attempt, or to help recent quitters avoid relapse. Interventions that began in hospital and continued after discharge were included. The intervention could be delivered by physicians, nursing staff, psychologists, smoking cessation counsellors or other hospital staff. Interventions could be delivered in person, by telephone or videoconference, or delivered using digital or web-based devices. The intervention could include advice to quit, more intensive behavioural therapy, smoking cessation pharmacotherapy, or e-cigarettes. An intervention starting in the hospital could offer continued contact after hospital discharge or not. Alternatively, studies could provide similar treatment in the hospital and randomly assign participants to different post-discharge interventions. Post-discharge interventions could be delivered by staff based in the hospital or healthcare setting or by referral to community-based resources.

Comparators were placebo or no intervention. Studies could also compare two active interventions or compare an intervention to a less intensive intervention, such as brief advice to quit or usual care. We included studies of smoking interventions that were part of a broader risk reduction programme only if it was possible to extract data on the outcome effects of the smoking cessation component specifically, and if details of the nature of the intervention and control were explicitly stated. We included studies that reported the use of NRT, varenicline, bupropion or other pharmacotherapy for smoking cessation. We also included e-cigarettes when they were used to promote abstinence from combustible tobacco use, though our search did not yield any studies on e-cigarettes and, thus, these studies were not reported in this review.

We categorised behavioural interventions beginning during the hospital stay according to whether they included follow-up after discharge. Within these categories, we further defined both the hospital and follow-up interventions by level of intensity. This led to the following four categories of counselling intervention intensity.

- Single brief in-hospital contact (i.e. advice to quit) lasting ≤ 15 minutes, no follow-up support;
- One or more contacts in hospital that include counselling, lasting in total > 15 minutes, no follow-up support;
- Any hospital contact plus follow-up contacts lasting for ≤ 1 month;
- Any hospital contact plus follow-up contacts lasting for > 1 month.

Types of outcome measures

As per the previous versions of this review, we did not extract data on adverse or serious adverse events, as more comprehensive data on these can be seen in our reviews dedicated to the specific pharmacotherapies covered here (Hajizadeh 2023; Hartmann-Boyce 2018; Livingstone-Banks 2023). A potential harm of any smoking cessation intervention is that more people quit in control than in intervention groups; our analysis methods include this possibility.

Primary outcomes

The primary outcome measure was abstinence from smoking, assessed at least six months after the start of the intervention or hospital discharge. We used the most conservative measure of quitting at the longest follow-up that was available, i.e. we preferred a biochemically validated quit rate to self-reported

abstinence, and preferred continuous or sustained abstinence to point prevalence abstinence. We used abstinence at 12-month follow-up in preference to abstinence at six-month follow-up.

Secondary outcomes

We had no secondary outcomes.

Search methods for identification of studies

Electronic searches

We searched the Cochrane Tobacco Addiction Group's Specialised Register for studies, using relevant terms (e.g. (hospital and patient*) or hospital* or inpatient* or admission* or admitted) in the title or abstract, or as keywords. This Register has been developed from electronic searching of the Cochrane Central Register of Controlled trials (CENTRAL), MEDLINE, Embase, and PsycINFO, together with handsearching of specialist journals, conference proceedings and reference lists of previous studies and overviews. The most recent search of the Register was on 7 September 2022, and included reports of studies indexed in CENTRAL (2022, Issue 6); MEDLINE OVID (to 9 August 2022); Embase OVID (to week 2 March 2022); PsycINFO OVID (to 1 August 2022), all from inception. See the Cochrane Tobacco Addiction Group Website for details of the search strategies for these databases. In addition, we searched CINAHL (EBSCO) on 7 September 2022. The search strategies for this review are listed in Appendix 1. We did not place any limits on our searches (e.g. by language, year of publication, or publication format).

Searching other resources

Our search of the Cochrane Tobacco Addiction Group Specialised Register on 7 September 2022 also covered ongoing and unpublished trials included in the following databases, as these are indexed in CENTRAL.

- US National Institutes of Health Ongoing Trials Register ClinicalTrials.gov (www.clinicaltrials.gov, searched via CENTRAL); and
- World Health Organization (WHO) International Clinical Trials Registry Platform (apps.who.int/trialsearch, searched via CENTRAL).

We searched the Centers for Disease Control Smoking and Health database for the original review but since it did not retrieve any additional studies, we did not use it for any subsequent update. We asked individuals with expertise in the area of smoking cessation for details of conference abstracts and studies in press. We hand-checked bibliographies of studies generated by the search for further studies.

Data collection and analysis

Selection of studies

For this update, two authors (of JS, NR, HT, CC, JLB and JHB) independently screened titles and abstracts for inclusion using Covidence software (Covidence). The same authors then retrieved full texts for studies that made it through title/abstract screening, and screened these independently and in duplicate. We resolved discrepancies at both stages through discussion and/or referral to a third reviewer (of NR, JHB, JLB). We reported the selection process in a PRISMA diagram (Page 2021).

Data extraction and management

Two authors extracted data independently (of JS, NR, HT, CC) using a data extraction sheet in Microsoft Excel (Microsoft Corporation 2024). Disagreements were resolved by consensus. We noted reasons for the exclusion of studies. For each study, we extracted the following data, and summarised this in our analyses and Characteristics of included studies table.

- Country;
- Start and end dates of study;
- Reasons for hospitalisation or speciality of admission;
- Criteria for recruitment (e.g. whether selected according to willingness to make a quit attempt and whether participants who were screened for study eligibility were identified with an opt-in strategy [i.e. by referral from hospital staff] or opt-out strategy [i.e. all smokers admitted were proactively screened]);
- Smoking behaviour and characteristics of participants;
- Therapist types;
- Description of experimental and control interventions and classification by length of in-hospital contact and post-discharge support:
  - Behavioural support: type of support (e.g. cognitive behavioural therapy [CBT], mindfulness, etc.), background/training of the individual(s) who provided behavioural support interventions, duration of contacts, frequency or number of contacts. Source of behavioural support (based on hospital or healthcare system versus community resources accessed by referral), mode of delivery (in-person, video-based remote visit, phone call, text message, IVR, app, other). Designation of intensity for behavioural interventions (rated on a 1-4 scale of intensity of the intervention; intensity 1 = one brief, in-hospital contact (e.g. advice to quit) lasting ≤ 15 minutes with no post-discharge contact; intensity 2 = one or more in-hospital contacts that include counselling and last in total > 15 minutes with no post-discharge contact; intensity 3 = any hospital contact plus follow-up contacts for ≤ 1 month after discharge; intensity 4 = any hospital contact plus follow-up contacts for > 1 month after discharge);
  - Pharmacotherapy: products used in hospital and/or provided at discharge. For medication provided post-discharge: provided by prescription versus in-hand at discharge versus mailed post-discharge, amount provided/prescribed at discharge, duration of overall treatment (including refills offered), cost of medication to the participant (if available);
- Outcome measures (definition of abstinence used for this review, use of biochemical validation, when outcome was measured), and number of deaths;
- Funding and declarations of interest.

If necessary, we contacted the original authors for clarification of data.

Assessment of risk of bias in included studies

We assessed the risk of bias (RoB) in each included study using RoB 1 (Higgins 2011), for each of the following domains of risk, according to standard guidance from the Cochrane Tobacco Addiction Group (Hartmann-Boyce 2023).

- Random sequence generation (selection bias);
- Allocation concealment (selection bias);

- Blinding of participants and study personnel (performance bias);
- Blinding/objectivity of outcome assessment (detection bias); note, where study arms received differential levels of report and smoking cessation was not validated, we considered studies at high risk in this domain;
- Incomplete outcome data (attrition bias);
- Other potential risks of bias.

Two authors (of NR, JS, CC, CSM, HT for this update) independently judged each study to be at low, unclear or high risk of bias for each domain, with each judgement justified by information from the study report. We resolved disagreements through discussion and, if needed, by referring to a third author (JHB, JLB).

As per standard guidance from the Cochrane Tobacco Addiction Group, studies were considered to be at low risk of bias overall if they were low risk in all domains, at high risk of bias if they were judged to be at high risk in one or more domains, and at unclear risk if not high in any domains but unclear in at least one (Hartmann-Boyce 2023; Higgins 2011).

Measures of treatment effect

We expressed the results as a risk ratio (intervention risks/control risks) for achieving abstinence from smoking together with the 95% confidence interval for this estimate.

We calculated quit rates based on the numbers of patients randomised to an intervention, excluding any deaths. Those who dropped out or were lost to follow-up were counted as continuing to smoke. Most studies verified self-reported smoking status with a biochemical test. In these studies, self-reported nonsmokers who did not pass the verification procedure were counted as smokers. We noted the number of deaths in Characteristics of included studies.

We included the Tobacco Addiction Group glossary of tobacco-specific terms (Appendix 2).

Unit of analysis issues

In randomised trials with multiple study groups, we did not combine data between arms, as this method was not used by any study authors. In some cases, when there were more than two study arms, we only included two study arms in our meta-analyses when we were interested in a specific comparison (e.g. NRT versus placebo). We note in our analyses where this was the case. For cluster-randomised controlled trials, we used results as reported by the authors, which adjusted for clustering.

Dealing with missing data

For quit rates, we used a conservative approach, as is standard for the Cochrane Tobacco Addiction Group, treating participants with missing data as still smoking. We counted participants lost to follow-up as continuing to smoke.

If studies did not report summary data on smoking cessation at six months or longer in a format that could be included in our meta-analyses, we first attempted to contact study authors for these data. Where that was unsuccessful, we reported available results narratively.

Assessment of heterogeneity

We considered clinical and methodological heterogeneity in our protocol (e.g. sensitivity analyses removing studies at high risk of bias, including studies with inadequate randomisation). Studies were discussed amongst the author team during the analysis. Before entering each study in meta-analysis, we (JHB, NR, JS, JLB) discussed clinical heterogeneity and decided whether to include studies in individual comparisons.

To investigate statistical heterogeneity, we used the I^2 statistic, given by the formula [(Q - df)/Q] x 100%, where Q is the Chi^2 statistic and df is its degrees of freedom (Higgins 2003). This describes the percentage of the variability in effect estimates that is due to heterogeneity rather than sampling error (chance). A value greater than 50% may be considered to indicate moderate to substantial heterogeneity (Deeks 2023).

Assessment of reporting biases

For the analyses with 10 or more studies, we assessed the risk of reporting bias using a funnel plot, while noting that asymmetrical funnel plots can be caused by issues other than reporting bias. Regardless of the number of studies included, we considered the possibility of reporting bias in our discussion.

Data synthesis

In this review, a narrative summary of the included studies is provided. When appropriate, data were pooled in meta-analyses. To examine our dichotomous outcome (smoking abstinence), we employed a random-effects Mantel-Haenszel model to calculate the RR with a 95% confidence interval, which aligns with the standard methods of the Cochrane Tobacco Addiction Group for smoking cessation studies.

These methods replaced the Peto method (Yusuf 1985) used in the initial versions of this review, since the Mantel-Haenszel method is now recommended for Cochrane Reviews (Higgins 2011). Differences in results using the two methods are small, and most likely to be apparent where numbers are unbalanced between groups, in which case, the Peto method may give biased results.

Subgroup analysis and investigation of heterogeneity

We conducted three subgroup analyses for our primary outcome of smoking cessation, using the I^2 value as an indication of subgroup differences.

We analysed data according to our predetermined classification of four levels of intensity (see Types of interventions, above).

We analysed data based on participant readiness to quit smoking.

In an exploratory analysis, we evaluated the effects of interventions on patients admitted to hospital because of the following diagnoses: cardiovascular disease, respiratory disease and stroke. We also assessed the effects of interventions that were designed to be delivered to all (or nearly all) of the smoking patients who were admitted to hospital regardless of the patient's admission diagnosis. Where there were insufficient data for meta-analysis, the results were tabulated. In cases where a single study reported data on patients from different categories, we pooled the data only when it was possible to extract data by disease category. Otherwise, we

included only those studies reporting data from patients in a single disease category.

Sensitivity analysis

We conducted the following sensitivity analyses using the 'investigate sensitivity' function in RevMan Web, to assess the consistency of our results when different groups were removed from the analyses.

- Excluding studies using quasi-experimental designs, limiting the meta-analysis to RCTs only;
- Excluding outliers in cases where there was substantial heterogeneity;
- Excluding studies judged to be at high risk of bias (in any domain), to determine whether their exclusion altered findings.

We did not include forest plots of these, but instead reported these narratively.

Summary of findings and assessment of the certainty of the evidence

Following standard Cochrane methodology, we created summary of findings tables for our four main comparisons using GRADEpro GDT: counselling versus no counselling, pharmacotherapy versus placebo or no pharmacotherapy, quitline versus control or hospital-based counselling, and intervention versus control for interventions that were the same in hospital but systematically differed post-discharge. We selected these comparisons a priori as being the most clinically relevant. In the summary of findings tables, we present data on our primary outcome (smoking abstinence at six months or later) for the main comparisons aforementioned. Aligning with standard Cochrane methodology, we used the five GRADE considerations (study limitations, consistency of effect, imprecision, indirectness, and publication bias) to assess the certainty of the evidence for our outcome, and to make conclusions about the certainty of evidence within the body of this review. Two review authors (JHB and JLB) completed all summary of findings analyses and created all the resulting tables via discussion. When judging imprecision, we used thresholds for clinical significance based on a previous Cochrane Review (Hartmann-Boyce 2021).

RESULTS

Description of studies

Results of the search

Our literature searches for this update found 2126 records. We did not identify any records from other sources. After we removed duplicates, 1350 records remained for title and abstract screening. We ruled out 1104 records at this stage, leaving 246 reports for full-text screening. Of these, we excluded 99 studies (Excluded studies), and identified 13 ongoing studies and 36 new included studies, which combined with 46 studies from previous updates of this review, results in a total of 82 included studies of 42,273 people. The 13 studies are included in an Ongoing studies section, which includes studies that are in progress without results yet available, confirmed by emailing study investigators. See Figure 1 for the PRISMA diagram detailing study flow and the Included studies section for details on included studies.

Figure 1. PRISMA flow diagram.

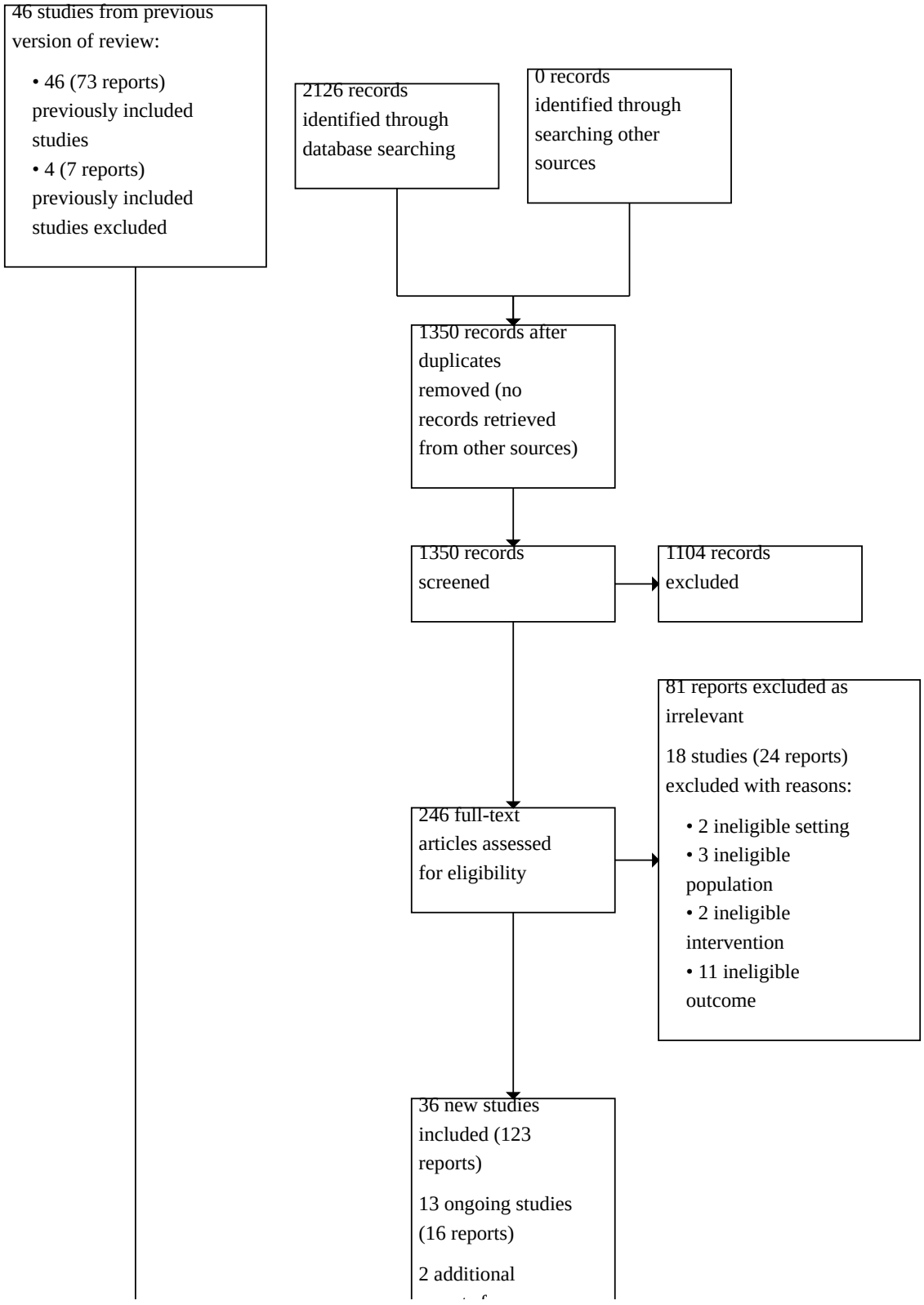
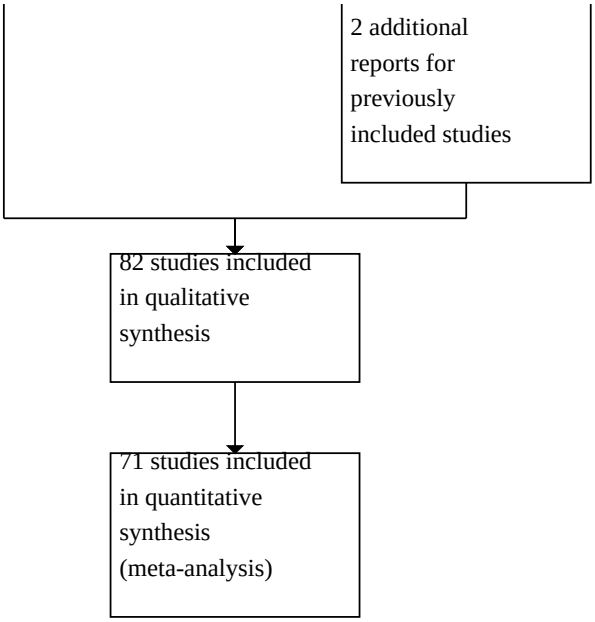


Figure 1. (Continued)



Included studies

Eighty-two studies conducted in 17 countries (United States, United Kingdom, Australia, Canada, Tunisia, the Netherlands, Denmark, Brazil, Spain, Japan, South Korea, Ireland, France, Belgium, China, Israel, and Norway) and published between 1990 and 2023 met the inclusion criteria and contributed to the review. Of the included studies, 74 were RCTs. For the majority of studies, the unit of assignment was the individual. However, eight studies did not allocate treatment at the individual level (Berndt 2017a; Bolman 2002; Borglykke 2008; Garcia-Pazo 2021; Murray 2013a; Pelletier 1998; Stevens 1993; Stevens 2000). Two of them allocated treatment by alternating the intervention condition between hospitals over time (Stevens 1993; Stevens 2000); two were cluster-randomised at the ward level versus patient-level (Berndt 2017a; Murray 2013a); and one study employed a quasi-experimental design, with one intervention and two control hospitals (Pelletier 1998). One study used a quasi-experimental design and assigned participants to an intervention or control group according to bed availability in two wards of the same hospital (Borglykke 2008). Garcia-Pazo 2021, another trial which employed a quasi-randomised design, assigned participants to intervention or control sequentially, not by week of enrolment. One other study, Bolman 2002, was not fully randomised; seven of 11 participating hospitals were randomised to condition, but four others selected their study arm. All eight studies share the potential problems of recruitment bias and of underestimation of confidence limits due to intracluster correlation.

Forty-five studies were included in this review from the prior 2012 review and 36 new studies published since 2012. Forty-nine studies contributed to the comparison of a behavioural counselling intervention, classified by intensity, that began in the hospital and may or may not have continued after hospital discharge, versus a control condition of no intervention during the hospital stay. Sixteen studies tested the use of pharmacotherapy versus a placebo or no pharmacotherapy beginning in the hospital. In 17 trials, the study arms had comparable content during a hospital stay and differed in content only after hospital discharge. Ten of these studies tested post-discharge interventions of behavioural support versus a control condition after discharge, while seven of the studies tested post-discharge interventions that combined behavioural support and pharmacotherapy.

Forty studies provided data that could be stratified by the type of disease that was the reason for the hospital admission. Studies in three disease categories were identified: cardiovascular disease (31 studies), respiratory disease (6 studies), and stroke (3 studies). As a new comparison in this update of the review, five studies tested a quitline-based intervention; two compared referral to a telephone quitline versus a control condition; and three compared a quitline referral-based intervention to telephone counselling provided within a healthcare system. Finally, 11 additional studies were identified whose interventions did not fit into the aforementioned comparisons and are described at the end of the results section with no pooled results reported.

We emailed three authors of the included studies when we were unable to locate the full text for an included study (Garcia-Pazo 2021; Richter 2023; Rigotti 2022) and all authors provided us with the full text.

The majority of studies were government-funded (see Characteristics of included studies table for funding details). We describe each intervention in Characteristics of included studies.

Counselling interventions

In virtually all studies in this review, the intervention included smoking cessation counselling (i.e. behavioural support). The largest group of studies compared providing behavioural support during a hospital stay with no in-hospital behavioural support.

The intensity and duration of these interventions varied broadly. We categorised them into four groups according to, (1) the intensity of the intervention provided in the hospital and (2) whether they included any follow-up counselling contact after discharge, producing four categories of increasing intensity (Types of interventions). A smaller group of studies addressed a narrower question: the value of continuing counselling support after hospital discharge if it had been provided during hospitalisation. These studies provided counselling to all patients while hospitalised and randomly assigned them to receive or not receive continued support and contact after hospital discharge.

The counselling provided in these studies ranged in duration from less than 16 minutes of brief, in-hospital advice to quit with no support following discharge (Kim 2019), to longer, in-hospital contact with multiple follow-up counselling contacts after discharge, with the longest duration counselling follow-up being 24 months from discharge (Carson-Chahhoud 2020; Suner-Soler 2022). The majority of studies included in the current review included high-intensity counselling interventions, defined as in-hospital cessation support with additional post-discharge cessation support beyond a month after discharge (Berndt 2017a; Borglykke 2008; Caruthers 2006; Hennrikus 2005; Reid 2003; Vial 2002). Counselling interventions were delivered by a range of different staff, and many interventions used multiple trained clinical staff to deliver the intervention (e.g. nurses and physicians, health educators and physicians). In 38 studies, a nurse helped deliver the cessation intervention, in 17 studies a physician, in 11 studies, a Tobacco Treatment Specialist (TTS) or other trained counsellor, in nine studies a quitline-based counsellor, in six studies, a health educator, in three studies, a psychologist, in three studies, a cardiac unit clinical staff member, in three studies, intervention delivery was not stated, in one study, a medical student delivered the intervention and, in two studies, a respiratory therapist (Characteristics of included studies). Most studies used in-person counselling (Borglykke 2008; Campbell 1991; Campbell 1996; Meysman 2010; Mohiuddin 2007; Pedersen 2005; Reid 2003; Steinberg 2011; Vial 2002), or synchronous telephone-based counselling modalities (Caruthers 2006; CASIS 1992; Chouinard 2005; Cossette 2011; De Azevedo 2010; DeBusk 1994; Dornelas 2000; Froelicher 2004; Hasuo 2004; Hennrikus 2005; Lacasse 2008; Lewis 1998; Miller 1997; Ortigosa 2000; Quist-Paulsen 2003; Rigotti 1994; Rigotti 1997; Rigotti 2006; Simon 1997; Simon 2003; Simon 2009a; Smith 2009b; Smith 2011; Stevens 1993; Stevens 2000; Taylor 1990). More recent studies included in this review tested telephone quitline-based counselling and interactive voice response (IVR) linkage to hospital-based or quitline-based counselling (Cummins 2016a; Rigotti 2022), and a few studies tested asynchronous delivery methods (e.g. watching a DVD or web-based intervention videos; Garcia-Pazo 2021; Harrington 2016).

Pharmacotherapy

No studies tested the efficacy of pharmacotherapy with nicotine replacement therapy (NRT), bupropion or varenicline versus placebo or no medication without providing at least some behavioural support to both groups. However, eight studies tested the marginal value of adding NRT to a counselling intervention (Campbell 1991; Campbell 1996; Cummins 2016a; Hasan 2014a; Lewis 1998; Molyneux 2003; Ortega 2011a; Vial 2002), four studies tested the marginal value of adding bupropion to a counselling intervention (Eisenberg 2013a; Planer 2011; Rigotti 2006; Simon 2009a), and four studies tested the marginal value of adding varenicline to a counselling intervention (Carson-Chahhoud 2020; Le Mao 2020; Steinberg 2011; Windle 2018). Only one study tested the marginal value of adding counselling (versus no counselling) to pharmacotherapy, in this case NRT (Simon 2003). A number of studies included pharmacotherapy as part of a broader intervention that included counselling or made pharmacotherapy available to participants in the trial but did not specifically vary the provision of pharmacotherapy by group. No studies evaluated pharmacotherapies other than NRT, bupropion or varenicline.

Other study characteristics

Seventeen studies provided a smoking cessation intervention to all patients during their hospitalisation and randomised patients to receive continuing post-discharge support or no support after discharge. Ten of these studies compared differing levels of behavioural support post-discharge (Caruthers 2006; Cossette 2011; Cummins 2016a; Garcia-Pazo 2021; Harrington 2016; Hornnes 2014a; Park 2015; Reid 2007; Reid 2019; Suner-Soler 2022), with two studies testing asynchronous interventions (Garcia-Pazo 2021; Harrington 2016), defined as interventions that did not happen in real time with a live counsellor (e.g. mobile app and web-based interventions), and eight studies testing synchronous interventions (Caruthers 2006; Cossette 2011; Cummins 2016a; Hornnes 2014a; Park 2015; Reid 2007; Reid 2019; Suner-Soler 2022), defined as interventions occurring in real time with a live counsellor. An additional seven studies compared differing levels of pharmacotherapy combined with behavioural support post-discharge (Brandstein 2012; Brunner-Frandsen 2012; Rigotti 2014a; Rigotti 2016a; Rigotti 2022; Sherman 2016a; Thomas 2016a).

Most studies (45 of 82) assessed cigarette abstinence 12 months after hospital discharge. Thirty-four studies reported a shorter follow-up period of six months. Three studies reported a longer duration of abstinence 24 months after discharge (Carson-Chahhoud 2020; Hornnes 2014a; Suner-Soler 2022). Fewer than half of the studies (31 of 82) used the preferred outcome measure, sustained abstinence. Forty-six studies used point prevalence abstinence as the outcome measure and four studies did not specify how abstinence was defined (Cossette 2011; Hasuo 2004; Hornnes 2014a; Ortega 2011a). One study reported sustained abstinence rates for overall cessation but point prevalence rates by diagnosis (Miller 1997).

All but one study included both males and females; the exception, Froelicher 2004, included only females. All studies included adults who smoked cigarettes currently or recently (e.g. smoked within the past month).

Excluded studies

We excluded 81 studies (81 full-text reports) as irrelevant. We excluded a further 18 studies with reasons for exclusion, which we listed in the Characteristics of excluded studies section. The most common reason for exclusion was having a follow-up period of less than six months. We excluded three previously included studies because they were conducted in rehabilitation settings rather than hospitals.

Ongoing studies

Please see Ongoing studies section for characteristics of the 13 ongoing studies (12 are RCTs and one study did not mention randomisation; eight will test behavioural interventions

versus usual care, three test a pharmacotherapy alone or in combination with another pharmacotherapy or placebo and two plan to test the combination of pharmacotherapy and counselling) (ACTRN12620001255976; Almonacid 2020; Chu 2019; Cossette 2012; CTRI/2019/09/021406; DRKS00013466; Gobarani 2022; NCT01413516; NCT02099097; NCT02106637; NCT02470923; NCT04590404; NCT05192031).

Counselling interventions

Eight studies will test standard counselling interventions. Of these, one study plans to test a brief (5A-s based) behavioural intervention to modify risk behaviours (including smoking) versus providing information materials on healthy lifestyles in patients scheduled for surgery or diagnostic procedures in surgery rooms interventions (Almonacid 2020). The Just Kwit! study will examine the Kwit app for 30 days versus current standard of care (TTS consult with patient-initiated follow-up after discharge) in hospitalised patients (Chu 2019). Another study will examine the feasibility, acceptability and preliminary efficacy of a smoking cessation intervention delivered by a Smoking Cessation Nurse Specialist (SCNS) versus usual care (community referral for tobacco treatment) to cardiac patients after hospital discharge (Cossette 2012). Another study will test face-to-face counselling (of patients and their caregivers), motivational videos, patient information leaflet and standard care plus telephone counselling, text messages and short videos using social media versus face-to-face counselling/bedside counselling (of patients and their caregivers), motivational videos, patient information leaflet and standard care in hospitalised patients (CTRI/2019/09/021406). Another study will test an inpatient nine-day behaviour-therapeutic smoking cessation in groups (~ nine hours of therapy) accompanied by supportive lifestyle interventions (nutrition counselling, therapeutic exercise) versus outpatient weekly behaviour-therapeutic smoking cessation in groups located nearby (~ nine hours of therapy) (DRKS00013466).

Two studies will test mobile-delivered smoking cessation interventions. The study (TextPOP study) plans to test 12 weeks of text messaging-based support (versus usual care) to aid smoking cessation in patients presenting for surgery (ACTRN12620001255976). The Quit IT study will test a Web-based, 3D Coping Skills Game to Increase Quitting Self-Efficacy for maintaining smoking abstinence following hospitalisation versus usual care (NCT02099097).

One study will test training for healthcare professionals to deliver smoking cessation support as part of hospital-based lung cancer workup versus usual care defined as no treatment (NCT05192031).

Pharmacotherapy

Three ongoing studies propose to test varenicline for smoking cessation in hospitalised patients. The VANISH study will assess the efficacy and safety of varenicline alone versus in combination with nicotine lozenges for smoking cessation amongst hospitalised smokers (Gobarani 2022). Another study will test varenicline or placebo during hospitalisation (Part 1) and will continue their study medication (placebo or active drug) for 4 weeks post-hospitalisation (Part 2) (NCT01413516). A third study will test varenicline or placebo, which will be initiated on the last day of hospitalisation and continued for 12 weeks after discharge. Additionally, a structured nurse-led behavioural support programme for smoking cessation will be initiated during hospitalisation, followed by telephone calls that will provide motivational support (NCT02106637).

Counselling and pharmacotherapy

Two studies will assess the combination of medication and counselling versus usual care. One study will assess the effect of in-hospital intensive counselling and NRT (nicotine replacement therapy) versus usual care, on smoking cessation or enrolment to a smoking cessation behavioural intervention (NCT02470923). The Metabolism-Informed Smoking Treatment (MIST) study will test a precision approach to smoking treatment that biologically tailors medication selection (NRT or varenicline) to nicotine metabolism versus usual care (UC) interventions (NCT04590404).

Risk of bias in included studies

Of the 82 included studies, we judged 10 to be at low risk of bias overall (low risk of bias in all domains assessed), 48 to be at high risk of bias overall (high risk of bias in at least one of the domains), and the remaining 24 to be at unclear risk of bias (low or unclear risk of bias in one or more domains but not at high risk of bias in any domain). A summary of judgements by domain can be seen in Figure 2; judgements by study can be seen in Characteristics of included studies tables (Characteristics of included studies) and in Figure 3.

Figure 2. Summary of risk of bias ratings for included studies

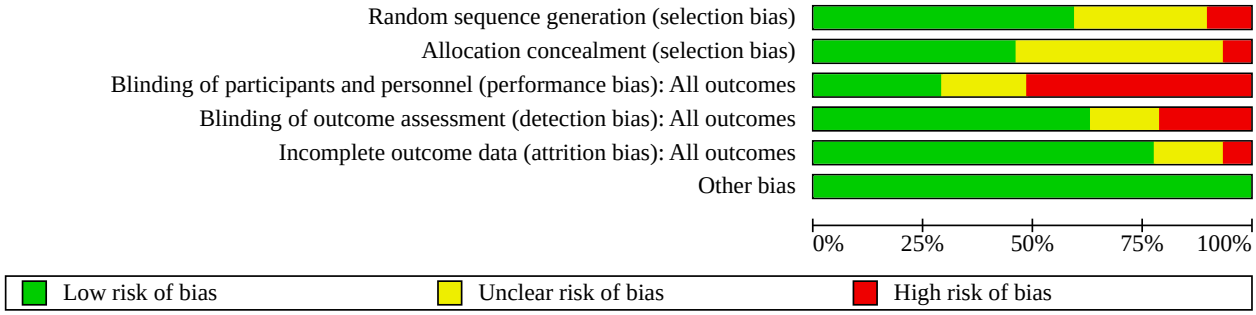
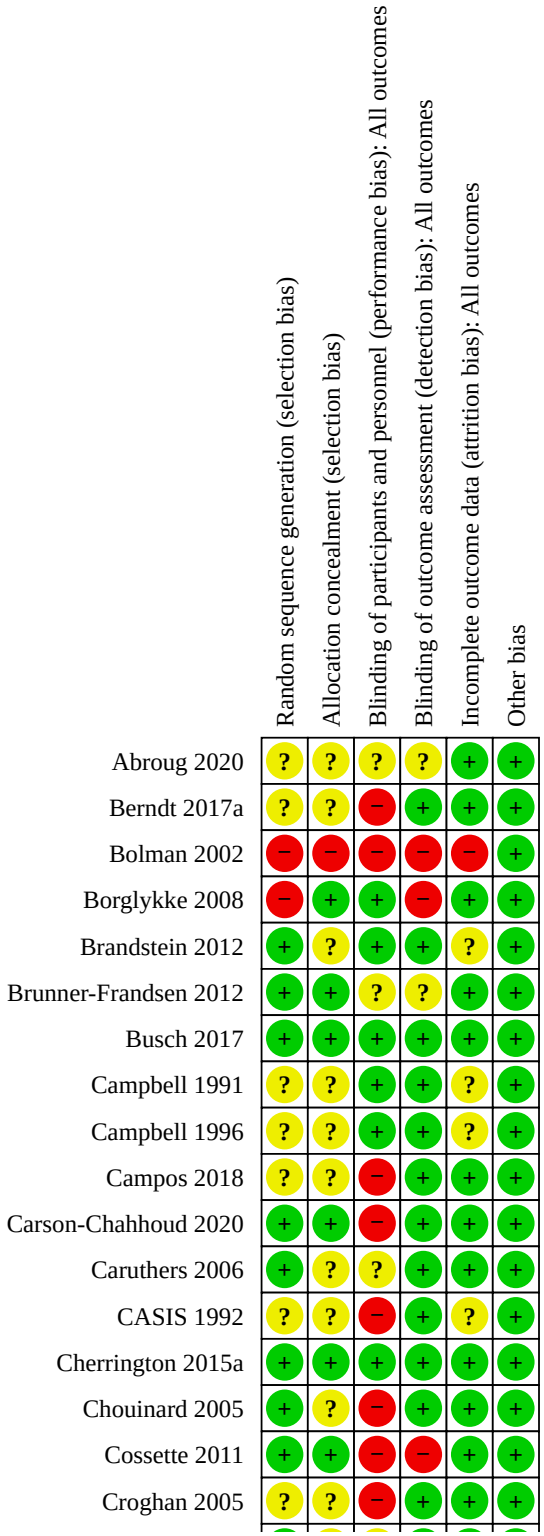


Figure 3. Risk of bias ratings for each included study



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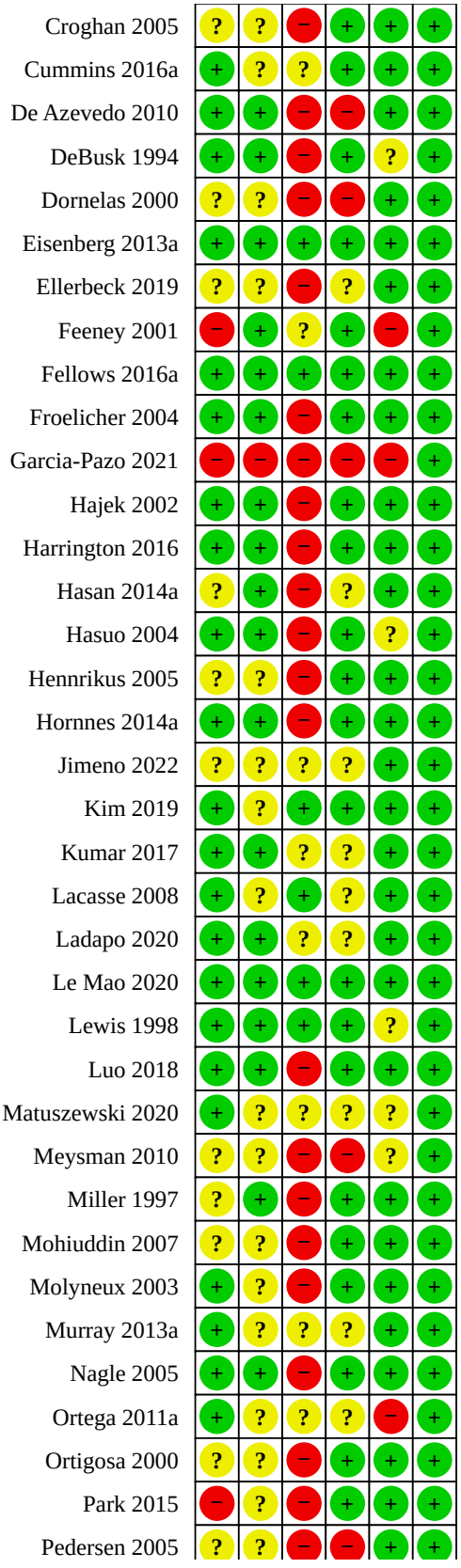

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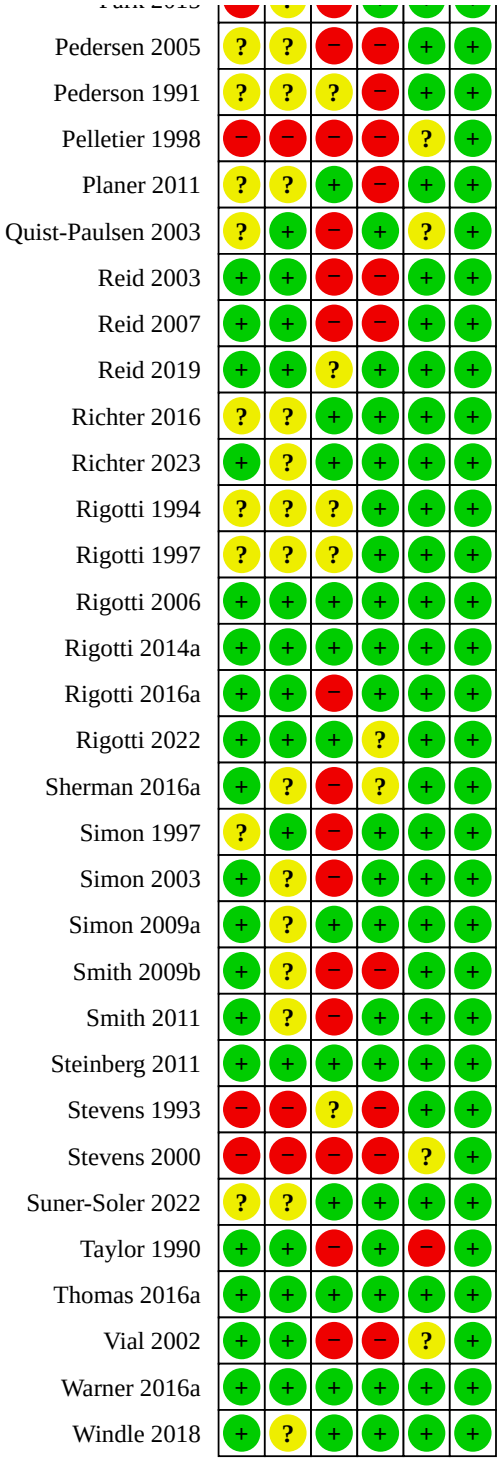


Allocation

Random sequence generation

Forty-nine (of the 82) studies reported procedures for random sequence generation that we judged likely to avoid selection bias (De Azevedo 2010; DeBusk 1994; Froelicher 2004; Hajek 2002; Hasuo 2004; Lewis 1998; Nagle 2005; Reid 2003; Reid 2007; Rigotti 2006; Steinberg 2011; Taylor 1990; Vial 2002). Twenty-five studies did not report the method of randomisation in enough detail to judge the risk of selection bias and were rated as being at unclear risk of bias. Eight studies were rated likely to have selection bias due to random sequence generation procedures (Berndt 2017a; Borglykke 2008; Feeney 2001; Garcia-Pazo 2021; Park 2015; Pelletier 1998; Stevens 1993; Stevens 2000).

Allocation concealment

Thirty-eight (of the 82) studies reported procedures for allocation concealment judged likely to avoid selection bias and were rated at low risk of bias (De Azevedo 2010; DeBusk 1994; Froelicher 2004; Hajek 2002; Hasuo 2004; Lewis 1998; Nagle 2005; Reid 2003; Reid 2007; Rigotti 2006; Steinberg 2011; Taylor 1990; Vial 2002). Thirty-nine studies did not report on the method of concealment in enough detail to judge the risk of selection bias and were judged as being at unclear risk of bias. Five studies were likely to have selection bias due to allocation concealment procedures listed and were rated as being at high risk of bias (Bolman 2002; Garcia-Pazo 2021; Pelletier 1998; Stevens 1993; Stevens 2000).

Overall, of the 82 included studies, 32 were judged to be at low risk of selection bias (judged to be low risk for both random sequence generation and allocation concealment), eight were judged to be at high risk of bias (judged to be at high risk for one or both domains), and 42 were judged to be at unclear risk (judged to be at unclear in both domains, or low in one domain and unclear in the other).

Blinding

Blinding of participants and personnel

Twenty-four studies reported procedures for blinding of study personnel that we judged likely to avoid performance bias. Sixteen studies did not report on blinding of personnel and were rated as being at unclear risk of performance bias (Abroug 2020; Brunner-Frandsen 2012; Caruthers 2006; Cummins 2016a; Feeney 2001 Jimeno 2022; Kumar 2017; Ladapo 2020; Matuszewski 2020; Murray 2013a; Ortega 2011a; Pederson 1991; Reid 2019; Rigotti 1994; Rigotti 1997; Stevens 1993). Finally, 42 studies were rated as being at high risk of performance bias due to lack of blinding study personnel.

Blinding of outcome assessment

Fifty-two studies reported procedures for blinding of outcome assessment that we judged likely to avoid detection bias and were rated as being at low risk of bias. Thirteen studies did not report on blinding of outcome assessment and were rated as being at unclear risk of bias (Abroug 2020; Brunner-Frandsen 2012; Ellerbeck 2019; Hasan 2014a; Jimeno 2022; Kumar 2017; Lacasse 2008; Ladapo 2020; Matuszewski 2020; Murray 2013a; Ortega 2011a; Rigotti 2022; Sherman 2016a). Finally, 17 studies were judged to be at high risk of detection bias due to lack of blinding the outcome assessor.

Biochemical validation

Most studies (67 of 82) used a method to validate participants' self-reports of quitting at the follow-up assessment. Biochemical validation of smoking status was done in 67 studies, exclusively using expired air carbon monoxide in 25 studies (Abroug 2020; Brunner-Frandsen 2012; Busch 2017; Campbell 1991; Campbell 1996; Campos 2018; Caruthers 2006; CASIS 1992; Cherrington 2015a; Cummins 2016a; Eisenberg 2013a; Jimeno 2022; Le Mao 2020; Lewis 1998; Luo 2018; Matuszewski 2020; Mohiuddin 2007; Molyneux 2003; Murray 2013a; Ortega 2011a; Ortigosa 2000; Steinberg 2011; Suner-Soler 2022; Thomas 2016a; Windle 2018), CO and/or cotinine in nine studies (Chouinard 2005; Croghan 2005; DeBusk 1994; Hajek 2002; Richter 2016; Rigotti 2006; Rigotti 2014a; Rigotti 2016a; Rigotti 2022); and using plasma, salivary, or urinary cotinine in 18 studies (Berndt 2017a; Fellows 2016a; Hasan 2014a; Hasuo 2004; Hennrikus 2005; Kim 2019; Lacasse 2008; Ladapo 2020; Nagle 2005; Park 2015; Pedersen 2005; Quist-Paulsen 2003; Rigotti 1994; Rigotti 1997; Simon 2009a;Taylor 1990; Warner 2016a;Feeney 2001). Two studies used "corroboration by significant other" or other proxy as the only validation method (Dornelas 2000; Smith 2009b), and seven other studies used "corroboration by significant other" in cases where a plasma or salivary or urinary cotinine measure was not available (Ellerbeck 2019: Froelicher 2004; Lewis 1998; Miller 1997; Simon 1997; Simon 2003; Smith 2011). Six other studies did not validate the smoking status of all participants who self-reported abstinence (Borglykke 2008; Carson-Chahhoud 2020; Ortega 2011a; Pederson 1991; Reid 2003; Vial 2002). Fifteen studies did not validate self-reported quitting at the follow-up assessment for any participants (Bolman 2002; Brandstein 2012; De Azevedo 2010; Garcia-Pazo 2021; Harrington 2016; Hornnes 2014a; Kumar 2017; Meysman 2010; Pedersen 2005; Pelletier 1998; Planer 2011; Reid 2007; Sherman 2016a; Stevens 1993; Stevens 2000).

Incomplete outcome data

The majority of studies (64 out of 82) reported numbers lost to follow-up and methods for addressing incomplete outcome data that we judged to be at low risk of attrition bias. Thirteen studies did not report enough information to be assessed for incomplete outcome data and hence were rated as being unclear. Five studies were rated as being at high risk of attrition bias: Bolman 2002 had a large and unequal percentage of losses to follow-up across groups; Feeney 2001 assessed only those participants who attended a follow-up programme and had a large and unequal percentage of losses to follow-up; Garcia-Pazo 2021 had high rates of participants lost to follow-up post-randomisation; Ortega 2011a outlined their completion rate, but deaths were not reported, and it was not clear if their primary outcome reported was biochemically verified; and differential dropout rates in Taylor 1990 increased the apparent effect of the intervention when using an intent-to-treat approach.

Selective reporting

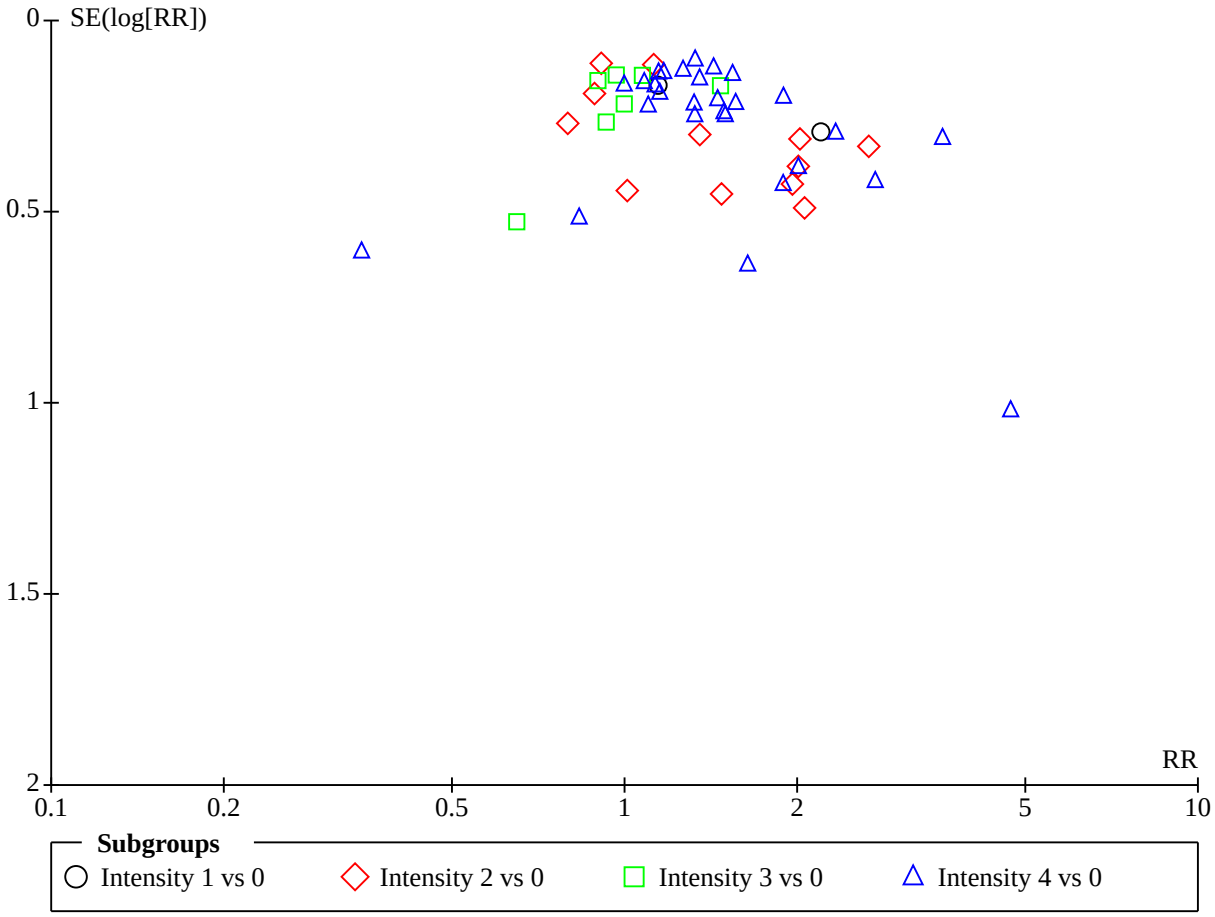
We did not use this risk of bias domain.

Other potential sources of bias

We did not identify any other sources of bias and, therefore, we rated all studies as being at low risk of bias for this domain.

We were able to assess publication bias for one comparison by constructing a funnel plot (Figure 4), and this showed no evidence of publication bias.

Figure 4. Funnel plot of comparison: Cessation counselling versus no counselling, grouped by intensity of intervention, outcome: 1.1 Quit at longest follow-up (6 + months) *Abbreviations*
RR: risk ratio; SE: standard error; vs: versus



Effects of interventions

See: **Summary of findings 1** Smoking cessation counselling compared to no smoking cessation counselling, grouped by intensity of intervention; **Summary of findings 2** Pharmacotherapy plus counselling versus no pharmacotherapy or placebo plus counselling; **Summary of findings 3** Hospital-only intervention versus intervention that continues after hospital discharge; **Summary of findings 4** Telephone quitline referral versus no treatment or usual care

Smoking cessation counselling versus no smoking cessation counselling, grouped by intensity of intervention

This comparison included any behavioural counselling intervention that was initiated during a hospital stay and that aimed to increase an individual's motivation to quit, increase the success of a quit attempt, or avoid relapse after a period of hospital-imposed temporary tobacco abstinence. The intensity and duration of these interventions varied broadly. We categorised them into four groups according to, (1) the intensity of the intervention provided in the hospital and (2) whether they included any follow-up counselling contact after discharge, producing four categories of increasing intensity:

1. a single brief in-hospital contact (i.e. advice to quit) lasting ≤ 15 minutes, no follow-up support;
2. one or more contacts in hospital that include counselling, lasting in total > 15 minutes, no follow-up support;
3. any hospital contact plus follow-up ≤ 1 month; and
4. any hospital contact plus follow-up > 1 month.

Only two included studies compared the effect of a brief intervention (≤ 15 minutes) for hospitalised patients with no follow-up contact after discharge (intensity 1) to no counselling (Hennrikus 2005; Kim 2019). Pooled data from these two studies showed an increase in quit rates in the intervention group, but with substantial statistical heterogeneity and wide CIs encompassing no effect and the possibility of lower quit rates in intervention groups (RR 1.52, 95% CI 0.80 to 2.89; I^2 = 74%; 1417 participants; very low-certainty evidence; Analysis 1.1; Summary of findings 1).

Twelve studies compared the effect of a more intensive intervention (> 15 minutes) for hospitalised patients that had no follow-up contact after discharge (intensity 2) to no counselling (Bolman 2002; Campos 2018; Cherrington 2015a; Chouinard 2005; Croghan 2005; Hajek 2002; Kumar 2017; Meysman 2010; Molyneux 2003; Nagle 2005; Pederson 1991; Pelletier 1998). Pooling the

results of these studies found an increase in quit rates with this level of intervention, but moderate statistical heterogeneity was observed also (RR 1.27, 95% CI 1.02 to 1.58; I^2 = 54%; 4432 participants; moderate-certainty evidence; Analysis 1.1; Summary of findings 1). Findings were not sensitive to the exclusion of studies at high risk of bias or the exclusion of quasi-RCT designs.

Seven studies compared the effect of an intervention beginning in the hospital and continuing for up to one month after discharge (intensity 3) with no counselling (Matuszewski 2020; Miller 1997; Ortigosa 2000; Rigotti 1994; Rigotti 1997; Stevens 1993; Stevens 2000). A pooled analysis of these studies found no clear evidence of a difference in quit rates between groups (RR 1.04, 95% CI 0.90 to 1.20; I^2 = 7%; 4627 participants; very low-certainty evidence; Analysis 1.1; Summary of findings 1). Findings were not sensitive to the exclusion of four studies at high risk of bias. Pooled results were also not sensitive to the removal of the two quasi-RCTs.

Twenty-eight studies tested the highest intensity counselling intervention (intensity 4), consisting of counselling that began in the hospital and continued for more than one month after discharge, compared to no counselling (Berndt 2017a; Borglykke 2008; Caruthers 2006; CASIS 1992; Chouinard 2005; Cossette 2011; De Azevedo 2010; DeBusk 1994; Dornelas 2000; Froelicher 2004; Hasuo 2004; Hennrikus 2005; Jimeno 2022; Lacasse 2008; Lewis 1998; Matuszewski 2020; Miller 1997; Mohiuddin 2007; Pedersen 2005; Quist-Paulsen 2003; Reid 2003; Reid 2007; Simon 1997; Simon 2003; Smith 2009b; Smith 2011; Taylor 1990; Vial 2002). At six months or longer, quit rates were higher in those randomised to receive the highest counselling intensity intervention, versus no counselling. Specifically, pooled results showed that the highest-intensity intervention produced clinically significantly higher quit rates than no counselling (RR 1.36, 95% CI 1.24 to 1.49; I^2 = 34%; 28 studies, 8234 participants; high-certainty evidence; Analysis 1.1; Summary of findings 1). Excluding the 23 studies with high risk of bias did not meaningfully change the effect but increased statistical heterogeneity (I^2 = 57%; 684 participants). Removing the two quasi-RCTs did not meaningfully change the estimate of effect and reduced statistical heterogeneity (I^2 = 22%; 7407 participants).

Pharmacotherapy plus counselling versus placebo or no pharmacotherapy plus counselling

This comparison included studies testing the effect of adding pharmacotherapy to a counselling intervention. We did not find trials that systematically tested the effect of pharmacotherapy compared with placebo or no pharmacotherapy in the absence of counselling. Additionally, although we planned to include e-cigarettes-based interventions when they were used to promote abstinence from combustible tobacco use, our search did not yield any studies on e-cigarettes and, thus, these studies were not reported in our results.

NRT

Eight studies tested the marginal effect of NRT added to counselling (Campbell 1991; Campbell 1996; Cummins 2016a; Hasan 2014a; Lewis 1998; Molyneux 2003; Ortega 2011a; Vial 2002). In these studies, NRT was compared with placebo NRT or no NRT and all participants received a counselling intervention. Compared to placebo or no NRT, pooled results showed that NRT produced clinically significantly higher quit rates (RR of 1.33, 95% CI 1.05 to 1.67; I^2 = 43%; 3838 participants; high-certainty evidence; Analysis 2.1; Summary of findings 2). Findings were not sensitive to the exclusion of studies at high risk of bias.

Bupropion

Four studies systematically compared the use of bupropion with placebo or no bupropion amongst hospitalised people who smoke and also received smoking cessation counselling (Eisenberg 2013a; Planer 2011; Rigotti 2006; Simon 2009a). Pooled data from these studies showed no clear evidence of a difference in quit rates when comparing bupropion to placebo or no bupropion, both with counselling, with a point estimate suggesting very modest potential benefit, and 95% CI incorporating clinically significant benefit and clinically significant harm (RR 1.11, 95% CI 0.86 to 1.43; I^2 = 6%; 872 participants; low-certainty evidence; Analysis 2.1; Summary of findings 2). The results were not sensitive to the exclusion of one study at high risk of bias.

Varenicline

Four studies compared the use of varenicline with placebo or no varenicline (Carson-Chahhoud 2020; Le Mao 2020; Steinberg 2011; Windle 2018). Compared to placebo or no varenicline, pooled results showed that varenicline produced clinically significant higher quit rates; however, the CIs incorporated the possibility of no clinically significant difference (RR 1.29, 95% CI 0.96 to 1.75; I^2 = 29%; 829 participants; moderate-certainty evidence; Analysis 2.1; Summary of findings 2). Findings were not sensitive to the exclusion of studies at high risk of bias.

All pharmacotherapy studies employed RCT designs; thus, it was not relevant to conduct sensitivity analyses to remove the quasi-RCT designs.

Hospital-only intervention versus intervention that continues after hospital discharge

In 17 studies, the interventions provided counselling to all patients while hospitalised and then randomly assigned them to receive or not receive continued support and contact after hospital discharge. The post-discharge component of all of these interventions included behavioural support. Ten studies provided behavioural support only, while seven provided both counselling and pharmacotherapy versus no contact after discharge.

Amongst the 10 studies providing behavioural support only, eight offered it synchronously (i.e. in real time, often with a telephone call), while two provided asynchronous behavioural support (text message, app, or a web-based intervention).

Pooled data from the two studies testing asynchronous behavioural support interventions after discharge (Garcia-Pazo 2021; Harrington 2016) showed no evidence of a clinically significant difference in quit rates when comparing the asynchronous interventions to control (RR 0.97, 95% CI 0.83 to 1.14; I^2 = 0%; 1598 participants; very low-certainty evidence; Analysis 3.1; Summary of findings 3). Both asynchronous behavioural support studies had risks of bias and one of the two studies was not an RCT.

Eight studies compared the effect on quit rates of adding a synchronous counselling intervention after discharge versus control (Caruthers 2006; Cossette 2011; Cummins 2016a; Hornnes 2014a; Park 2015; Reid 2007; Reid 2019; Suner-Soler 2022). Pooled data from these studies found clinically significantly increased quit rates in those receiving the intervention, but the CIs encompassed

no clinically significant difference and there was evidence of moderate statistical heterogeneity (RR 1.23, 95% CI 0.95 to 1.60; I^2 = 54%; 2299 participants; low-certainty evidence; Analysis 3.1; Summary of findings 3). The effect estimate was slightly smaller when removing studies at high risk of bias, but it was still greater than one.

Seven studies compared a post-discharge intervention that included both pharmacotherapy provision and behavioural support versus no post-discharge intervention (Brandstein 2012; Brunner-Frandsen 2012; Rigotti 2014a; Rigotti 2016a; Rigotti 2022; Sherman 2016a; Thomas 2016a). Compared to no intervention, pooled results showed that post-discharge pharmacotherapy plus behavioural support produced clinically significantly higher quit rates; CIs excluded no clinically significant difference (RR 1.23, 95% CI 1.09 to 1.38; I^2 = 0%; 5610 participants; high-certainty evidence; Analysis 3.2; Summary of findings 3). Findings were not sensitive to the exclusion of studies at high risk of bias.

Telephone quitlines versus control

Public health agencies support telephone quitlines as vehicles to deliver accessible smoking cessation counselling services and samples of NRT to the public. Healthcare systems often refer patients to quitlines to provide follow-up smoking cessation support following an ambulatory office visit or inpatient hospital admission. While telephone counselling delivered by quitlines is effective (Matkin 2019), there is less evidence of quitline's effectiveness with patients who are referred to them from healthcare systems.

Telephone quitline referral versus no treatment or usual care

Our review identified two studies that compared the effectiveness of referring a patient to a state quitline for provision of post-discharge care to a no-referral control condition (Cummins 2016a; Warner 2016a). Cummins and colleagues' trial was a 2 x 2 factorial design in which participants were randomly assigned to usual care, nicotine patches only, quitline-based counselling only, or patches plus quitline-counselling. For the pooled analysis, we included only two arms of the trial, quitline counselling only versus usual care. The Warner 2016a trial included a two-week sample of free NRT in both arms and compared the provision of brief advice only to a brief intervention that facilitated making a referral to the quitline for post-discharge care. Pooled data from these studies showed no clear evidence of a clinically significant difference in quit rates when comparing a quitline referral versus control; though the point estimate was consistent with modest benefit, the CIs were wide and encompassed clinically significant harm as well as clinically significant benefit (RR 1.17, 95% CI 0.70 to 1.96; 1870 participants; very-low certainty evidence; Analysis 4.1; Summary of findings 4). Heterogeneity was observed (I^2 = 71%). Both studies testing the effect of a quitline referral versus no referral were deemed to be at low risk of bias and both were RCTs.

Health system-based telephone counselling versus quitline-based counselling

Three studies compared providing telephone counselling after discharge either by referral to a community-based quitline versus delivery internally through the healthcare system (Matuszewski 2020; Rigotti 2022; Sherman 2016a). The pooled effect estimate showed a higher quit rate with the health system-based counselling model compared to the quitline-referral model, but the evidence is very uncertain (RR 1.23, 95% CI 1.00 to 1.51; I^2 = 20%; 3260 participants; very low-certainty evidence; Analysis 4.2; Summary of findings 4) and, when removing the one trial with high risk of bias, the direction of the point estimate changed (the point estimate decreased to less than 1; analysis not shown). Of note, all three of these studies included access to pharmacotherapy, provided either within the health system or made available by the quitline, for interested patients.

All quitline studies employed RCT designs; thus, it was not relevant to conduct sensitivity analyses to remove the quasi-RCT designs.

Subgroup analyses

Interest in quitting smoking

We conducted subgroup analyses to limit analyses to studies that included only patients who were ready to quit, compared to including all hospitalised smokers, regardless of readiness to quit. Overall, we selected 12 studies based on quit interest (Abroug 2020; Busch 2017; Eisenberg 2013a; Fellows 2016a; Garcia-Pazo 2021; Ladapo 2020; Le Mao 2020; Luo 2018; Rigotti 2014a; Rigotti 2016a; Rigotti 2022; Windle 2018). We did not include Luo 2018 in subgroup analyses given that this trial specifically recruited participants *not* interested in quitting smoking, nor did we include the four studies (Abroug 2020; Busch 2017; Fellows 2016a; Ladapo 2020), which are stand-alone studies that we were not able to pool in any analyses and are reported in a narrative-only section at the end of the results section (see 'Effect of other interventions (pooling not possible)' section). In our subgroup analyses, we found no evidence of differences in quit rates between subgroups of studies selecting for participant interest in quitting versus not selecting for interest in quitting in analyses of asynchronous behavioural interventions (I^2 = 0%; Analysis 5.1), buproprion versus placebo or no bupropion (I^2 = 0%; Analysis 5.2), varenicline versus placebo or no varenicline (I^2 = 0%; Analysis 5.3), and post-discharge pharmacotherapy plus behavioural support versus neither (I^2 = 0%; Analysis 5.4), where these subgroup analyses were applicable.

Effect of intervention by diagnostic categories

We examined subgroups of broad categories of medical diagnosis (i.e. reason for hospital admission; cardiovascular, respiratory disease, stroke), to explore the possibility that the efficacy of interventions differed for patients with different medical diagnoses, given that the included studies were heterogeneous in terms of the types of hospital patients recruited. We examined the results of interventions within the following diagnostic groups, keeping the same intensity subgroups where the number of studies justified this approach. Twenty-nine studies reported on the effects of interventions in patients hospitalised with a cardiovascular diagnosis (Berndt 2017a; Bolman 2002; Campbell 1991; CASIS 1992; Chouinard 2005; Cossette 2011; DeBusk 1994; Dornelas 2000; Eisenberg 2013a; Froelicher 2004; Hajek 2002; Jimeno 2022; Kim 2019; Miller 1997; Mohiuddin 2007; Ortigosa 2000; Park 2015; Pedersen 2005; Pelletier 1998; Planer 2011; Quist-Paulsen 2003; Reid 2003; Reid 2007; Reid 2019; Rigotti 1994; Rigotti 2006; Smith 2009b; Taylor 1990; Windle 2018). Six studies reported on interventions in patients with a respiratory diagnosis (Borglykke 2008; Campbell 1991; Campbell 1996; Le Mao 2020; Miller 1997; Pederson 1991). Three studies reported on interventions in patients with stroke (Brunner-Frandsen 2012; Hornnes 2014a; Suner-Soler 2022).

The estimate of the effect for each level of intervention intensity amongst patients with a cardiovascular diagnosis was similar to that for the entire sample of hospitalised patients (Analysis 1.1). Pooled analysis of 16 studies reporting on the effect of the most intensive counselling intervention with post-discharge support lasting greater than a month (intensity 4) found higher quit rates compared to no counselling amongst cardiac patients (RR 1.40, 95% CI 1.26 to 1.55; I^2 = 24%; 3495 participants; Analysis 6.1; Berndt 2017a; CASIS 1992; Chouinard 2005; Cossette 2011; DeBusk 1994; Dornelas 2000; Froelicher 2004; Jimeno 2022; Miller 1997; Mohiuddin 2007; Pedersen 2005; Quist-Paulsen 2003; Reid 2003; Reid 2007; Smith 2009b; Taylor 1990). The point estimate of the effect was similar to that for the overall analysis (RR 1.36, 95% CI 1.24 to 1.49). Generally, no differences in quit rates were found for lower-intensity counselling interventions (compared to no counselling) in patients with cardiovascular disease. Pooled analysis of four studies comparing in-hospital counselling without follow-up after discharge (intensity 2) to no counselling, did not find clear evidence of a difference in quit rates between groups (RR 1.17, 95% CI 0.87 to 1.57; I^2 = 58%; 1853 participants, Analysis 6.1; Bolman 2002; Chouinard 2005; Hajek 2002; Pelletier 1998). Pooled results of three studies that provided in-hospital counselling and brief follow-up support after discharge (intensity 3) compared to no counselling did not produce differences in quit rates between groups (RR 1.01, 95% CI 0.82 to 1.23; I^2 = 0%; 615 participants; Analysis 6.1; Miller 1997; Ortigosa 2000; Rigotti 1994). Only one trial tested a brief inpatient intervention only (intensity 1) compared to control in cardiac patients (Kim 2019), so it was not possible to pool effect estimates. This trial did show higher quit rates in the intervention versus control group (RR 2.20, 95% CI 1.24 to 3.89); however, the study was limited by a small sample size (< 35 participants per arm).

The effect estimates for pharmacotherapies in studies of patients with cardiovascular disease were similar to the analyses amongst all hospitalised patients (Analysis 2.1). Three studies compared the effect of bupropion on abstinence in cardiac patients when compared to placebo or no bupropion, and pooling of results found no evidence of effect (RR 1.16, 95% CI 0.90 to 1.49; I^2 = 0%; 789 participants; Analysis 6.1; Eisenberg 2013a; Planer 2011; Rigotti 2006). There were only single studies examining the effects of varenicline (Windle 2018) and NRT (Campbell 1991), respectively, in cardiac patients, and thus pooling of effect estimates was not possible. Higher abstinence rates were observed for varenicline versus placebo in the single trial recruiting patients with cardiovascular diagnoses (RR 1.50, 95% CI 1.02 to 2.21; 299 participants). The single, very small trial that systematically tested the effect of NRT in patients hospitalised due to cardiovascular disease suggested that NRT might improve abstinence rates over placebo or no NRT, but confidence intervals were very wide and consistent with no effect (RR 1.16, 95% CI 0.62 to 2.18; 85 participants).

Six studies provided interventions to patients hospitalised with a respiratory diagnosis. Two of these studies evaluated NRT (Campbell 1991; Campbell 1996), one evaluated varenicline (Le Mao 2020), and three other studies evaluated different intensity counselling interventions (Borglykke 2008; Miller 1997; Pederson 1991). We estimated a separate pooled effect for the NRT studies (RR 1.38, 95% CI 0.37 to 5.16; I^2 = 65%; 173 participants; Analysis 6.2) and for the counselling studies (RR 1.28, 95% CI 0.71 to 2.33; I^2 = 76%; 715 participants; Analysis 6.2); both found point estimates favouring the intervention but with wide CIs consistent with no difference and with lower quit rates in intervention arms. A pooled estimate was not possible with the single varenicline study and the estimate suggested that varenicline was not associated with smoking abstinence compared to placebo or no varenicline (RR 0.93, 95% CI 0.43 to 1.99; 81 participants) in the single-trial patients with respiratory disease.

Two studies tested a post-discharge behavioural intervention in patients with stroke (Hornnes 2014a; Suner-Soler 2022) and one study tested a post-discharge intervention which included pharmacotherapy (NRT) and behavioural counselling (intensity 4) in patients with stroke (Brunner-Frandsen 2012). The pooled analyses of the post-discharge behavioural intervention versus control had a point estimate suggesting benefit but with wide CIs (RR 1.24, 95% CI 0.72 to 2.13; I^2 = 48%; 309 participants; Analysis 6.3). The single trial examining pharmacotherapy with behavioural support post-discharge also had a point estimate favouring the intervention group, but with wide CIs (RR 1.13, 95% CI 0.61 to 2.08; 94 participants).

Effect of other interventions (pooling not possible)

Eleven studies met the inclusion criteria for the review (Criteria for considering studies for this review), but tested unique interventions that did not fit within existing categories of analyses or subgroup analyses (Abroug 2020; Busch 2017; Ellerbeck 2019; Feeney 2001; Fellows 2016a; Hasan 2014a; Ladapo 2020; Luo 2018; Murray 2013a; Richter 2016; Richter 2023). Specifically, comparator groups for these interventions did not involve control conditions and thus did not fit into existing analyses. More details on these 11 studies and their findings are presented below.

High-intensity counselling versus high-intensity counselling or standard care

Busch 2017 tested two types of behavioural interventions amongst inpatients with acute coronary syndrome. Specifically, they compared smoking cessation counselling in hospital plus behavioural activation treatment post-discharge for 12 weeks (intensity 4) versus standard care, which included five mailings of printed materials for 12 weeks post-discharge and 5- to 10-minute check-in calls after each mailing with master's level health educators (intensity 4). The CIs were wide and encompassed the possibility of both benefit and harm (RR 1.16, 95% CI 0.60 to 2.24; 64 participants). The lack of a control condition precluded pooling of these data in the meta-analysis.

Feeney 2001 tested two behavioural smoking session interventions for cardiac patients after acute myocardial infarction (intensity 4 versus intensity 4), with no pharmacotherapy provided in either group. The intervention group received a smoking cessation manual and inpatient counselling, which extended post-discharge to 12 months (telephone counselling weekly for 4 weeks and at 2, 3, 6 and 12 months) and the usual care group received inpatient educational materials on cessation with counselling calls offered at 3, 6, and 12 months post-discharge. Higher quit rates were observed in the intervention compared to the usual care group (RR 32.68, 95% CI 4.55 to 234.56; 189 participants); however, this study was an outlier, as there was a very high dropout rate (79%) and low quit rate (1%) at 12 months in the usual care group versus 55% dropout and 34% quit rate in the intervention group. The control group quit rates for this trial were unusually low compared to other studies in this review and other reviews (generally control group quit rates are

> 10%), suggesting that the support provided in the control group may have impacted the findings and relative intervention effect.

Luo 2018 tested 5As plus 5Rs versus 5Rs alone (intensity 4 versus intensity 4), with no pharmacotherapy provided in either group. The 5As plus 5Rs group received personalised counselling sessions in hospital plus post-discharge counselling sessions up to six months (intensity 4) and the 5Rs only group received hospital-based counselling sessions plus post-discharge counselling sessions monthly for six months. Quit rates were higher in the 5As plus 5Rs group but the CIs incorporated no difference (RR 1.58, 95% CI 1.00 to 2.51; 320 participants). The comparison of two, high-intensity interventions without a control condition precluded pooling of data in the main meta-analysis.

Comparing different levels of counselling plus pharmacotherapy

Abroug 2020 compared two interventions that provided behavioural support plus NRT but which differed in when NRT was started in hospitalised smokers with acute coronary syndrome (ACS). The lack of a control condition precluded pooling of data in this meta-analysis. The study compared starting NRT in hospital one day after the ACS event versus starting NRT only after discharge, a mean 14 days after the ACS event. Both groups received comparable counselling support both in the hospital and for 24 weeks after discharge, which was judged to be an intensity of 4. There was no clear difference between the two groups on smoking abstinence, though the point estimate favoured NRT one day after the ACS event (RR 1.36, 95% CI 0.90 to 2.05; 99 participants).

Hasan 2014a tested hypnotherapy plus NRT versus each alone in hospitalised patients with either a cardiac or pulmonary admission diagnosis. We were unable to include this study in the main meta-analysis of behavioural counselling because hypnotherapy differs substantially from standard cognitive behavioural counselling. The study compared the hypnotherapy plus NRT group to hypnotherapy without NRT. All patients received in-hospital and post-discharge telephone-based smoking cessation counselling up to 12 weeks (intensity 4). The estimate did not detect a significant effect of adding NRT to hypnotherapy versus hypnotherapy alone (RR 0.89, 95% CI 0.49 to 1.62; 81 participants).

Murray 2013a compared an intervention consisting of inpatient counselling plus post-discharge telephone support (intensity 3) and NRT to inpatient advice to quit (intensity 1). Again, as there was no control condition, we could not include this trial in our main pooled analysis. Higher quit rates were observed for the post-discharge counselling and NRT group versus brief inpatient advice to quit (RR 1.30, 95% CI 1.30 to 3.55; 493 participants), consistent with our pooled results reported in this review, which found NRT plus higher-intensity counselling effective for promoting smoking abstinence.

Ladapo 2020 compared incentivising patients to participate in counselling (both community-based counselling and state quitline counselling) and use pharmacotherapy (counselling intensity grade not applicable) versus standard, hospital-directed tobacco-use screening, counselling, education, and pharmacotherapy, all at the discretion of nursing and physician staff, and referral to a state quitline (intensity 1). Quit rates were higher in the intervention group but the CIs were wide (RR 1.80, 95% CI 0.63 to 5.16; 176 participants).

Opt-in versus opt-out or assisted referral to quitline versus usual care quitline and health system-based studies

Several studies tested alternative ways to connect hospital patients to post-discharge telephone counselling support provided by state-funded quitlines. These studies did not directly test the effect of quitline counselling services. Instead, they compared alternative strategies to optimise patients' connection to these services after discharge.

Richter 2016 compared two strategies for connecting participants, all of whom received counselling in the hospital, to a state quitline in order to receive post-discharge counselling. The quitline provided mailed cessation materials and up to five proactive post-discharge counselling calls. In one condition (opt-out referral), hospital staff called the quitline from the patient's bedside to connect directly to and introduce the post-discharge support services while the patient was still in hospital. In the alternative condition (opt-in referral), hospital staff faxed a referral to the quitline on the day of hospital discharge, after which quitline staff called the patient to offer post-discharge counselling support. Both groups could receive the same post-discharge support; the trial tested which strategy was better for connecting patients to resources. As there was no untreated control group, this trial could not be included in meta-analyses. A higher proportion of patients receiving the opt-out referral in the hospital completed quitline calls after discharge compared to patients who received opt-in contact from the quitline after discharge (99.6% versus 59.6%; OR 1.67, 95% CI 1.65 to 1.68). However, no clear difference in smoking abstinence was observed between study groups (RR 1.10, 95% CI 0.88 to 1.37; 1054 participants).

Richter 2023 compared the opt-in versus opt-out paradigm differently. In this study, both interventions' counselling components were intensity 3. There was no control group, so the study could not be included in the meta-analysis. Specifically, 'opt-out' patients were offered (1) counselling in hospital and four weekly calls after discharge, (2) a prescription for NRT on the discharge medication orders, and (3) a 14-day pack of NRT at discharge to take home. These were offered to all without the counsellor asking for a stated interest in staying quit after discharge, although patients could refuse any or all of these services. Patients in the opt-in arm were asked if they would like to receive these services, rather than having them provided proactively. Patients in the opt-out group were more likely than those in the opt-in group to use both counselling and NRT after discharge. Verified quit rates at six months were 19% for the opt-out group versus 18% for the opt-in group (difference 0.7%; 95% credible interval -0.06 to 0.07). The Bayesian posterior probability that the opt-out group was better than the opt-in group was 59% at 6 months.

Assisted quitline referral plus computerised calls versus usual care

Fellows 2016a compared an assisted referral to a quitline plus proactive computerised phone calls that delivered messages to promote use of treatment resources and quitting versus usual care. Both groups received counselling in the hospital. The intervention group received assistance enroling on outpatient cessation programmes, with programme options differing based on the hospital at which patients were enroled (intensity 4). Patients could also have pharmacotherapy included in discharge orders for

up to 12 weeks. The usual care condition provided written and oral information on how to access post-discharge support, including a telephone call after discharge in some hospitals. No differences in quit rates were observed between intervention and usual care groups (RR 1.01, 95% CI 0.67 to 1.53; 989 participants). The study was not included in the meta-analysis because patients in both conditions received some post-discharge support.

Behavioural support plus care coordination versus behavioural support without care coordination

Ellerbeck 2019 compared behavioural support plus care coordination versus behavioural support without care coordination. The counselling in both arms was rated as intensity 4, with inpatient counselling plus post-discharge support for six weeks post-enrolment, with the option of an additional cycle of phone counselling offered after the 6-week assessment to persistent or relapsed smokers or those who had quit less than 90 days. In the care coordination arm, participants also received screening for contraindications to various pharmacotherapies and information on the types of smoking cessation treatments covered by the participant's insurance plan. Counsellors provided the patient with a tailored list of options with a strong recommendation for pharmacotherapy. Using an 'opt-out' approach, counsellors asked participants which type of pharmacotherapy they would like to use from the list, rather than if they would like to use pharmacotherapy. After helping the participant choose the medication, the counsellor faxed a prescription request to the participant's healthcare provider along with a patient action plan summarising the counselling session. No clear differences in quit rates were observed between counselling plus care coordination versus counselling alone groups (RR 1.14, 95% CI 0.80 to 1.61; 580 participants). This trial did not employ a control or usual care condition and therefore was not included in a meta-analysis.

DISCUSSION

Summary of main results

This updated review includes 82 studies; 36 studies are new since our prior review.

Smoking cessation counselling versus no counselling

We found high-certainty evidence for the effectiveness of providing smoking cessation counselling that began in the hospital and continued for more than one month after discharge, compared to no hospital counselling intervention. In a pooled analysis of 28 studies, this intervention increased quit rates by 36% at six or more months after discharge (Summary of findings 1). The effectiveness of this level of counselling support has remained constant through several updates of this review, and we think it is unlikely to change with further evidence.

There was less evidence to support the effectiveness of counselling interventions that had lower intensity or shorter duration (Summary of findings 1). There was moderate-certainty evidence, limited by imprecision, that the provision of >15 minutes of counselling in the hospital without post-discharge follow-up might produce a modest increase in quit rates, compared to no intervention. Our analysis did not find evidence of benefit for brief support of less than 15 minutes in hospital without follow-up support. There was also little evidence that hospital counselling was more effective than no counselling when the counselling intervention did not provide more than one month of behavioural support after discharge.

Pharmacotherapy (plus counselling) versus no pharmacotherapy or placebo (plus counselling)

We also found high-certainty evidence to support the effectiveness of nicotine replacement therapy. For varenicline, the point estimate analysis favoured treatment, but confidence intervals were wide and incorporated no clinically significant difference; as a result, this evidence was judged to be of moderate certainty (downgraded one level due to imprecision; Summary of findings 2). The finding about nicotine replacement was present in the last update, but the finding about varenicline is new to this update, which included four new randomised studies of varenicline in the pooled analysis. Evidence for bupropion was judged to be low-certainty due to serious imprecision, with no clear evidence of a difference in quit rates when compared to placebo or no pharmacotherapy. This finding differs from the results of pooled analyses of bupropion in the general population. The confidence limits of this estimate do not encompass the confidence limits for the effect of bupropion in other settings (Hajizadeh 2023), suggesting that bupropion may not be effective, or may be less effective, when started in the hospital.

Hospital-only intervention versus intervention that continues after hospital discharge

Amongst studies that provided smoking counselling to all hospital patients, we found high-certainty evidence that providing both smoking cessation counselling and pharmacotherapy after discharge increased quit rates compared to no post-discharge support (Summary of findings 3). Post-discharge interventions providing only counselling without pharmacotherapy had low and very low-certainty evidence of effectiveness.

Telephone quitlines versus control

To provide post-discharge support, hospitals sometimes refer patients to community-based telephone quitlines. While quitlines increase quit rates in the general population (Matkin 2019), insufficient evidence supports quitlines' effectiveness for providing post-discharge support for hospitalised patients, compared to no intervention (Summary of findings 4). However, we cannot rule out the possibility that this lack of effect was due to the participants not engaging in quitline services. Future research should explore more robust quitline-based interventions to ensure a high connection rate between referred patients and the quitline. Additionally, our analysis found little evidence to compare the provision of post-discharge counselling directly via the healthcare system versus by referral to a state quitline. The point estimate for the comparison of health system-based counselling versus quitline counselling aligned with a modest benefit for health systems-based interventions but included no effect. Additional studies are needed to confirm the certainty of the finding.

Subgroup and sensitivity analyses

We conducted the subgroup analyses below. We also conducted sensitivity analyses, removing those studies judged to be at high risk of bias (including studies that were quasi-randomised); where findings were sensitive to their inclusion, we noted this in the relevant summary of findings table and downgraded the certainty of the evidence accordingly.

Effect of intervention by diagnostic categories

In an exploratory subgroup analysis, we compared results of groups of diagnoses responsible for the hospitalisation. We found no evidence that counselling interventions in patients hospitalised due to cardiovascular disease (the largest category) had a different effect from the group of all hospital patients. Only six studies contributed patients to the respiratory disease category, while three studies enroled patients with stroke. There was no evidence that hospital interventions had a different effect on these smaller subgroups than in the general population.

Interest in quitting smoking

Another exploratory subgroup analysis found comparable effectiveness for interventions that included all hospitalised patients compared to those which were limited to patients expressing an intention to quit after hospital discharge.

Overall completeness and applicability of evidence

The evidence we found enabled us to address our review questions to different degrees. Studies were predominantly conducted in research-intensive settings in high-income countries and their translation in other settings warrants further investigation. For all of our outcomes limited by imprecision, more studies are needed to confirm results; this includes studies of bupropion and varenicline in hospital settings, as well as studies of non-intensive behavioural counselling. Digital interventions, including mobile phone-based ones, are increasingly being tested, but few studies in hospital patients tested interventions using digital health tools to provide behavioural support after hospital discharge, which might be tested or incorporated into future studies for this population.

Quality of the evidence

We consider the certainty of the evidence below, as it relates to smoking abstinence for our 12 main comparisons, within four comparison categories: counselling versus no counselling (Summary of findings 1), pharmacotherapy plus counselling versus placebo or no pharmacotherapy plus counselling (Summary of findings 2), hospital-only intervention versus intervention that continues after hospital discharge (Summary of findings 3), and quitline versus control (Summary of findings 4). Our summary of findings tables and assessments of certainty are based on the evidence from randomised controlled trials (RCTs) and quasi-RCTs.

Smoking cessation counselling compared to no counselling

There was high-certainty evidence of the benefit of high-intensity counselling (intensity 4) compared to no counselling. All other comparisons in this category were downgraded due to imprecision, with wide CIs. Intensity 1 (one brief, in-hospital contact (e.g. advice to quit; lasting ≤ 15 minutes with no post-discharge contact)) compared to no counselling was also downgraded due to unexplained statistical heterogeneity (inconsistency); and intensity 3 (any hospital contact plus follow-up contacts for ≤ 1 month after discharge) versus 1 (one brief, in-hospital contact (e.g. advice to quit) lasting ≤ 15 minutes with no post-discharge contact) was downgraded due to risk of bias.

Pharmacotherapy compared to no pharmacotherapy or placebo (all received counselling)

There was high-certainty evidence of benefit for NRT. Evidence was downgraded to moderate and low-certainty evidence for varenicline and bupropion, respectively, due to imprecision; for bupropion, this was judged to be very serious imprecision, as CIs encompassed clinically significant benefit as well as clinically significant harm. More studies are needed to increase the certainty of these results.

Hospital-only intervention versus intervention that continues after hospital discharge

There was high-certainty evidence that combined pharmacological and behavioural support post-discharge increased quit rates compared to a hospital-only intervention. Evidence was less certain for behavioural support only. For asynchronous behavioural support, the risk of bias and imprecision reduced the certainty of the finding of no clear benefit to very low. For synchronous behavioural support, inconsistency and imprecision reduced the certainty of evidence in the finding of possible benefit to low.

Telephone quitlines versus control

Both comparisons were of very low certainty, due to imprecision and serious unexplained statistical heterogeneity (inconsistency) for quitline referral versus control, and risk of bias and imprecision for the health system telephone counselling versus quitline comparison.

Potential biases in the review process

We consider the review methods we used to be robust. We complied with standard methods used for Cochrane Tobacco Addiction Review Group smoking cessation reviews and our search strategy included the Cochrane Tobacco Addiction Group Specialized Register; thus, we captured various ongoing clinical studies. Our searches were run in September 2022 (though we identified some newer references from contacting experts in the field for details of studies in press). This means that studies published after this date are not included; this should be borne in mind as a limitation.

We counted participants lost to follow-up as people who continued to smoke, which is a conservative approach that is recognised as standard practice in the field. We also used the most rigorous definition of abstinence available - this varies across studies, with some being stricter than others. In some cases, this may mean that a participant who only smokes once after discharge would be considered a continuing smoker.

We conducted systematic searches of multiple online databases, including clinical trials registries, and followed Cochrane methods for screening. We therefore expect that any published studies we have missed will be through chance rather than systematic error. We were able to assess publication bias for one comparison by constructing a funnel plot and this showed no evidence of publication bias. This was the only comparison with enough studies to construct a funnel plot, so we were unable to assess publication bias for other comparisons. We cannot rule out the possibility of publication bias.

We also did not assess selective reporting for pragmatic reasons; we had not done so in previous versions of our review, and all included

studies reported cessation at six months or longer, which is our primary outcome. We cannot rule out selective reporting.

Two of our authors are authors of studies included in the present review. However, we took robust measures to address this potential bias, and two other reviewers not involved in these studies reviewed and extracted data and rated the risk of bias and certainty of the evidence for these trials.

As per the previous versions of this review, we did not extract data on adverse or serious adverse events. Few studies evaluate potential harms from behavioural interventions for smoking cessation, but of those that have, no evidence of harms has emerged (Hartmann-Boyce 2021). For pharmacotherapies, there is no reason to believe that harms would differ in hospital settings from those in the general population, and another comprehensive Cochrane Review provides up-to-date evidence on the risk of reporting serious adverse events amongst people randomised to receive front-line pharmacotherapies (Lindson 2023). In their component network meta-analysis, Lindson and colleagues found that overall rates of SAEs for varenicline, NRT and bupropion were low (average 3%). Low-certainty evidence did not show a clear difference in the number of people reporting SAEs for varenicline or NRT when compared to no pharmacotherapy/e-cigarettes or placebo. Bupropion was found to slightly increase rates of SAEs, although the credibility intervals (CrI) also incorporated no difference (moderate certainty). In absolute terms, bupropion may cause one more person in 100 to experience an SAE (95% CrI 0 to 2). Summary details for this outcome are presented in Table 1.

Finally, it is important to note that subgroup analyses were exploratory, did not contain sufficient studies to produce meaningful results, and thus readers should interpret the results with caution.

Agreements and disagreements with other studies or reviews

In our review, we had the highest confidence in our effect estimates for the highest intensity behavioural interventions (inpatient counselling plus post-discharge support for at least a month), which produced increased quit rates compared to no counselling; this is consistent with findings from other populations (Hartmann-Boyce 2021). Matkin 2019 compared subgroups of telephone counselling intensity in the general population and found higher intensity programmes were associated with higher quit rates; this is consonant with evidence from our review.

This update includes a new finding regarding varenicline, and we confirm our prior review's finding about the efficacy of NRT for promoting cigarette cessation in hospitalised smokers. Specifically, in the current review update, we found moderate-certainty evidence that varenicline increases quit rates compared to placebo or no varenicline in hospitalised smokers. This aligns with the effect estimate of varenicline from a recently published Cochrane Review on nicotine receptor partial agonists for smoking cessation in the general population of smokers (Livingstone-Banks 2023), which found high-certainty evidence of the effectiveness of varenicline with CI that excluded no difference. The review's point estimate was larger in magnitude than the present review in hospitalised smokers, and included many more studies and participants. Our finding showing the benefit of NRT on quitting smoking is consistent with the effect of NRT seen in other settings (Hartmann-Boyce 2018). However, for buproprion, while our CIs were wide, they did not compare to the CI for the effect of bupropion in other settings (Hajizadeh 2023), suggesting that bupropion may not be effective, or may be less effective, when started in the hospital.

Finally, the findings from this review align with a recent systematic review and meta-analysis examining the efficacy of smoking cessation interventions for sustaining abstinence after discharge from a smoke-free setting (Shoesmith 2021). This prior review of 37 studies found that behavioural and pharmacological interventions increase quit rates post-discharge consistent with the findings of our review. The prior review did not test the effects of individual pharmacotherapies, as we did in the currrent review, and rather combined pharmacotherapy interventions into a single category. Additionally, the prior review included multiple smoke-free institutions, including prisons, inpatient mental health and substance use treatment centres, in addition to acute hospital settings, unlike the current review, which only includes acute care hospital settings. Future studies should test the hospital-based interventions found to be effective in the present review (i.e. combined intensive counselling and NRT or varenicline pharmacotherapy) in other smoke-free institutions, with higher proportions of vulnerable smokers, such as mental health and substance use inpatient treatment centres.

AUTHORS' CONCLUSIONS

Implications for practice

- Providing smoking cessation counselling that begins in the hospital and continues for over one month after discharge helps more hospitalised patients to stop smoking than not providing counselling. There is less evidence to support the effectiveness of interventions that start in a hospital but have a shorter duration or intensity. Providing more than 15 minutes of counselling in hospital only, compared to no counselling in hospital, likely results in a small increase, at most, in smoking cessation after discharge.
- Amongst hospitalised patients who receive smoking cessation counselling, continuing to provide both behavioural support and pharmacotherapy (NRT or varenicline) after discharge may help more patients to stop smoking than stopping this assistance at hospital discharge, though for varenicline this evidence is less certain. To provide this support after discharge, hospitals may refer patients to community-based telephone quitlines. While quitlines increase quit rates in the general population, there is very little evidence of their effectiveness when used to provide post-discharge support for hospitalised patients.
- Starting nicotine replacement during a hospitalisation (combined with counselling) helps more smokers to quit smoking after discharge than not starting this medication or using placebo medication during hospitalisation. Starting varenicline during a hospitalisation (with counselling) may also help more smokers quit smoking after discharge compared to no varenicline or placebo, though the CI included the possibility of no difference; thus, the evidence for varenicline is less certain. In contrast, the available evidence suggests that starting bupropion during a hospitalisation (with counselling) is not likely to increase quit rates substantially after discharge compared to no medication or placebo.

- There is insufficient evidence of quitlines' effectiveness for providing support after hospital discharge, compared to no intervention. Very low-certainty evidence, limited by imprecision and risk of bias, suggests that patients randomised to receive post-discharge telephone counselling through the healthcare system might have higher quit rates than patients randomised to a quitline referral.

Implications for research

- There is limited benefit to be gained from conducting more studies to demonstrate the effectiveness of providing hospitalised patients with smoking cessation counselling that begins in hospital and continues for more than one month after discharge. Instead, future research should identify effective strategies to implement, disseminate, and sustain this intervention during routine healthcare delivery in hospitals and healthcare systems.
- Future research examining counselling interventions should specify the intensity of the intervention (e.g. number and duration of sessions) and seek to better understand which specific aspects of counselling interventions are most effective to make more fine-grained recommendations to clinicians about post-discharge interventions.
- A particular research need is to identify effective ways to implement smoking cessation interventions that can be sustained as patients transition from hospital to post-discharge settings of care, as evidence on this is currently inconclusive. Whether referral to community-based telephone quitlines is an effective way to provide services in this setting, and how that compares to the effectiveness of providing the services through the healthcare system, warrants further study.
- The studies included in this review did not test combination pharmacotherapies or extended-duration pharmacotherapy. Future prospective studies should test combination pharmacotherapies (varenicline and NRT) for smoking cessation (See Gobarani 2022 in the Characteristics of ongoing studies), as well as exploring extended pharmacotherapy durations (beyond 12 weeks). These have been tested in other settings, but not in hospitalised patients.
- The effectiveness of starting NRT in hospitalised patients to increase quit rates after discharge is established and is consistent with the established effectiveness of these medications for smoking cessation in other settings. Further studies are needed to confirm the benefit of varenicline in this setting; current evidence is promising but limited by imprecision. Future studies might also test varying the duration of treatment; this has been tested outside of hospital settings but to date not within them. The pooled evidence for bupropion, in combination with its reduced use in clinical practice due to an excess of serious adverse events and limited effectiveness compared to varenicline and combination NRT, does not provide strong support for conducting further studies of this drug in this context.
- Few studies have examined the effectiveness of incorporating digital health tools, such as SMS or apps which offer asynchronous support, into the behavioural support provided to smokers after hospital discharge. Future research could test the effectiveness of these newer modalities in the post-discharge period.
- For some comparisons, issues with risk of bias affected our certainty of the evidence for the outcomes. Further studies should ensure random sequence generation and allocation concealment methods meet best practice, and should dedicate ample resources to follow-up across all arms of trials.

ACKNOWLEDGEMENTS

Lindsay F Stead was an author on all prior reviews and updates. The authors would like to thank Sara Kalkhoran and Irina Gonzalez for their assistance in translating and extracting data. The authors also wish to thank Kimber Richter and Louisa Ng for providing us with unpublished data for this review and Michael Werner for assistance in helping to screen publications for the current update.

Editorial and peer reviewer contributions

The Cochrane Tobacco Addiction Group supported the authors in the development of this review.

The following people conducted the editorial process for this article:

- Sign-off Editor (final editorial decision): Tari Turner, Cochrane Australia;
- Managing Editor (selected peer reviewers, provided editorial guidance to authors, edited the article): Joanne Duffield, Central Editorial Service;
- Editorial Assistant (conducted editorial policy checks, collated peer-reviewer comments and supported the editorial team): Sara Hales-Brittain, Central Editorial Service;
- Copy Editor (copy editing and production): Anne Lethaby, Cochrane Central Production Service;
- Peer-reviewers (provided comments and recommended an editorial decision): Timothy B Baker, Department of Medicine, University of Wisconsin School of Medicine and Public Health (clinical/content review); Mark J Eisenberg, MD MPH Professor of Medicine McGill University (clinical/content review); Brian Duncan (consumer review); Jen Hilgart, Cochrane (methods review); and Steve McDonald, Cochrane Australia (search review). One additional peer reviewer provided clinical peer review but chose not to be publicly acknowledged.

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* Indicates the major publication for the study

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Abroug 2020

Study characteristics	
Methods	Country: Tunisia Study dates: January 2015 to June 2016 Recruitment: inpatients with ACS Inclusion/exclusion criteria: Patients were hospitalised with ACS. Patients were actively smoking at the time of inclusion, motivated to quit smoking, able to provide informed consent, and willing to participate in a clinical study including a follow-up examination every 2 weeks after hospital discharge. Active smoking was defined as smoking at least 1 cigarette (or water pipe) per day during the month preceding hospitalisation. Refusal of assistance for smoking cessation, inability to attend follow-up clinical visits (professional, regional or physical hindrance), or diagnosis of depression or other serious health condition at admission (e.g. ventilatory support or cardiogenic shock)
Participants	Participants: 99 daily smokers (intervention 1 n = 54, intervention 2 n = 45) in month before admission Number smoked: 31.61 cigarettes Age: 55 years Therapist: Not stated; study conducted via Smoking Cessation Service and psychiatrist, addictologist and clinical psychologists available for consult
Interventions	Intervention 1: Counselling and NRT during hospital stay 1 day after ACS. Plus regular follow-up visits at the Smoking Cessation Service every 2 weeks for 24 weeks (12 sessions total) Intervention 2: Counselling during hospital stay, but NRT was offered at a mean 14 days after ACS at the first clinical visit after discharge. Plus regular follow-up visits at the Smoking Cessation Service every 2 weeks for 24 weeks (12 sessions total)

Abroug 2020 *(Continued)*

	Both interventions had behavioural support intensity level 4.
Outcomes	Abstinence: Verified PPA at 24 weeks Validation: Expired air CO Died: 0 in intervention 1 and 2 in intervention 2
Notes	Study assessed whether beginning NRT during hospitalisation or at discharge produced higher smoking cessation rates at 24 weeks amongst patients with acute coronary syndrome Funding: "None" Declarations of Interest: "None declared"

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Blinding not mentioned
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Blinding not mentioned
Incomplete outcome data (attrition bias) All outcomes	Low risk	Minimal difference by group; overall loss not > 50% (follow-up rates were 44/54 in intervention 1 and 30/45 for intervention 2)
Other bias	Low risk	No other risks of bias detected

Berndt 2017a

Study characteristics

Methods	Country: Netherlands Study dates: December 2009-June 2011 Recruitment: Cardiac wards of hospital Inclusion/exclusion criteria: "Eligible patients were ≥ 18 years of age, smoked ≥ 5 cigarettes per day or had quit smoking less than 4 weeks prior to admission, and had been admitted to the cardiac ward for less than 4 days for an acute coronary syndrome, stable angina, or other forms of heart disease following the International Classification of Diseases-10. Exclusion criteria were being unable to speak and/or read Dutch, not owning a telephone, a medically unstable situation, and cognitive impairment."
Participants	Participants: 625 individuals who smoked at least 5 CPD or quit smoking < 4 weeks before hospital admission (usual care n = 245, telephone counselling + NRT n = 223, face-to-face counselling + NRT n = 157) Number smoked: 21 CPD

Berndt 2017a *(Continued)*

	Age: 56 yrs Therapist: Cardiac nurses trained as smoking counsellors.
Interventions	Face-to-face counselling + NRT: NRT patches x 8 weeks at no cost if cardiologist approved; post-discharge in-person counselling of 30-45 min/session by cardiac nurses trained as smoking counsellors for 3 months; weekly sessions x 6 weeks + 1 session at week 12 [intensity 4] Telephone counselling + NRT: NRT patch for 8 weeks provided free if cardiologist agrees; post-discharge telephone counselling of 15 min/call provided by Dutch Expert Center for Tobacco Control for 3 months; weekly x 6 wk + 1 session at week 12 [intensity 4]. Usual care: No medication or counselling [intensity 1]
Outcomes	Abstinence: SR continuous abstinence at 12 mo, biochemically validated by saliva cotinine Validation: Only some pts had validation with cotinine but not all Died: 3 in 1. 7 in 2. 11 in 3
Notes	Post-discharge counselling in person vs. by phone vs usual care Funding: "This project was supported by a research grant from ZonMw, the Netherlands Organisation for Health Research and Development (grant number: 50-50110-96-524)." Declarations of Interests: "N. Berndt, H. de Vries, L. Lechner, F. Van Acker, E. S. Froelicher, F. Verheugt, A. Mudde and C. Bolman state that they have no competing interest."

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not clear how randomisation was done
Allocation concealment (selection bias)	Unclear risk	Not clear how randomisation was done
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants were not blinded.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Biochemically validated; "Patients who indicated not smoking at 12-month follow-up (n = 187) were invited to the hospital for biochemical validation using the NicAlert® test strips for assessing cotinine in saliva specimens".
Incomplete outcome data (attrition bias) All outcomes	Low risk	At 12 months, 188/245 usual care, 169/223 telephone counselling and NRT, 112/157 face-to-face counselling and NRT, completed follow-up.
Other bias	Low risk	No other risks of bias detected

Bolman 2002

Study characteristics

Methods	Country: Netherlands Study dates: Information not available Recruitment: Cardiac ward patients in 11 hospitals

Bolman 2002 *(Continued)*

	Inclusion/exclusion criteria:"all patients who had smoked in the week prior to admission"
Participants	Participants: 789 smokers who had smoked in previous week (control group n = 458, experimental group n = 433) Number smoked: not stated Age: 56 yrs average Therapists: Physician, nurse
Interventions	1. Experimental group (5 hospitals): Cardiologist advice, 15-30 min counselling from ward nurse. Follow-up: cardiologist prompted to advise at 4-6 wk clinic but no counselling provided by team. Self-help materials. No pharmacotherapy. [Intensity 2] 2. Control group: Usual care NRT: No
Outcomes	Abstinence: Sustained at 12 m Validation: None Died: 25 at 12 m
Notes	Included in CVD subcategory Numbers in meta-analysis adjusted to approximate the OR reported from a logistic regression analysis on continuous abstinence (OR 1.17, 90% CI 0.85 to 1.61) Funding: "This study was supported by grants from The Netherlands Heart Foundation and The Dutch Foundation on Smoking and Health." Declarations of Interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Method for random sequence generation not described, cluster-randomised by hospital; 4/11 self-selected intervention condition, although exclusion of these did not change results
Allocation concealment (selection bias)	High risk	Participants identified by ward nurses. Possibility of selection bias although control group nurses were said to be blind to condition
Blinding of participants and personnel (performance bias) All outcomes	High risk	Nurses in the control group were blind; however, nurses in the experimental group were not, "Since nurses in the experimental condition could not be blinded for the treatment status (as they implemented the intervention), they were explicitly instructed by the researcher and ward representatives not to inform patients about the content of the control and experimental treatments."
Blinding of outcome assessment (detection bias) All outcomes	High risk	No biochemical validation and participants aware of treatment assignment
Incomplete outcome data (attrition bias) All outcomes	High risk	"One hundred fourteen experimental patients (30%) and 96 control group members (25%) were lost to follow-up, resulting in a study sample of 554 of the 764 living responders (73%)." 390/458 control and 374/433 completed follow-up at 12 months; 25 deaths, 38 refusals, 64 missing baseline data excluded from analysis denominator
Other bias	Low risk	No other risks of bias detected

Borglykke 2008

Study characteristics	
Methods	Country: Denmark Study dates: January 2000-June 2001 Recruitment: patients admitted with symptoms of acute exacerbation of COPD in 1 university hospital Inclusion/exclusion criteria: All patients admitted to Glostrup University Hospital with symptoms of acute exacerbation of COPD from 01 January 2000 to 29 June 2001
Participants	Participants: 223 current smokers (control group n = 102, intervention group n = 121) Diagnosis: COPD Age: 65.9 yrs av Gender: 35% male Willingness to quit: not reported Therapists: nurses
Interventions	1. Intervention group: smoking cessation groups: standard information on the benefits of smoking cessation, weekly sessions of 2 hours during 5 weeks. Follow-up session at 3 months. [Intensity 4] 2. Control group: usual care (not described) Pharmacotherapy: complimentary NRT when needed in intervention group
Outcomes	Abstinence: self-reported PP at 12 m Validation: CO (in 84% of patients) Died: none reported
Notes	Category: pulmonary patients Only 48/105 intervention patients received intervention. OR adjusted for sex, age and duration of COPD: 2.83 (1.40 to 5.74) Funding: "This study was funded by a grant from the Danish Centre for Evaluation and Health Technology Assessment." Declarations of Interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Not randomised. Participants assigned to intervention ward or control ward based on vacancy
Allocation concealment (selection bias)	Low risk	Randomly assigned; "On hospital admission, the patients were met by the medical officer in charge of the distribution of patients...who had no knowledge of the study being conducted. The medical officer randomly assigned the patients to one of the hospital wards by ... vacancy."
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Participants and personnel blinded

Borglykke 2008 *(Continued)*

Blinding of outcome assessment (detection bias) All outcomes	High risk	Abstinence not biochemically validated
Incomplete outcome data (attrition bias) All outcomes	Low risk	No loss to follow-up at 1 year
Other bias	Low risk	No other risks of bias detected

Brandstein 2012

Study characteristics	
Methods	Country: USA Study dates: Information not available Recruitment: Inpatients Inclusion/exclusion criteria: "English speaking adult smokers (age 18 and up) who were admitted to the hospital for more than 24 hours, smoked at least 10 or more cigarettes per day prior to admission, and had quit smoking during hospitalization were considered potential study participants. Additional inclusion criteria included the need to have a telephone and no plans to move from current address in the next six months. Smokers were excluded if they were: pregnant, hospitalized for psychiatric treatment, terminally ill (prognosis less than 12 months), or unable to communicate verbally. Patients with the following medical conditions were also excluded: stroke or acute cerebrovascular accident within the previous year, angina, arrhythmia, uncontrolled diabetes or insulin dependence."
Participants	Participants: 126 smokers (control group n = 62, intervention group n = 64) Number smoked: 17 CPD Age: 47 yrs Therapist: Respiratory therapists and quitline coaches, depending on group
Interventions	Intervention group: The enhanced intervention group received the same standard bedside intervention as the control group. In addition, they received an eight-week supply of nicotine patches prior to discharge and telephone counselling for up to two months post-discharge. F/u counselling by quitline staff with self-help companion materials mailed. For f/u counselling calls, counselling consisted of a comprehensive initial call (about 30 minutes) to set up or solidify the quitting plan and up to five follow-up calls (about 10-15 minutes each). [intensity 3] Control group: Brief bedside intervention by a respiratory therapist for 10-15 m and no medication [intensity 1]
Outcomes	Abstinence: 180-day prolonged abstinence rate ITT at 6 months Validation: None Died: 0 in both groups
Notes	Proactive f/u counselling programme and pharmacotherapeutic intervention in addition to standard bedside counselling in hospital vs. standard bedside intervention Funding: "This study was funded by a $50,000 grant from the Scripps Clinical Research Development Award for new investigators at Scripps Health." Declarations of Interest: Information not available

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**

Brandstein 2012 *(Continued)*

Random sequence generation (selection bias)	Low risk	The PI used computer-generated randomisation lists so that randomisation was stratified by the RT and participants were allocated to treatment condition using blocks of four.
Allocation concealment (selection bias)	Unclear risk	Not specified
Blinding of participants and personnel (performance bias) All outcomes	Low risk	"Randomization took place after the RT collected baseline data, provided bedside counseling, and obtained consent; thus RTs were blind to group assignment during those procedures."
Blinding of outcome assessment (detection bias) All outcomes	Low risk	A separate group of evaluators (not counselling staff) conducted follow-up interviews with participants by telephone at two and six months after randomisation. "At six months, all participants who were evaluated (n = 73) were sent a collection kit and asked to submit a saliva sample. This request operated more like a bogus pipeline than an actual test of cotinine level (Roesé & Jàmieson, 1993) because it was expected the return rate will be low. The aim was to ensure that there was no differential return rate."
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Retention rate was low (follow-up at 6 months was 34/56 in the intervention group and 29/53 in the control group) but analyses were ITT.
Other bias	Low risk	No other risks of bias detected

Brunner-Frandsen 2012

Study characteristics	
Methods	Country: Denmark Study dates: Febuary 2005-January 2006 Recruitment: Patients admitted to 1 hospital with stroke or TIA Inclusion/exclusion criteria: "Within the period February 2005 through October 2006, current daily smokers under age 76 admitted to the Department of Neurology, in University Hospital in Odense, with acute ischemic stroke or TIA were invited to participate in the study. Patients with severe stroke (e.g. continuously impaired consciousness, aphasia, or symptoms that would make it impossible to smoke), patients with severe concomitant disease that causes decreased life expectancy, and patients who were otherwise unable to participate in a smoking cessation program were excluded."
Participants	Participants: 94 daily smokers (minimal smoking cessation intervention n = 45, intensive smoking cessation intervention n = 49) Number smoked: not stated Age: not stated Therapists: Study nurse
Interventions	1. Intensive smoking cessation intervention: All patients included in the study received 30-min individual counselling by the study nurse. The study nurse advised the patient to quit smoking and handed out a booklet containing information on smoking cessation. Free nicotine replacement therapy, nicotine patch, was offered during the hospital stay on the patients' request and was ordered by a physician. Patients randomised to the intensive smoking cessation intervention were offered a five-session outpatient smoking cessation programme after discharge. The smoking cessation course was given by an authorised smoking cessation instructor. Free samples of nicotine replacement therapy (gum, patches, tablets, or nasal spray) were offered as part of the programme. Furthermore, the patients were invited to a 30-min outpatient visit after six weeks and five telephone counselling sessions by the

Brunner-Frandsen 2012 *(Continued)*

	study nurse at two days, one week, three weeks, three months, and four months, respectively, after discharge. At each session, patients completed a short structured interview on current smoking habits including daily consumption of cigarettes and use of nicotine replacement therapy. Persistent smokers were given repeated advice to stop smoking [intensity 4]. Plus free samples of nicotine replacement therapy (gum, patches, tablets, or nasal spray) were offered as part of the programme. 2. Minimal smoking cessation intervention: All patients included in the study received 30-min individual counselling by the study nurse. The study nurse advised the patient to quit smoking and handed out a booklet containing information on smoking cessation. Free nicotine replacement therapy and/or nicotine patch, were offered during the hospital stay on the patients' request and was ordered by a physician [intensity 2]. No pharmacotherapy provided
Outcomes	Abstinence: Smoking cessation rates at six months were determined by self-report and verified by measurement of exhaled carbon monoxide (CO). Validation: Breath CO Died: 0
Notes	Minimal smoking cessation intervention vs. intensive smoking cessation intervention Funding: "This work was supported by the Danish Heart Foundation (grant no. 04-10-B138-A208-22173), Hjernesagen, and the Odense University Hospital Foundation." Declarations of Interest: "None declared"

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Patients were randomised using a computer-generated list of odd and even numbers. These numbers, representing minimal and intensive smoking cessation intervention, respectively, were used to create consecutive numbered sealed envelopes.
Allocation concealment (selection bias)	Low risk	After having obtained informed consent, the study nurse opened the randomisation envelope and the patients were informed to which intervention they had been assigned.
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Not specified
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Biochemically validated smoking cessation: "At the last visit, 21 of the initial 49 (42.8%) reported smoking cessation. Of these patients, 16 had a CO level of less than 8 ppm." Not clear whether physicians were blinded: "Physicians were not involved in patient recruitment, smoking cessation intervention, or follow-up visits."
Incomplete outcome data (attrition bias) All outcomes	Low risk	Good retention: "Thus, all randomized patients were included in the final analysis of smoking cessation rates. None of the patients died within the follow-up period." Analyses were ITT.
Other bias	Low risk	No other risks of bias detected

Busch 2017

Study characteristics	
Methods	Country: USA Study dates: 2013-2014 Recruitment: Inpatients with ACS Inclusion/exclusion criteria: "Inclusion criteria were: 1) ACS diagnosis documented in the medical record, 2) smoking ≥ 3 cigarettes per day immediately prior to hospitalization, 3) age 18–75, 4) English fluency, 5) regular telephone access, 6) living within a 1 hour drive of the admitting hospital, and 7) willingness to "strongly consider" an attempt to quit smoking at discharge. We used a cut-off of ≥ 3 cigarettes per day to include regular, daily smokers who could benefit from the nicotine patch. Exclusion criteria were: 1) evidence of limited mental competency, 2) current psychosis, bipolar disorder, borderline personality disorder, or suicidality (based on chart review and self-report), 3) expectation that the participant would not live through the study period, or 4) regularly attending counselling for depression or smoking cessation and plans to continue this counselling after discharge (which would duplicate BATCS treatment)."
Participants	Participants: 64 daily smokers (Standard of Care group n = 31, BAT-CS group n = 28) Number smoked: 16.4 CPD Age: 55.6 yrs Therapist: Masters-level health educator or clinical psychologist, depending on group
Interventions	BAT-CS group: 50-min smoking cessation counselling in hospital. Post-discharge: Behavioural activation treatment for cardiac smokers (BAT-CS) that includes mood management every 3 weeks (weeks 1, 3, 6, 9, 12) for 12 weeks [intensity 4] Standard of Care group: The SC group received 5 mailings of print materials at 1, 3, 6, 9 and 12 weeks post-discharge and 5-10 m check in calls after each mailing with master's level health educator [intensity 4]. All recieved nicotine patches x 8 weeks if patient agreed to make quit attempt.
Outcomes	Abstinence: Confirmed continuous abstinence at 24 weeks Validation: Expired air CO Died: 0 in both groups
Notes	Compared 2 types of behavioural intervention (BAT + mood management vs. std behavioural counselling) Funding: "Data collection for this study was supported by the National Heart, Lung, and Blood Institute of the National Institutes of Health under award number K23- HL107391. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health." Declarations of Interest: "The authors declare that they have no competing interests."

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	A computer-generated randomisation procedure with results put in sealed envelopes opened only after informed consent given; "We used a computer generated (using R, Cran.R-project.org) permuted block randomization procedure, with small, random sized blocks. Randomization was stratified by counselor and elevated symptoms of depression (i.e., Patient Health Questionnaire-9 (PHQ-9) ≥ 10 vs. PHQ-9 ≤ 9)."
Allocation concealment (selection bias)	Low risk	Envelopes with allocation opened by study staff only after patient consented: "The study statistician provided sequenced randomization envelopes. The randomization envelopes were opened by counselors following the comple-

Busch 2017 *(Continued)*

		tion of each in-hospital smoking cessation session. Counselors then immediately informed the participant of their treatment condition."
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Behavioural intervention so no blinding possible, although different people may have led the 2 groups
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Biochemically verified: "The primary smoking outcome was 7-day point prevalence abstinence (7-day PPA), defined as no smoking at all in the past 7 days, not even a puff. A breath sample was collected at follow-up assessments if the participant reported ≥ 7-days of abstinence. Carbon monoxide (CO) level in the breath sample verified self-reported 7-day PPA (< 10 ppm = abstinence)."
Incomplete outcome data (attrition bias) All outcomes	Low risk	Similar follow-up rates between arms (follow-up rates were 26/31 for Standard of Care group and 24/28 for BAT-CS group at 24-week follow-up assessment)
Other bias	Low risk	No other risks of bias detected

Campbell 1991

Study characteristics	
Methods	Country: UK Study dates: Information not available Recruitment: Inpatients with smoking-related diseases Inclusion/exclusion criteria: "Hospital inpatients with smoking-related diseases were advised by their physicians to give up smoking and were later seen by SB and invited to take part in the study....Patients with organic psychosis, malignant disease, pre-terminal or terminal disease, drug and alcohol abuse and patients aged under 18 years were not eligible for the study."
Participants	Participants: 212 current smokers (placebo gum n = 105, nicotine gum n = 112) Number smoked: not stated Most had heart or lung disease. Therapists: Physician and non-specialist counsellor
Interventions	1. Nicotine gum (intervention): Physician advice, inpatient counselling (1 x, total not stated, type not stated). NRT (gum, dose 2-4 mg, for 3 m). Follow-up (5 x at 2, 3, 5 wks, 3 m, 6 m in clinic by counsellor) 2. Control: Other (as above, placebo NRT gum) [Intensity 4 for both arms] NRT: Yes
Outcomes	Abstinence: Sustained abstinence at 6 and 12 m Validation: Expired air CO Died: None reported
Notes	Not included in analysis by counselling intensity because arms differed only by use of NRT Heart disease, lung disease and other given separately in analysis by diagnosis. Funding: Information not available Declarations of Interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement

Campbell 1991 *(Continued)*

Random sequence generation (selection bias)	Unclear risk	"Those who had agreed were given packages of identical appearance randomly containing either nicotine (2mg) or placebo gum".
Allocation concealment (selection bias)	Unclear risk	No details reported
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Placebo-controlled
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Biochemically validated abstinence: "Claims of abstinence were verified by expired air CO".
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	"Non-attenders were classified as failures"; rate of dropouts not reported
Other bias	Low risk	No other risks of bias detected

Campbell 1996

Study characteristics	
Methods	Country: UK Study dates: Information not available Recruitment: Inpatients with respiratory or cardiovascular disease Inclusion/exclusion criteria: Patients eligible: "Hospital inpatients and outpatients with smoking-related respiratory or cardiovascular disease, aged 18-75 years, who were willing to try to stop smoking. They must have smoked 21 cigarettes daily within 1 week prior to admission to hospital or attendance at outpatients." Patients not eligible: "Cigar or pipe smokers, those with hypersensitivity to any adhesive cutaneous application, any skin disease, myocardial infarction within the previous month, severe cardiac arrhythmias, pregnancy or lactation, patients with mental disturbances and patients with terminal or pre-terminal cancer."
Participants	Participants: 234 current smokers (placebo n = 119, transdermal nicotine n = 115) Age: not stated Approx. 75% had respiratory disease. Therapists: Physician and non-specialist counsellor
Interventions	1. Transdermal nicotine: Physician advice. Counselling (1 x, total 30-60 mins, type information). NRT (patch, dose 17.5-35 mg, for 12 wks). Follow-up (4 x at 2, 4, 8, 12 wks in clinic by counsellor) 2. Placebo: Other (as above, placebo NRT patch) [Intensity 4 for both arms] NRT: Yes
Outcomes	Abstinence: Sustained abstinence at 3, 6, 12 m Validation: Expired air CO Died: None reported
Notes	Only data on inpatients extracted from study; included in respiratory disease subcategory Funding: "We thank Ciba-Geigy Ltd for funding this study and for providing Nicotine 11 TTS and placebo patches."

Campbell 1996 *(Continued)*

Declarations of Interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Randomisation method not described
Allocation concealment (selection bias)	Unclear risk	No details reported
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Double-blind, placebo-controlled "In a double-blind, placebo-controlled, randomized manner"
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Placebo-controlled and biochemically verified: "At the 12-week visit, those who said they had not smoked for the previous 48 h and whose statement was verified by a reading of 7 ppm or less on the Bedfont Micro Smokerlyzer carbon monoxide meter"
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	ITT analysis, but number lost to follow-up in inpatient-only group not specified
Other bias	Low risk	No other risks of bias detected

Campos 2018

Study characteristics

Methods	Country: Brazil Study dates: January 2016-December 2016 Recruitment: Hospital Inpatients on medical/surgical wards Inclusion/exclusion criteria: To be eligible for the study, participants had to be current cigarette smokers; between 18 and 80 years of age; and motivated to remain abstinent from smoking after hospital discharge. Individuals who had smoked regularly (at least one cigarette per day) for at least 30 days before hospitalisation, were classified as current smokers. Prospective participants were excluded if they were receiving end-of-life care, were clinically unstable, had cognitive or memory deficits, had a psychiatric disorder, or were pregnant.
Participants	Participants: 90 current smokers motivated to quit (brief intervention n = 45, intensive intervention n = 45) Number smoked: 20.7 cigs Age: 51.1 years Therapist: Researcher trained in smoking cessation
Interventions	Intensive intervention: The intensive cognitive behavioural therapy-based intervention was performed by a researcher who had previously been trained in smoking cessation treatment at the Brazilian National Cancer Institute. Patients assigned to the InterV group were counselled in a session that lasted approximately 40 min, comprising a 10-min oral intervention and a 30-min educational video presentation. In that session, the counsellor reviewed the dangers of smoking and the benefits of quitting; assessed the knowledge and beliefs of the participant, as well as the potential barriers to smoking cessation; explained the mechanisms of nicotine dependence and the symptoms of withdrawal; present-

Campos 2018 *(Continued)*

	ed counter-arguments to belief barriers; and discussed behavioural self-management strategies to counter relapse triggers [intensity 2]. Brief intervention: Patients in the BrInter group received counselling on the dangers of smoking and the benefits of quitting in an ordinary session lasting 10 min [intensity 1]. No pharmacotherapy in either group
Outcomes	Abstinence: Confirmed smoking status at 6 mo Validation: Expired air CO Died: 2 in group 1, 3 in group 2
Notes	Comparison of 2 forms of CBT-based (brief v extended intervention) Funding: No information available Declarations of Interest: No information available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	No details provided
Allocation concealment (selection bias)	Unclear risk	No details provided
Blinding of participants and personnel (performance bias) All outcomes	High risk	Blinding not possible; interventions were both single session (although 1 was longer & more involved with the video component)
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Biochemical validation with CO reduces risk of bias: "smoking status was assessed and self-reported abstinence was biochemically validated by measuring exhaled carbon monoxide (eCO) with a portable breath analyzer (Micro CO; Micro Medical Ltd, Rochester, UK)."
Incomplete outcome data (attrition bias) All outcomes	Low risk	Follow-up rates were 81/90 after 6 months (41/45 in intensive intervention group and 40/45 in brief intervention group).
Other bias	Low risk	No other risks of bias detected

Carson-Chahhoud 2020

Study characteristics

Methods	Country: Australia Study dates: August 2008-December 2011 Recruitment: Patients presenting to hospital under disciplines of respiratory, cardiology, neurology and vascular medicine following a serious tobacco-related illness Inclusion/exclusion criteria: "Participants were considered for inclusion if they were aged between 18 and 75 years, smoked at least 10 cigarettes on average per day over the preceding 12 months, had a plan of discharge to go home and had no contraindications to varenicline. Participants were excluded if they had cancer within the past seven years, renal impairment with creatinine clearance < 30mL/min, had acute or pre-existing psychiatric illnesses including depression un-

Carson-Chahhoud 2020 *(Continued)*

	controlled with medication, past history psychosis or suicidal ideation, were pregnant or breastfeeding, were using other forms of nicotine replacement therapy or had used varenicline in the past 12 months. Patients with psychiatric illnesses who were stable on medication were considered for inclusion."
Participants	Participants: 392 daily smokers in past year (VT + C n = 196, C alone n = 196) Number smoked: 24.8 CPD Age: 53.25 Therapist: Quitline counsellor
Interventions	VT + C: 12 weeks of varenicline tartrate (titrated from 0.5 mg daily to 1 mg twice-daily); the counselling programme employed the 5A approach (Ask, Assess, Advise, Assist and Arrange), consisting of eight scheduled callbacks over a 12-week period of approximately 5–10 minutes duration [intensity 4]. C alone: The counselling programme employed the 5A approach (Ask, Assess, Advise, Assist and Arrange), consisting of eight scheduled callbacks over a 12-week period of approximately 5–10 minutes duration [intensity 4].
Outcomes	Abstinence: continuous abstinence between weeks 2 and 104 (two-year follow-up), continuous abstinence was defined as smoking < = five cigarettes in total by the follow-up period at 104 weeks. Abstinence was by self-report with biochemical validation in a random subset of participants via exhaled carbon monoxide levels of < = 10 ppm. Validation: Subset of pts had validation with expired CO Died: 10 in 1, 12 in 2
Notes	Authors aimed to evaluate the long-term (104 weeks) efficacy following a standard course of inpatient-initiated varenicline tartrate plus Quitline-counselling compared to Quitline-counselling alone. Funding: "The authors received no specific funding for this work." Declarations of Interest "The authors have read the journal's policy and have the following potential competing interests: KVCC was paid an honorarium and provided with economy airfares and accommodation by Pfizer Australia to present at the 2019 Smoking Exchange Summit in New South Wales where she spoke about 'cultural specific issues in smoking cessation' and as an invited panellist in a plenary session about 'a national approach to smoking cessation'. In 2017, she received an honorarium and was provided with economy airfares and accommodation to speak about 12-month results of the STOP trial at the annual Pfizer Australia conference in New South Wales, Hunter Valley. This does not alter our adherence to PLOS ONE policies on sharing data and materials. There are no patents, products in development or marketed products associated with this research to declare."

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	"A computer-generated simple randomization sequence generation with permuted blocks of 20 was used to assign participants in a 1:1 ratio to either 12 weeks of varenicline tartrate plus Quitline counselling or Quitline counselling alone."
Allocation concealment (selection bias)	Low risk	Allocation concealment occurred with the use of consecutively numbered opaque, sealed envelopes that were opened by study investigators following completion of all baseline data collection.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Randomisation and allocation concealment were performed by respiratory staff independent of the study. Participants and investigators were not blinded to treatment assignment.
Blinding of outcome assessment (detection bias)	Low risk	Randomisation and allocation concealment were performed by respiratory staff independent of the study. Participants and investigators were not blind-

Carson-Chahhoud 2020 *(Continued)*

All outcomes		ed to treatment assignment. Biochemical validation: "Abstinence was by self-report with biochemical validation in a random subset of participants via exhaled carbon monoxide levels of < 10 ppm."
Incomplete outcome data (attrition bias) All outcomes	Low risk	Loss to follow-up clearly outlined in Consort figure, at 104-week follow-up 117/196 in VT + C (intervention 1), 101/196 in C alone (intervention 2) groups
Other bias	Low risk	No other risks of bias detected

Caruthers 2006

Study characteristics	
Methods	Country: USA Study dates: May 2002-March 2005 Recruitment: smokers admitted to a medical/surgical unit Inclusion/exclusion criteria: "Inclusion criteria for this project required participants to be admitted to a medical or surgical patient care unit and a current smoker. Patients were required to be 18 years or older, of either gender, with no exclusion by diagnosis unless admitted for transplantation or terminal condition with death imminent..... Exclusion criteria for this project included the following: 1) diagnosis of cancer in a terminal state, 2) patients under evaluation for organ transplantation or awaiting transplantation, 3) cerebral vascular disorders, 4) senile dementia, 5) Alzheimer disease, 6) abstinence from smoking greater than one month, 7) non-English speaking patients, 8) lack of a home telephone, 9) lack of a mailing address, 10) lack of any ability to participate with self-care activities, and 11) transfer to a rehabilitation hospital or nursing home following hospital admission."
Participants	Participants: 80 smokers (smoking at least one cigarette within 30 days of their hospital admission) (enhanced usual only group n = 40, special intervention group, n = 40) Diagnosis: medical and surgical Age: 51 yrs av. Gender: 40% male Willingness to quit: 79/80 indicated a desire to quit. Therapists: nurses
Interventions	1. Special intervention group: In-hospital counselling and study-specific intervention booklet + post-discharge phone calls (8 individualised telephone calls in 12 weeks after discharge) [Intensity 4] 2. Control: enhanced usual only group Pharmacotherapy: Smoking cessation pharmacotherapy was not provided as part of the intervention; however, several patients were prescribed such medication during their hospital admission.
Outcomes	Abstinence: self-reported 7-day PP at 12 and 24 wks (6 m) post-discharge Validation: CO confirmed Died: 3 (2 in intervention), 1 (in control group)
Notes	Additional information provided by 1st author 2/2012 Funding: "I would like to express my gratitude and acknowledgement to the National Institutes of Nursing Research for the predoctoral fellowship award funding granted to conduct this research. In addi-

Caruthers 2006 *(Continued)*

	tion, I am grateful to the Pennsylvania Nursing Foundation and the Eta Chapter of Sigma Theta Tau for their generous financial support that assisted this project." Declarations of Interest: No information available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Adaptive randomisation by minimisation was computer-generated via a programme which provided stratification by gender, ethnicity, and whether the participant was admitted with or without tobacco-related disorder(s).
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Not described
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Biochemical validation: "Abstinent smokers beyond baseline were defined as self-reporting abstinence from tobacco with validation by exhaled carbon monoxide testing less than or equal to 8 ppm." Outcome assessment was blinded.
Incomplete outcome data (attrition bias) All outcomes	Low risk	10 /90 participants lost to 12-week follow-up in control group and 2/90 in intervention but ITT analyses conducted
Other bias	Low risk	No other risks of bias detected

CASIS 1992

Study characteristics

Methods	Country: USA Study dates: February 1986-February-1988 Recruitment: Inpatients with coronary artery stenosis confirmed by catheterisation. Inclusion/exclusion criteria: "Patients were eligible for CASIS if they (a) had at least a single coronary artery lesion with a 50% or greater reduction in lumenal diameter, (b) were between 30 and 75 years of age, (c) were willing to be followed for 1 year, (d) lived within a 25-mile radius of the hospital where they were undergoing coronary arteriography, and (e) were current smokers or reported having smoked at least five cigarettes per day (or an equivalent cigar or pipe intake) at any time within a 2-month period before catheterization."
Participants	Participants: 267 current smokers or recent quitters (50%, defined as at least 5 cpd at any time in previous 2 m) (advice only group n = 132, short Intervention group n = 135) Number smoked: 25 cpd Age: 53 yrs 78 had acute MI, 21 recent MI, 152 other symptoms Therapists: Masters-level health educators
Interventions	1. Short Intervention: Counselling (2 x, total 40 mins, type not stated). Self-help materials, relaxation tapes. Follow-up (4 x at 1, 3 wks and 3 m if quit or 2,4 m if did not quit, by telephone) [Intensity 4] 2. Advice only: Advice only

CASIS 1992 *(Continued)*

	NRT: No
Outcomes	Abstinence: Sustained abstinence at 6 m, 12 m Validation: Expired air CO Died: None reported
Notes	Patients admitted with MI more likely to be quitters at 6 m (74%). Evidence of interaction between intervention and illness. Included in CVD subcategory Funding: "This work was supported by National Heart, Lung, and Blood Institute Grant HL 35110." Declarations of Interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Randomised, method not described "all patients remaining eligible were randomized to either the AO condition or the SI condition".
Allocation concealment (selection bias)	Unclear risk	No details reported
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants and personnel not blinded
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Outcome assessor blinded to group; biochemical validation: "Both self-reported 1-week point-prevalence abstinence rates and validated rates were calculated at 6 and 12 months—determined by a saliva cotinine level of less than 20 ng/ml"
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	No mention of losses to follow-up; all survivors included in denominators
Other bias	Low risk	No other risks of bias detected

Cherrington 2015a

Study characteristics

Methods	Country: USA Study dates: April 2006-December 2008 Recruitment: African-Americans hospitalised at one urban safety net Southern hospital admitted Inclusion/exclusion criteria: "Age 19 and older, self-identified African-American race/ethnicity, current smoker at the time of admission, and absence of hearing, vision, or comprehension difficulties. Patients were excluded if they had a primary diagnosis of alcoholism, drug dependency, serious mental illness (schizophrenia or bipolar), were incarcerated, or were unable to participate in a phone call following discharge."
Participants	Participants: 300 smokers at time of admission, aged 19 and above (control n = 150, intervention n = 150) Number smoked: not summarised as mean

Cherrington 2015a *(Continued)*

	Age: 49.9 Therapists: Inpatient clinical providers/teams
Interventions	1. Intervention: Watched DVD on quitting smoking while inpatient. The DVD intervention was provided as an augmentation of standard medical care in the hospital (and follow-up outpatient care), including smoking cessation counselling and treatments and nicotine replacement therapy. No follow-up support provided [intensity 2] 2. Control: standard medical care in the hospital + attention-control DVD that included five brief health-related mini-lectures (e.g. non-culturally tailored, non-narrative, and non-tobacco-related) [intensity 1] In both groups, the inpatient clinical providers and teams were responsible for choosing nicotine-replacement therapy and other pharmaceutical treatments, and could also provide brief counselling and patient education materials.
Outcomes	Abstinence: 6 mo confirmed continuous abstinence. Validation: Expired breath CO Died: 6 in 1 and 7 in 2
Notes	Stories, DVD + routine clinical treatment vs. routine clinical treatment Funding: "This work was supported by the National Heart, Lung, and Blood Institute [U01HL7917]." Declarations of interest: "The authors declare that they have no competing interests."

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	"For randomization we used blocks of 10 to balance allocation."
Allocation concealment (selection bias)	Low risk	"The DVDs (intervention and control) were ordered in the order of the randomization table, and the intervention or control DVD placed inside and sealed. Thus, randomization status was concealed for the research staff until the seal on the DVD was broken."
Blinding of participants and personnel (performance bias) All outcomes	Low risk	"The staff conducting follow-up calls w[ere] different than recruiting staff, and these staff were blinded to intervention or control status."
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Biochemically verified: "After the 6-month telephone interview, patients who reported quitting were asked to confirm cessation by carbon monoxide validation at the hospital".
Incomplete outcome data (attrition bias) All outcomes	Low risk	117/150 in control group at 6-month follow-up; 121/150 in intervention group at 6-month follow-up
Other bias	Low risk	No other risks of bias detected

Chouinard 2005

Study characteristics

Methods	Country: Canada

Chouinard 2005 *(Continued)*

	Study dates: Information not available Recruitment: Inpatients with cardiovascular disease (MI, angina, CHF) or PVD Inclusion/exclusion criteria: Inclusion: "(a) adult (18 years and older); (b) hospitalised for a CVD (myocardial infarction, angina, heart failure, or peripheral vascular disease); (c) smoker (having smoked at least one cigarette in the past month); (d) the ability to communicate in French; (e) local resident; (f) a telephone available at home; (g) plan of hospital discharge to home; (h) no mental or physical disabilities that would impede participation."
Participants	Participants: 168 past-month smokers (inpatient counselling with telephone follow up n = 56, inpatient counselling only n = 56, usual care n = 56) Number smoked: not stated Age: 56 yrs av Therapist: nurse
Interventions	1. Counselling only: Counselling by research nurse (1 x, 10-60 mins, av. 40 min, tailored to stage of change); 23% used pharmacotherapy [Intensity 2] 2. Counselling with telephone follow-up: As 1 plus telephone follow-up, 6 calls over 2 m post-discharge [Intensity 4] 3. Usual care: cessation advice NRT: Yes (partial)
Outcomes	Abstinence: Sustained abstinence at 2 & 6 m Validation: Urine cotinine or expired air CO Died: 3 in 1, 1 in 2, 0 in 3
Notes	Two interventions compared separately to control in intensity subgroups Included in CVD subcategory Funding: Information not available Declarations of Interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	"Cluster randomization was used... by first randomly assigning individuals to predetermined clusters of three to six participants. The group assignment was then randomly assigned to each of these clusters."
Allocation concealment (selection bias)	Unclear risk	"Individuals not familiar with the study were in charge of the randomization procedure, which included inserting the information into envelopes that were sealed and would be opened by the investigator only at the time of treatment." No other information on envelopes provided
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants and personnel not blinded
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Outcome assessor was blinded. Biochemically validated: "Self-reports on smoking cessation were validated using a Home Health Testing® urinary continence test. This immuno-test detects active smoking elements in the urine if a person has smoked during the previous 4 days."
Incomplete outcome data (attrition bias)	Low risk	4 deaths and 3 not meeting follow-up criteria excluded from meta-analysis; all other dropouts and those lost to follow-up counted as smokers; similar num-

Chouinard 2005 *(Continued)*

All outcomes		bers in all arms (at 6-month follow-up, inpatient counselling with telephone follow-up 53/56, inpatient counselling only 53/56, usual care 55/56)
Other bias	Low risk	No other risks of bias detected

Cossette 2011

Study characteristics

Methods	Country:Canada Study dates: Information not available Recruitment: smokers admitted to 1 specialised cardiac hospital Inclusion/exclusion criteria: To be included, participants had to: 1) Smoke cigarettes daily; 2) Have the cognitive and physical ability to answer a questionnaire and communicate by telephone; and 3) Be able to communicate in French or English. Only patients who were seen during hospitalisation by the ISCT were eligible. Excluded were patients already followed by the "J'Arrête" line or in a smoking cessation centre (CAT) (Quebec Council on Tobacco and Health, 2010). In both cases (*I quit* and CAT), services were provided by social workers, nurses, physiotherapists and other personnel with specialised training in smoking cessation.
Participants	Participants: 40 current daily smokers (intervention group n = 20, control group n = 20) Diagnosis: cardiovascular disease Age: 57.1 yrs av Gender: 60% male Willingness to quit: yes (most in preparation stage, 1 in contemplation stage in control group) Therapists: nurse specialised in smoking cessation
Interventions	1. Intervention group: usual care during hospitalisation consisting of 1 or more sessions with the study nurse. Follow-up: 6 phone calls by study nurse at wk 1, 2, 3, 4, 8, 12 and then, if needed, additional phone calls could be arranged between 3 and 6 m post-discharge. At wk 3, an appointment with the study nurse if asked by the patient [Intensity 4] 2. Control group: usual care during hospitalisation consisting of 1 and more sessions with the study nurse. Follow-up: referral to a national quitline or a community centre for smoking cessation Pharmacotherapy: NRT, bupropion or varenicline were suggested during hospitalisation and follow-up.
Outcomes	Abstinence: self-reported abstinence at 6 m Validation: only for one participant Died: 0
Notes	Included in post-discharge intervention category (randomisation after discharge) Funding: "Research funded by the Quebec Nursing Intervention Research Group (GRIISIQ) and the Canadian Nurses Foundation (CNF)" Declarations of Interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement

Cossette 2011 *(Continued)*

Random sequence generation (selection bias)	Low risk	Not specified, but generated by a centre for randomised controlled trials
Allocation concealment (selection bias)	Low risk	Opaque sealed envelopes, "When the patients confirmed their acceptance, the ISCT carried out the randomization by opening a sealed, opaque envelope provided by a center for coordinating randomized clinical trials".
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants and personnel not blinded
Blinding of outcome assessment (detection bias) All outcomes	High risk	Outcome assessor not blinded. Smoking cessation not biochemically verified: "we had planned to assess the feasibility of performing urinary or salivary nicotine/cotinine tests during a home visit by the research assistant at 6 months for people who lived within a radius of 50 kilometres from the hospital where the study took place. Only one patient took such a control test, the others having refused or living too far away."
Incomplete outcome data (attrition bias) All outcomes	Low risk	Missing data similar in both groups (6-month follow-up 13/20 in intervention group and 10/20 in control group) and analyses were ITT; participants lost to follow-up considered smokers
Other bias	Low risk	No other risks of bias detected

Croghan 2005

Study characteristics	
Methods	Country: USA Study dates: January 2008-August 2008 Recruitment: Inpatients having surgical resection of lung or oesophageal cancers Inclusion/exclusion criteria: Information not available
Participants	Participants: 30 smokers admitted for surgery for newly diagnosed lung or oesophageal cancer Age: not stated Therapist: doctor, nurse and trained smoking counsellor
Interventions	1. Intervention: Physician advice from thoracic surgeons and study nurses. Counselling (1 x 45 min. Stage of change assessed, individualised pharmacotherapy) [Intensity 2] 2. Control: Physician advice only NRT: Yes
Outcomes	Abstinence: 7-day PP at 6 m Validation: expired air CO or saliva tobacco alkaloid Died: 1 at 6 m
Notes	Funding: Information not available Declarations of Interest: Information not available
Risk of bias	
Bias	**Authors' judgement** / **Support for judgement**

Croghan 2005 *(Continued)*

Random sequence generation (selection bias)	Unclear risk	Randomised, method not stated
Allocation concealment (selection bias)	Unclear risk	No details reported
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants and personnel not blinded
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Outcome assessor was blinded.
Incomplete outcome data (attrition bias) All outcomes	Low risk	2 lost to follow-up in control group considered smokers. 1 death in intervention group excluded from MA
Other bias	Low risk	No other risks of bias detected

Cummins 2016a

Study characteristics	
Methods	Country: USA Study dates: August 2011- November 2013 Recruitment: Hospitalised patients were recruited from five hospitals across three healthcare systems: University of California, San Diego (UCSD), Scripps Healthcare in San Diego, and the University of California, Davis (UCD). Inclusion/exclusion criteria: "Hospitalized smokers were eligible for inclusion if they were aged ≥ 18 years, had smoked in the last 30 days, smoked at least six CPD on the days they smoked, were interested in quitting or staying quit, spoke English or Spanish, provided sufficient contact information for intervention and evaluation (i.e. name, address, phone number), were cognitively and physically able to give consent and participate, were not pregnant, were interested in staying quit after discharge, and had an MD's approval for their study participation. Obstetrics, Surgery, and Behavioral Health units were excluded from participation."
Participants	Participants: 1270 smokers (usual care n = 316, patches only n = 320, counselling only n = 317, counselling + patches n = 317) Number smoked: 14.6 CPD Age: 49.9 years Therapists: Nurses
Interventions	1. NRT patches only: Those who smoked six to ten CPD were provided 6 weeks of 14 mg patches and 2 weeks of 7 mg patches. Those who smoked ≥ 11 CPD were provided 4 weeks of 21 mg patches and 2 weeks each of 14 mg and 7 mg patches. Protocol dictated that patches be dispensed at discharge and the patient encouraged to put a patch on prior to leaving the hospital. This procedure was intended to reinforce the intention to stay smoke-free. If the patient left the facility without receiving them, the patches were mailed the next day to the address on file. 2. Counselling only: An automated referral with expected date of discharge to the state quitline. Quitline staff began proactive attempts to reach the study participants 3 days after discharge. Ten attempts were made, varying days and times of attempts, before coding them as not reached. Counselling was the standard telephone counselling provided by the state quitline. Counselling focused on motivation

Cummins 2016a *(Continued)*

	and planning to stay quit, or for those who had relapsed following discharge, planning a new quit attempt [intensity 4]. 3. Patches + Counselling [intensity 4] 4. Usual care: Standard practice in all hospitals was to provide smokers with the quitline number. After randomisation, participants also received the quitline number from recruitment staff. Beyond that, hospital systems, individual hospitals, and even individual units had their own approach to usual care for smokers with differences in providing counselling or prescribing quitting aids during hospitalisation. In this study, there was no attempt to constrain these activities. Therefore, participants might have received support for quitting while in the hospital. However, no hospital system routinely provided follow-up cessation care.
Outcomes	Abstinence: 30-day confirmed PPA at 6 mo Validation: Salivary cotinine Died: Not reported
Notes	2 X 2 factorial design in which participants were stratified by recruitment site and smoking rate and randomly assigned to usual care, nicotine patches only, counselling only, or patches plus counselling Funding: "This research was supported by a grant from the National Cancer Institute (CA159533)." Declarations of Interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Participants who provided consent were stratified by recruitment site and cigarettes per day (CPD; six to 10 or ≥ 11) and randomly assigned by computer to one of four groups: usual care, nicotine patches at discharge, proactive quitline counselling, or both. Blocks of eight were used to balance characteristics across the four groups.
Allocation concealment (selection bias)	Unclear risk	Not mentioned in main paper or protocol paper
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Not mentioned in main or protocol papers; participants and research personnel presumably not blind due to study design
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Not mentioned in main or protocol papers; but participants and research personnel presumably not blind due to study design. "Some biochemical validation. Those who reported being abstinent for 7 days at 6 months were sent saliva collection kits and asked to send a sample to test for cotinine. The overall return rate was 57%; the counselling condition had a lower return rate than the no counselling condition (52.2% vs 62.5%, p = 0.03)."
Incomplete outcome data (attrition bias) All outcomes	Low risk	Follow-up rates decent and similar between treatment groups (6-month follow-up rate: usual care 218/316, patches only 218/320, counselling only 207/317 patches + counselling 214/317); deaths not reported
Other bias	Low risk	No other risks of bias detected

De Azevedo 2010

Study characteristics	
Methods	Country: Brazil Study dates: October 2007-June 2008 Recruitment: patients admitted to 1 public university hospital Inclusion/exclusion criteria: "The criterion for inclusion in this smoking-cessation trial was a patient report of a smoking habit of at least one cigarette smoked daily immediately prior to hospital admission."
Participants	Participants: 273 current smokers (smoked ≥ 1 cpd in month prior to admission) (low-intensity intervention n = 132, high-intensity intervention n = 141) Diagnosis: all (excluding ICU and psychiatric units) Age: not reported Gender: 63.7% male Willingness to quit: any Therapists: trained smoking cessation counsellor (psychologists, nurses, occupational therapist)
Interventions	1. High-intensity Intervention: 30 minutes session of individual counselling with motivational interview + 7 follow-up telephone calls over 4 months at wk 1, 2, 3 and month 1, 2, 3, 4 [Intensity 4] 2. Low-intensity intervention (Control): 15-minute session of individual counselling Pharmacotherapy: none provided
Outcomes	Abstinence: self-reported 7-day PP at 6 m Validation: none Died: 28
Notes	In the article, analyses excluded lost to follow-up and death. Extra control arm not randomised and not included in data extraction Funding: "This work was supported by the Research Foundation of the State of São Paulo (grant no. 06/61885-6)". Declarations of Interest: Information not available

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	"An allocation sequence based on a random-number table was used to randomly assign all enrolled participants".
Allocation concealment (selection bias)	Low risk	"The allocation was maintained in a serially numbered, opaque envelope, which was opened at the Phase 2 interview to prevent counsellor bias."
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants and personnel not blinded

De Azevedo 2010 *(Continued)*

Blinding of outcome assessment (detection bias) All outcomes	High risk	Outcome assessor not blinded. No biochemical validation: "The main outcome measure was smoking cessation, as determined by self-reported abstinence (7-day point prevalence abstinence)."
Incomplete outcome data (attrition bias) All outcomes	Low risk	108/132 participants from low-intensity intervention group at follow-up, 107/141 participants from high-intensity intervention; if analyses were done ITT, low risk of bias
Other bias	Low risk	No other risks of bias detected

DeBusk 1994

Study characteristics	
Methods	Country: USA Study dates: November 1988-April 1991 Recruitment: Inpatients with acute MI Inclusion/exclusion criteria: "hospitalised for acute myocardial infarction"; no additional information
Participants	Participants: 585 current smokers or recent quitters (proportion not stated, defined as any tobacco use in previous 6 m) (special intervention n = 293, usual medical care n = 292) Number smoked: not stated Age: 57 yrs av. First year after MI Therapists: Physician and nurse
Interventions	1. Special intervention: Physician advice; Counselling (1 x, total not stated, type not stated); NRT ('reserved for highly-addicted patients'); Other (self-help materials, relaxation tapes); follow-up (8 x at 48 hr, 1 wk, and every month for 6 m by telephone) [Intensity 4] 2. Usual medical care: Advice only NRT: Yes (partial)
Outcomes	Abstinence: Sustained abstinence at 6 and 12 m Validation: Expired air CO and plasma cotinine Died: None reported
Notes	Included in CVD subcategory Funding: "By HL38874 from the National Heart, Lung, and Blood Institute, Bethesda, Maryland and a Shannon Award from the National Institutes of Health, Bethesda, Maryland" Declarations of Interest: Information not available

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	"Patients were randomly assigned using a computer program that achieved a balanced allocation to the two management conditions within each hospital."
Allocation concealment (selection bias)	Low risk	"Randomization was done centrally; nurses were notified of the assignments by telephone calls from the coordinating centre staff."
Blinding of participants and personnel (performance bias)	High risk	Participants and personnel not blinded

DeBusk 1994 *(Continued)*

All outcomes		
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Outcome assessor blinded; biochemical validation
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Unclear what percentage of smokers were lost to follow-up. "Among participants who did not relapse before death or dropout, censoring occurred at the last point at which they reported not smoking."
Other bias	Low risk	No other risks of bias detected

Dornelas 2000

Study characteristics	
Methods	Country: USA Study dates: 1996 Recruitment: Inpatients with acute MI Inclusion/exclusion criteria: Smoked cigarettes in the month prior to hospitalisation, no substance abuse or cognitive disorders, must speak English, must be medically stable
Participants	Participants: 100 current smokers (Intervention n = 54, minimal care n = 46) Number smoked: 29 cpd Age: 54 yrs av Therapists: Psychologist
Interventions	1. Intervention: Counselling (1 x, total 20 mins, type behavioural); follow-up (7 x at < 1, 4, 8, 12, 16, 20, 26 wk by telephone) [Intensity 4] 2. Minimal care: Advice only NRT: No
Outcomes	Abstinence: PP at 12 m Validation: Significant other Died: 5 at 12 m
Notes	Validation by significant other only in 70% of cases. Included in CVD subcategory Funding: "This study was supported in part by Hartford Hospital Grant 127002". Declarations of Interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Randomised; method of sequence generation not specified
Allocation concealment (selection bias)	Unclear risk	"Drawing random numbers from an envelope"; no further details provided

Dornelas 2000 *(Continued)*

Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants and personnel not blinded
Blinding of outcome assessment (detection bias) All outcomes	High risk	Outcome assessor not blinded; no biochemical validation: "The report of a significant other was used to validate smoking status at 1 year and 70% of cases were validated".
Incomplete outcome data (attrition bias) All outcomes	Low risk	20 (20%) lost to follow-up included in ITT analysis (40/54 intervention group and 40/46 minimal care group available for 1 year follow-up)
Other bias	Low risk	No other risks of bias detected

Eisenberg 2013a

Study characteristics

Methods	Country: Canada Study dates: Information not available Recruitment: Smokers hospitalised with acute myocardial infarction Inclusion/exclusion criteria: 1. Age ≥ 18 years; 2. Smokes ≥ 10 cigarettes per day, on average, for the past year; 3. Suffered an ACS and planned hospitalisation of ≥ 24 hours. ACS is defined as positive troponin T, troponin I, or CK-MB levels and ≥ 1 of the following: 1. Ischaemic symptoms (i.e. typical chest pain) for at least 20 minutes; 2. ECG changes indicative of ischaemia (ST-segment elevation or depression); 3. Development of pathological Q waves on the ECG; Note: If patient is to undergo percutaneous coronary intervention (PCI) and/or coronary artery bypass graft surgery (CABG), they are still eligible to be enroled. 4. Willing to consider smoking cessation; 5. Able to read and understand English or French; 6. Likely to be available for follow-up. Exclusion: 1. Current seizure disorder, history of seizures, or predisposition to seizures (e.g. history of brain tumour, severe head trauma, or stroke); 2. Current use of medications that lower seizure threshold, e.g. amantadine, antidepressants, antimalarials, antipsychotics, levodopa, lithium, quinalone antibiotics, ritonavir, systemic steroids, theophyllin, type 1C antiarrhythmics (e.g. encainide, flecainide, propafenone); 3. Current use of Wellbutrin or any other medications that contain bupropion; 4. Current use of any medical therapy for smoking cessation (e.g. BuSpar, doxepin, fluoxetine, nicotine gum, or nicotine patch); 5. Excessive alcohol consumption defined as ≥ 14 alcoholic drinks per week; 6. Use of MAO inhibitors or thioridazine in the past 15 days; 7. Current diagnosis of major depression (requiring medication), bipolar disease, or dementia; 8. History of suicidal events (previous suicide attempt, suicidal ideation) or family history of suicide; 9. History of anorexia nervosa or bulimia; 10. Current use of over-the-counter stimulants (e.g. ephedrine, phenylephrine) or anorectic; 11. Diagnosed hepatic failure, cirrhosis, hepatitis or *history* of hepatic impairment (AST or ALT levels ≥ 2 times the upper limit of normal prior to admission for ACS); 12. Renal impairment (creatinine levels ≥ 2 times the upper limit of normal); 13. Pregnancy or lactation; 14. Use of any illegal drugs in the past year (e.g. opiates, cocaine, heroin); 15. Likely to be unavailable for follow-up; 16. Medical condition with a prognosis of less than 1 year.

Eisenberg 2013a *(Continued)*

Participants	Participants: 392 smokers with AMI (bupropion SR n = 192, placebo n = 200) Number smoked: 23.2 CPD Age: 53.9 yrs average Therapists: Physicians, nurses
Interventions	1. Bupropion SR + counselling: Bupropion was administered as 150 mg daily for 3 days, followed by 150 mg twice daily for the remainder of the 9-week treatment period. The behavioural counselling provided in the trial consisted of minimal clinical intervention that included brief advice to stop smoking and the importance of smoking cessation post-MI. This intervention was administered in-hospital by the attending physician before randomisation and was < 20 min. Additional counselling was received at baseline (post-randomisation) and at all follow-up at week 4, 9, month 6, 12 (both telephone and clinic visits). The sessions consisted of brief advice delivered in < 20 min (average of 5 min) and was based on the "5 A's" model. Counselling was administered to all patients by the research nurses at baseline and follow-up visits. In addition to the counselling provided by the research nurses, patients were allowed to receive supplementary counselling from the hospital stop-smoking service, if one existed [intensity 4]. 2. Placebo + counselling: Same counselling as noted above [intensity 4]
Outcomes	Abstinence: Continuous abstinence (defined as negative self-report and CO 10 ppm at all follow-up periods (longest 12 mo) Validation: Expired air CO Died: 9 in group 1, 6 in group 2
Notes	Buproprion vs. placebo (all pts got counselling) Funding: "The study was funded by the Canadian Institutes of Health Research and by the Heart and Stroke Foundation of Quebec." Declarations of Interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Internet website randomisation generator "Randomization was done via an internet website using random blocks of 2 and 4 and was stratified by center to ensure that similar numbers of patients were randomized to the 2 arms of the study at each study center."
Allocation concealment (selection bias)	Low risk	Random blocks of 2 and 4 "Randomization was done via an internet website using random blocks of 2 and 4 and was stratified by center to ensure that similar numbers of patients were randomized to the 2 arms of the study at each study center."
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Double-blind placebo-controlled design "All clinical end points were adjudicated by members of the Endpoints Evaluation Committee who were blinded to treatment assignment".
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Double-blind, biochemically validated: "Patients were considered abstinent if they abstained from smoking in the 7 days before the visit through a self-report of 0 cigarettes smoked/day, confirmed by a CO monitor reading ≤ 10 ppm."
Incomplete outcome data (attrition bias)	Low risk	In the bupropion SR group, 165/192 retained at follow-up; in the placebo group 174/200 retained

Eisenberg 2013a *(Continued)*
All outcomes

Other bias	Low risk	No other risks of bias detected

Ellerbeck 2019

Study characteristics

Methods	Country: USA Study dates: April 2010-October 2013 Recruitment: 31 rural hospitals in Kansas Inclusion/exclusion criteria: "Smokers were eligible to participate if they were ≥ 18 years of age, smoked cigarettes on ≥ 25 of the last 30 days prior to admission, and had a home address and telephone. We excluded smokers who were pregnant, terminally ill, or being discharged to a nursing facility where they could not smoke."
Participants	Participants: 606 smokers (Counselling with Care Coordination n = 310, Counselling n = 296) Number smoked: 19.4 CPD Age: 50.8 years Therapists: Physicians, counsellors
Interventions	1. Counselling with Care Coordination (CCC). The CCC intervention offered the same as Arm 2 plus provided additional care coordination, including screening for contraindications to different types of pharmacotherapy and collecting information on the types of smoking cessation treatments covered by the participant's insurance plan. Based on this information, counsellors provided a tailored list of options with a strong recommendation for pharmacotherapy using an "opt-out" approach. With the opt-out approach, counsellors asked participants which type of pharmacotherapy they would like to use from the list, rather than if they would like to use pharmacotherapy. After helping the participant choose his or her desired treatment, the counsellor faxed a prescription request to the participant's healthcare provider along with a patient action plan summarising the counselling session. Baseline inpatient requests were sent to attending physicians and post-discharge requests were sent to the patient's primary care physician. Additional prescription requests and patient action plans were sent to the provider following subsequent counselling calls to prompt medication refills or if a medication change was warranted. Counsellors sent a counselling report to the participant's physician twice during each cycle of counselling calls. Follow-up counselling for up to 7.5 mo on post d/c day 2, week 1, 3, 6 w/option for call at 6 months and option for repeating cycle at that point for 1, 3, 6 w [intensity 4]. 2. Counselling without Care Coordination. Counselling was telephone-based counselling scheduled at enrolment and day 2 and weeks 1, 3, and 6 post-enrolment. All participants were offered an additional counselling session following their month 6 assessment. A second cycle of telephone-based counselling was then offered at 1, 3, and 6 weeks after the month 6 assessment for persistent or relapsed smokers or those who had quit for less than 90 days, in addition to any who were on cessation medications regardless of how long they had been quit [intensity 4]. No pharmacotherapy provided in either group.
Outcomes	Abstinence: 7-day abstinence at 12 months validated by saliva cotinine sample or proxy contact Validation: salivary cotinine and proxy Died: 12 in group 1 and 11 in group 2
Notes	Smoking cessation counselling combined with care coordination post-hospitalisation to counselling alone Funding: "This work was supported by the National Cancer Institute of the National Institutes of Health grant number R01CA101963". Declaration of Interest: "Drs. Ellerbeck, Cox, Hui, Keighley, Hutcheson, Cupertiono, Greiner, Miller, Rabius, and Richter and Ms. Fitzgerald report grants from the National Institutes of Health during the con-

Ellerbeck 2019 *(Continued)*

duct of the study. Dr. Rigotti reports grants from NCI, during the conduct of the study; personal fees from UpToDate, Inc.; personal fees from Achieve Life Sciences; and grants and non-financial support from Pfizer, outside the submitted work."

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not clearly stated but randomised centrally presumably by computer "We randomized patients in blocks of 4 at each hospital to reduce the potential for confounding by treatment site."
Allocation concealment (selection bias)	Unclear risk	Not clearly stated but randomised centrally presumably by computer
Blinding of participants and personnel (performance bias) All outcomes	High risk	Patients and counsellors knew to which study arm they were assigned.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Not stated if f/u assessors were blinded; biochemically validated: "A salivary cotinine level of < 15 ng/mL was used to confirm abstinence."
Incomplete outcome data (attrition bias) All outcomes	Low risk	Similar between groups, at 12-month follow-up; 212/310 participants for counselling with care coordination, and 284/296 for counselling
Other bias	Low risk	No other risks of bias detected

Feeney 2001

Study characteristics

Methods	Country: Australia Study dates: Information not available Recruitment: Smokers admitted to coronary care with an acute myocardial infarction (AMI) Inclusion/exclusion criteria:: "One hundred and ninety-eight patients sequentially admitted to the coronary care unit (CCU) were identified by nursing staff as current cigarette smokers (tobacco use in the week before hospitalisation). All had suffered AMI, documented by two or more of the following: elevated serum creatine phosphokinase, history of prolonged ischaemic chest pain and the appearance of new Q waves or evolving ST segment change on an electrocardiogram."
Participants	Participants: 198 current smokers admitted to coronary care with an AMI (Staying Free group n = 96, usual care group n = 102) Number smoked: 130 of 198 participants (66%) smoked greater than 10 CPD (data reported categorically) Age: 53.9 years Therapist: Staff cardiologist and smoking cessation nurse counsellors
Interventions	Stanford Heart Attack Staying Free programme (intervention): Staff cardiologist advised all patients to stop smoking. Patients were also interviewed by a tobacco counsellor and enroled in a behavioural counselling programme. They were given the programme manual, "Staying Free", designed to identify

Feeney 2001 *(Continued)*

	high-risk relapse situations. Patients worked through the manual during a 2-week period across inpatient and outpatient settings. At discharge, the smoking nurse counsellor initiated telephone contact weekly for 4 weeks at 2, 3, 6, and 12 months. Additional counselling was provided if deemed necessary by staff. Usual care: verbal and printed advice provided about tobacco cessation. It was primarily didactic. Patients watched an educational video during their cardiac stay and were reviewed by the smoking cessation nurse. Outpatient ADAU supportive counselling and follow-up was offered at 3-, 6-, 12-month intervals. All patients were advised by the attending cardiologist to stop smoking.
Outcomes	Abstinence: Verified abstinence at 12 months Validation: Urinary cotinine Died: 9 total (4 in intervention and 5 in usual care)
Notes	Funding: Information not available Declarations of Interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Random sequence generation did not appear to be used and authors noted that despite randomisation, an administrative error resulted in 96 patients in the intervention programme and 102 patients in the usual care programme and two omissions.
Allocation concealment (selection bias)	Low risk	"A random list of odd and even numbers was generated and a sequence of 200 sealed envelopes created."
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	No details provided on blinding of participants and personnel
Blinding of outcome assessment (detection bias) All outcomes	Low risk	No details provided on blinding of outcome assessment; however, biochemical verification (cotinine samples) was used for primary outcome.
Incomplete outcome data (attrition bias) All outcomes	High risk	Assessed only those participants who attended a follow-up programme and had a large and unequal percentage of losses to follow-up (47/96 SF group and 21/102 UC group available at 12-month follow-up)
Other bias	Low risk	No other risks of bias detected

Fellows 2016a

Study characteristics

Methods	Country: USA Study dates: Information not available Recruitment: Patients admitted to one of three large hospitals Inclusion/exclusion criteria: "The study population comprised adult patients (aged ≥ 18 years) who had been admitted to one of the hospitals and reported having smoked a cigarette (even a puff) within the previous 30 days, spoke English, had a working telephone, and were interested in remaining abstinent from smoking post-dis-

Fellows 2016a *(Continued)*

	charge. Because of the need for 6-month in-person follow-up and biochemical confirmation tests, eligibility was restricted to patients living within 50 miles of their hospital. Patients were also excluded if they were admitted to a critical care, labour/delivery, or psychiatric unit; were pregnant or breastfeeding; had access restrictions (e.g. isolation bed due to resistant infections); were physically too ill to participate in a research study (i.e. could not complete the 6-month follow-up); or were cognitively unable to provide informed consent."
Participants	Participants: 898 smokers who had smoked in the previous month (AR + IVR n = 597, usual care n = 301) Number smoked: 13 CPD Age: 53.27 yrs average Therapists: Trained health educators or quitline counsellors
Interventions	1. Assisted referral to quitline (AR) plus IVR: The AR + IVR patients were offered the UC cessation consult and materials, as well as assistance in enroling in outpatient cessation programmes. At the HMO site, patients could accept a bedside warm transfer call to HES or arrange a callback at a more convenient time. Trained HES behavioural interventionists discussed programme options and encouraged enrolment. Programmes included evidence-based single and multi-session telephone counselling, individual and group classes, and an interactive web-based programme. Community and academic hospital participants were offered a faxed referral to the Oregon or Washington state quitline (1-800-QUIT-NOW) for evidence-based proactive single or multiple call counselling. They could recieve weekly calls for up to 12 weeks [intensity 4]. Pts could also have pharmacotherapy included in discharge orders up to 12 weeks: arranging for quit medications to be included in discharge medication orders. Patients could accept or refuse the referral offer. The state quitlines offered NRT, bupropion, or varenicline (prescriptions and dispensing) based on patients' insurance coverage. HMO patients interested in medications received nicotine-replacement therapy (NRT; transdermal patches, lozenges, gum), bupropion, or varenicline, as part of their discharge medication packet. Medication orders were electronically submitted, approved, and processed prior to discharge. Overall, they could get up to 12 weeks of meds. 2. Usual care: The consultations were designed to take about 15 minutes. The UC intervention involved a tobacco use and quit history assessment, discussion of the health consequences of tobacco use and benefits of quitting (focusing on the latter), and tailored discharge treatment recommendations based on patients' tobacco history and personal circumstances. included a single, brief follow-up call shortly after discharge to assess smoking status [intensity 3]. Pharmacotherapy recommendations also made.
Outcomes	Abstinence: past 7-day confirmed PPA at 6 mo Validation: Breath CO and salivary cotinine Died: 21 in group 1 and 7 in group 2
Notes	Assisted referral plus IVR (AR + IVR) vs. usual care (UC) tobacco-cessation consultation for hospitalised smokers Funding: "Funding was provided by the National Heart, Lung, and Blood Institute (U01 HL105231; clinical trials registration, NCT01236079)." Declarations of Interest: information not available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Computer generated (the study statistician managed randomisation procedures and fidelity. Randomisation was conducted via a selection and documentation procedure that ensured balanced enrolment over time, blinded the TTS, and prevented post-randomisation assignment changes. Each site assigned patients using secure, preprinted, sequentially numbered randomisation envelopes. Randomised block sizes maintained group balance and prevented TTS staff from guessing assignment. Randomisation fidelity was monitored regularly by comparing information from the randomization log, pre-

Fellows 2016a *(Continued)*

		screening priority list, and the consult and enrolment checklists. Study investigators and follow-up staff were blinded to treatment group assignment).
Allocation concealment (selection bias)	Low risk	Each site assigned patients using secure, preprinted, sequentially numbered randomisation envelopes.
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Study investigators and follow-up staff were blinded to treatment group assignment.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Study investigators and follow-up staff were blinded to treatment group assignment. Biochemical validation: "Thus, abstinence was biochemically confirmed if both salivary cotinine (≤ 10 ng/mL25) and CO (≤ 5 ppm) tests were consistent with quitting."
Incomplete outcome data (attrition bias) All outcomes	Low risk	All participants analysed at 6-month follow-up (467/597 AR + IVR completed follow-up, 242/301 usual care completed follow-up); participants lost to follow-up were coded as smokers.
Other bias	Low risk	No other risks of bias detected

Froelicher 2004

Study characteristics	
Methods	Country: USA Study dates: October 1996-December 1998 Recruitment: Inpatients with CVD or PVD admitted to 10 hospitals Inclusion/exclusion criteria: All women recruited were evaluated according to the following initial criteria for inclusion: (1) they were admitted to the hospital for medical or surgical treatment of CVD or peripheral vascular disease; (2) they were 18 years of age or older; (3) they had a history of smoking cigarettes within the past 1 month; (4) they were willing to make a serious attempt to quit smoking and not to smoke after their discharge from the hospital; (5) they were medically stable and able to provide informed consent; and (6) they agreed to give written informed consent to participate in the trial, which required a commitment to 30 months of participation. Eligible women were also screened for potential alcohol abuse with the CAGE questionnaire; women with a score > 2 were excluded. The exclusion criteria were (1) an inability to read or speak English, (2) being medically unstable, (3) having a current diagnosis of alcohol or substance abuse, and (4) having dementia or schizophrenia.
Participants	Participants: 277 current smokers or recent quitters (smoked in past month), willing to make serious quit attempt at discharge (usual care group n = 135, intervention group n = 142) Gender: All females Number smoked: 20 cpd Age: 61 yrs av Therapists: Physician and nurse
Interventions	1. Intervention group: Physician advice to quit, nurse counselling (30-45 mins, type cognitive/behavioural and relapse prevention); follow-up (5 x at 2, 7, 21, 28, 90 days by telephone (5-10 min/call) [Intensity 4] 2. Usual care group: modified usual care (physician advice + booklet) NRT: Patch or gum offered to selected women after discharge who had relapsed and wanted to try to quit (pharmacotherapy used by 20% of intervention and 23% of control group)
Outcomes	Abstinence: 7-day PP at 12 m Validation: Saliva cotinine < 14 ng/mL OR family/friend verification

Froelicher 2004 *(Continued)*

	Died: 11 at 12 m
Notes	Included in CVD subcategory Funding: "This study was funded by grant No. R01H150749 (8/1/1996–6/30/2002) from the National Institutes of Health National Heart, Lung, and Blood Institute." Declarations of interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	"Randomization was by random permuted blocks, stratified by hospital, with an equal chance of assignment to the usual-care group or the intervention group."
Allocation concealment (selection bias)	Low risk	"Randomization was by random permuted blocks, stratified by hospital, with an equal chance of assignment to the usual-care group (UG) or the intervention group (IG)."
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants and personnel not blinded
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Outcome assessor was blinded. Biochemical validation: "If a participant did not provide a saliva sample for cotinine verification, confirmation of her nonsmoking status was obtained from her family or friends instead; if they did not contradict her self-report of nonsmoking, then she was considered a nonsmoker for her latest follow-up period."
Incomplete outcome data (attrition bias) All outcomes	Low risk	20 participants (13 intervention; 7 control) lost to follow-up included in meta-analysis as smokers; 11 deaths excluded from meta-analysis
Other bias	Low risk	No other risks of bias detected

Garcia-Pazo 2021

Study characteristics

Methods	Country: Spain Study dates: November 2019- April 2020 Recruitment: Smokers admitted to a public hospital in the Migjorn health sector in the Balearic Islands Inclusion/exclusion criteria: The following inclusion criteria were used: "(1) age over 18 years old; (2) smoking five or more cigarettes per day; (3) expressing a desire to remain abstinent after hospital discharge; (4) a minimum hospitalisation period of 24 h in the reference hospital of the study; (5) having a personal Smartphone (Android or IOs); (6) understanding the Spanish language; (7) having sufficient cognitive capacity to understand the treatment. Exclusion criteria were: (1) being diagnosed with any mental illness, (2) substance abuse, or active alcoholism, and (3) participating in a smoking cessation treatment prior to admission."
Participants	Participants: 110 current smokers (TAU n = 49. NoFumo+ app n = 61) Number smoked: 20.68 CPD Age: 56.27 yrs av

Garcia-Pazo 2021 *(Continued)*

	Therapists: Staff at Tobacco Detoxification Unit provided usual care; intervention delivered by tech platform/not a human
Interventions	1. Treatment through the NoFumo+ app, available free of charge for Android and iOS devices, after obtaining an access code provided by the hospital's Tobacco Detoxification Unit (TDU). The app administered a multicomponent programme with CBT, consisting of second-generation CT with extensive scientific evidence in the field of smoking cessation. The treatment lasted 30 days and was distributed in 15 sessions represented by numbered boxes that formed a circle [intensity 4]. 2. Treatment-as-usual (TAU) Educational brochure No medication provided in either group
Outcomes	Abstinence: SR PPA 24 wks Validation: None Died: 0 in group 1, 1 in group 2
Notes	The main objective of this study is to evaluate the efficacy of the NoFumo+ app for smoking cessation or reducing cigarette consumption, compared to the usual treatment (information brochure), in hospitalised smokers. Funding: "This research was funded for publication by the College of Nursing of the Balearic Islands in the framework of Support for Research Projects (grant number PI-2020/0439). This research received no specific grant from any funding agency in the commercial or not-for-profit sectors." Declarations of Interest: "The authors declare not to have conflict of interest." Study found in search of trial registers

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Pseudorandomised (every other pt assigned to INT) "the participants were pseudo-randomly distributed in each of the two branches of the trial (EG and CG), so that participants were assigned to each group alternately."
Allocation concealment (selection bias)	High risk	Not concealed
Blinding of participants and personnel (performance bias) All outcomes	High risk	Not possible to blind
Blinding of outcome assessment (detection bias) All outcomes	High risk	No mention that outcome assessors blinded; no biochemical validation
Incomplete outcome data (attrition bias) All outcomes	High risk	High loss to follow-up post-randomisation (at follow-up 2, 34/49 participants were analysed in TAU group and 38/61 in NoFuno+ app group)
Other bias	Low risk	No other risks of bias detected

Hajek 2002

Study characteristics	
Methods	Country: UK Study dates: Information not available Recruitment: Inpatients with acute MI Inclusion/exclusion criteria: "Patients admitted after myocardial infarction or for coronary bypass surgery were screened for eligibility. Participants were current smokers or those who had recently stopped smoking. All patients had recovered enough to receive the intervention, had no gross memory impairment, were under 76 years of age, could read English, had not smoked at all since admission to hospital, and were motivated to stop smoking permanently."
Participants	Participants: 540 current smokers. (control group n = 266, intervention group n = 274) Number smoked: 23 cpd Age: 56 yrs av Therapists: cardiac rehabilitation nurse
Interventions	1. Intervention group: Nurse advice. Counselling (1 x, total 20-30 min). Self-help materials [Intensity 2] 2. Control: Brief advice and booklet NRT: No
Outcomes	Abstinence: PP at 12 m, with visit to self-reported non-smoker Validation: Expired air CO and salivary cotinine Died: 35 at 12 m
Notes	Included in CVD subcategory Funding: "NHS research and development programme on cardiovascular disease and stroke." Declarations of Interest: "None declared"

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	"Participants...were randomised to the intervention or control group on a 1:1 ratio by nurses opening a serially numbered.... envelope."
Allocation concealment (selection bias)	Low risk	Nurses opened a "serially numbered, opaque, sealed envelope designating the patient's allocation."
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants and personnel not blinded
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Outcome assessment process was blinded. Biochemical validation: "They also had to have an expired carbon monoxide reading < 10 ppm and, at 12 months, a salivary cotinine concentration < 20 ng/mL."
Incomplete outcome data (attrition bias) All outcomes	Low risk	No significant differences in numbers lost to follow-up (at 12-month follow-up 240/266 analysed in control group and 230/274 analysed in intervention group) or patients who had died or moved away. Those who had died or moved away excluded from outcome data; those lost to follow-up counted as smokers
Other bias	Low risk	No other risks of bias detected

Harrington 2016

Study characteristics	
Methods	Country: USA Study dates: July 2011-May 2013 Recruitment: Inpatients at a tertiary care hospital Inclusion/exclusion criteria: Patients identified as current smokers at admission were recruited to the study if they met study inclusion criteria: 1.aged > 18 years; 2. English-speaking/reading; 3.cognitively and physically able to participate; 4. current smoker (self-identified and smoked at least one cigarette in previous 30 days); 5. having Internet and email access; 6. not having another household member participating in the study. In addition, patients under isolation precautions, except for contact isolation only, were not approached for participation.
Participants	Participants: 1488 current smokers (intervention n = 744, usual care only n = 744) Number smoked: 14.1 CPD Age: 41.6 yrs av Therapists: Hospital-based TTS
Interventions	1. Intervention: participants were visited at bedside by hospital-paid Quit Staff and oriented to an adapted version of Decide2Quit (www.Decide2Quit.org), a WATI guided by Social Cognitive Theory and the Transtheoretic Model. This included website registration assistance and instructions for access from home. For patients discharged prior to website registration, access instructions were mailed to allow telephone-assisted registration at home. Emails encouraged quitting and use of the website with messages from either peers or experts. Follow-up telephone contacts were attempted by Quit Staff at 7–14 days post-charge to encourage website use in the context of the primary health concern area, but no additional counselling was provided [intensity 3]. 2. Usual care only: Brief advice to quit in hospital [intensity 1]
Outcomes	Abstinence: self-reported 30-day abstinence Validation: None Died: 27 in group 1, 18 in group 2
Notes	Usual care (UC; brief bedside advice to quit, a quit plan template, and quitline contact information) vs. UC + web intervention (access to a website with asynchronous e-message communication with a tobacco counsellor, use of interactive self-assessments, helpful cessation information, and access to additional web resources, as well as automated email messages tailored for health concern and readiness to quit) Funding: "The funding source was the National Institute of Drug Abuse". Declarations of Interest: "No financial conflicts of interest were reported by the authors of this paper."

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Computer-generated randomisation schedule
Allocation concealment (selection bias)	Low risk	Computer generated randomisation: "randomized to study condition (Web Intervention [WI] or Usual Care [UC]) following an assignment list developed by the study statistician with SAS PROC PLAN within blocks of four per each patient care unit"

Harrington 2016 *(Continued)*

Blinding of participants and personnel (performance bias) All outcomes	High risk	Staff and patients were aware of study arm assigned (but this was a behavioural intervention).
Blinding of outcome assessment (detection bias) All outcomes	Low risk	"Treatment blind interviewers conducted 6 month calls" Smoking cessation biochemically verified: "Abstinence was biochemically verified among a subset of self-identified past 30–day abstainers at follow-up using a level of < 10 ng/mL for verified abstinence."
Incomplete outcome data (attrition bias) All outcomes	Low risk	Similar loss to follow-up rates by group and overall 85% follow-up (607/748 in intervention group and 630/740 in usual care group at 6-month follow-up)
Other bias	Low risk	No other risks of bias detected

Hasan 2014a

Study characteristics	
Methods	Country: USA Study dates: October 2006 and May 2009 Recruitment: Inpatients with cardiac or pulmonary dx at 1 hospital Inclusion/exclusion criteria: "All current smokers between the ages of 18 and 75 years admitted with a cardiac or pulmonary illness were electronically identified. Patients with a terminal illness, history of substance abuse, or a major psychiatric disorder were excluded. Psychiatric diagnoses were identified from the medical history and included schizophrenia, bipolar and personality disorders. We also excluded patients who were pregnant, patients who could not be followed after hospital discharge due to cognitive or language barriers, and patients who received hypnotherapy or NRT within the past six months."
Participants	Participants: 122 current smokers (hypnotherapy n = 41, NRT n = 41, NRT with hypnotherapy n = 40) Number smoked: 20 CPD Age: 55 yrs av Therapists: TTS
Interventions	1. Hypnotherapy + NRT: counselling session in hospital + 1 90-minute in-person hypnotherapy session 1-2 weeks after discharge + f/u phone calls for all groups at 1, 2, 4, 8, 12 weeks [intensity 4]; plus nicotine patch x 1 month 2. Hypnotherapy alone: counselling session in hospital + 1 90-minute in-person hypnotherapy session 1-2 weeks after discharge + f/u phone calls for all groups at 1, 2, 4, 8, 12 weeks [intensity 4] 3. NRT w/standard counselling: Nicotine patch x 1 month and counselling in hospital only + f/u phone calls after discharge for all groups at 1, 2, 4, 8, 12 weeks [intensity 4]
Outcomes	Abstinence: Cotinine verified (urine cotinine < 15ng/mL) past 7-day abstinence rate at 26 weeks Validation: urinary cotinine Died: 2 in group 1, 0 in groups 2 and 3
Notes	Hypnotherapy + NRT vs. NRT vs. hypnotherapy Funding: "This work was supported by the Norman H. Read Charitable Trust Foundation." Declarations of Interest: "No authors have any conflict of interest to declare."

Hasan 2014a *(Continued)*

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Permuted blocks of 3 with assignments sequentially numbered but did not say who or how the sequence was generated.
Allocation concealment (selection bias)	Low risk	Study coordinator had randomisation sequence and staff and patients were blinded "Randomized assignments were concealed from both patients and research staff until patients had signed the informed consent document and were enrolled in the study".
Blinding of participants and personnel (performance bias) All outcomes	High risk	Behavioural intervention; staff aware of allocation
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Not stated if f/u assessors were blinded; primary outcome was biochemically confirmed: "The primary outcome measure was 7-day prevalence of tobacco abstinence at 26 weeks post-hospitalization, as determined by self-report and verified by urinary cotinine levels (a level of less than 15 ng/mL was considered indicative of abstinence)."
Incomplete outcome data (attrition bias) All outcomes	Low risk	High follow-up rate and similar between groups (41/41 hypnotherapy group, 39/41 NRT group, 38/40 NRT with hypnotherapy group)
Other bias	Low risk	No other risks of bias detected

Hasuo 2004

Study characteristics

Methods	Country: Japan Study dates: Information not available Recruitment: Inpatients (all diagnoses) to 1 hospital Inclusion/exclusion criteria: Intending to be quit on day of discharge
Participants	Participants: 120 current smokers or recent quitters (smoked in past month) Diagnoses include cancer (n = 37), cardiac (n = 57) Age: not stated Therapists: Nurse
Interventions	1. Intervention: nurse counselling (3 x 20-min sessions). Follow-up (3 x at 7, 21, 42 days by telephone) (5 min/call) [Intensity 4] 2. Control: In-hospital: same as intervention (nurse sessions, 3 x 20 min each) but no follow-up contact [Intensity 2] NRT: No
Outcomes	Abstinence: Abstinence at 12 m (type not stated) Validation: urinary cotinine at 12 m Died: 6 at 12 m
Notes	Not clear whether results were self-reported or cotinine-validated

Hasuo 2004 *(Continued)*

Funding: Information not available

Declarations of Interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Computerised randomisation stratified by smoking status, FTND, and self-efficacy
Allocation concealment (selection bias)	Low risk	Computerised programme randomly assigned individual participants.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants and personnel not blinded
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Outcome assessment process was blinded.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	More control participants missing outcome data at 12 m than intervention group (9 versus 5). MA denominators excluded 6 deaths, but included 8 who were still smoking on day of discharge. This gives a marginally larger relative effect.
Other bias	Low risk	No other risks of bias detected

Hennrikus 2005

Study characteristics

Methods	Country: USA Study dates: Information not available Recruitment: Inpatients (all diagnoses) admitted to 4 hospitals Inclusion/exclusion criteria: Information not available
Participants	Participants: 2095 current smokers (smoked in past week and considered themselves to be regular smokers in the month before admission) Age: 47 yrs av. Therapists: Physician and nurse
Interventions	1. Intervention: Physician advice to quit (60 seconds) + smoking cessation booklet + additional mailed booklet after discharge [Intensity 1] 2. Intervention: Physician advice to quit (60 seconds) + nurse counselling (motivational interviewing and relapse prevention) for 20 min. av. (note: 43% of counselling sessions conducted after discharge by telephone rather than at bedside). Follow-up: 3-6 phone calls over 6 m (10 min/call median) [Intensity 4] 3. Control: modified usual care: smoking cessation booklet in hospital NRT: No
Outcomes	Abstinence: 7-day PP at 12 m Validation: Saliva cotinine (< 15 ng/mL)

Hennrikus 2005 *(Continued)*

	Died: 78 at 12 m
Notes	High and differential levels of refusal to provide validation/misreporting Funding: Information not available Declarations of Interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Method of sequence generation not specified
Allocation concealment (selection bias)	Unclear risk	"Research assistants... randomized [participants] to one of three treatment conditions by looking up the next available group assignment on a list on which the three conditions were randomly ordered within blocks of 30 assignments."
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants and personnel not blinded
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Outcome assessment process was blinded.
Incomplete outcome data (attrition bias) All outcomes	Low risk	78 deaths and ineligible (too ill) for follow-up excluded from denominators; all other participants missing data at final follow-up counted as smokers. Similar numbers lost to follow-up in all groups
Other bias	Low risk	No other risks of bias detected

Hornnes 2014a

Study characteristics

Methods	Country: Denmark Study dates: November 2005-September 2007 Recruitment: Current smokers hospitalised at 2 Copenhagen University Hospitals Inclusion/exclusion criteria: Diagnosis of TIA or stroke, discharged to their own home, without cognitive deficits preventing written consent, expected to live 2 years or more
Participants	Participants: (254 total including both current and former smokers), 125 current smokers randomised (intervention n = 116, control n = 138) Number smoked: not stated Age: 70 yrs av. Therapists: Study nurses
Interventions	1. Intervention: 1 session of lifestyle counselling by nurse in hospital. After discharge, 4 1-hour nurse delivered MI-based smoking cessation counselling sessions delivered at patient's home; also given written material and information about the free national quitline. Pts contacted at months 1, 4, 7, and 10 after discharge [intensity 4]

Hornnes 2014a *(Continued)*

	2. Control: 1 session of lifestyle counselling by nurse in hospital. No f/u contacts [intensity 1] No medication provided in either group
Outcomes	Abstinence: smoking status at 2 year f/u; no details how this outcome measured Validation: None Died: 4 in group 1 and 4 in group 2
Notes	Post-discharge behavioural support via home visits vs usual care (no f/u) Funding: "This study was supported by the Ludvig and Sara Elsass Foundation, the Lundbeck Foundation and The Danish Heart Foundation (Grant 07-4-B703-A1378-22384F)." Declarations of Interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Statistician developed computer generation programme. "An independent statistician produced a computer-generated block randomisation programme with concealed block size and allocation sequence with stratification according to baseline blood pressure < 140/90 mmHg/≥ 140/90 mmHg 1:1."
Allocation concealment (selection bias)	Low risk	Computer-generated sequence but details not given
Blinding of participants and personnel (performance bias) All outcomes	High risk	Blinding not possible for behavioural intervention and very different intervention intensities
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Outcome assessors were blinded to group allocation; no biochemical validation
Incomplete outcome data (attrition bias) All outcomes	Low risk	Good follow-up rate and attrition presented (105/116 participants in intervention group and 123/138 participants in control group analysed at 2-year follow-up)
Other bias	Low risk	No other risks of bias detected

Jimeno 2022

Study characteristics

Methods	Country: Spain Study dates: April 2019-March 2020 Recruitment: Cardiac ward patient in 1 hospital Inclusion/exclusion criteria: Smokers who had acute coronary syndrome admitted to 1 hospital
Participants	Participants: 72 smokers Number smoked: 22 CPD Age: 53 yrs average Therapists: Cardiac rehab staff

Jimeno 2022 *(Continued)*

Interventions	1. In-hospital: brief advice to quit, cognitive behavioural intervention, self-help material provided + cardiac rehab groups with motivational interviewing and cognitive behavioural intervention [intensity 4] 2. Nothing in hospital. At cardiac rehab: groups with motivational interviewing and cognitive behavioural intervention [intensity 4] No medications provided in either group
Outcomes	Abstinence: Point prevalence abstinence confirmed by CO at 52 weeks Validation: Expired breath CO Died: Not stated
Notes	Spanish text only, translated to extract; Smoking cessation intervention begun in hospital vs after discharge at cardiac rehab amongst ACS patients

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not discussed in article
Allocation concealment (selection bias)	Unclear risk	Not discussed in article
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Not discussed in article
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Not discussed in article
Incomplete outcome data (attrition bias) All outcomes	Low risk	Loss to follow-up was clearly described including attrition.
Other bias	Low risk	No other risks of bias detected

Kim 2019

Study characteristics

Methods	Country: S Korea Study dates: September 2014-May 2016 Recruitment: Inpatients with ACS Inclusion/exclusion criteria: Current smokers (amount of smoking not defined), who had acute coronary syndrome (acute MI or unstable angina), and were scheduled to undergo PCI with consciousness during the procedure
Participants	Participants: 266 current smokers (aversive advice group n = 33, control group n = 33) Number smoked: not stated Age: 55.9 yrs Therapists: Physicians

Kim 2019 *(Continued)*

Interventions	1. Aversive advice group: 3 aversive (negative framed) statements given during the PCI procedure about smoking as a cause of chest pain, need to quit smoking now, and risk of death if smoking continues [intensity 1] 2. Control group: no aversive statements given during PCI procedure No meds in either group
Outcomes	Abstinence: cotinine verified (urine cotinine < 30 ng/mL) smoking cessation rate at 24 weeks - exact self-report measure not defined Validation: Urinary cotinine Died: Not stated
Notes	Brief aversive advice in hospital w/ no f/u intervention vs no advice Funding: Information not available Declarations of Interest: "The authors report no relationships that could be construed as a conflict of interest."

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Computer-generated randomisation list
Allocation concealment (selection bias)	Unclear risk	Computer-generated but a list and it was not stated how assignment was done. "Randomization was carried out using a computer-generated randomization list."
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Blinding not possible due to behavioural intervention but investigator "did not have any involvement in" the interventional advice.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Not stated who measured outcome but biochemically validated outcome measure, "At every visit, urine nicotine metabolite (cotinine) levels were measured. Cotinine levels < 50 ng/mL were considered to denote no active smoking".
Incomplete outcome data (attrition bias) All outcomes	Low risk	No loss to follow-up at 24 weeks
Other bias	Low risk	No other risks of bias detected

Kumar 2017

Study characteristics

Methods	Country: Ireland Study dates: Information not available Recruitment: All identified inpatient smokers Inclusion/exclusion criteria:

Kumar 2017 *(Continued)*

	Inclusion criteria were: all identified inpatient smokers Exclusion criteria were: 1. Advised by ward manager that patient was too unwell or cognitively impaired, or otherwise unsuitable; 2. Death during hospitalisation; 3. Receiving palliative care; 4. Under 18 years old; 5. To be transferred to another hospital; 6. Non-English-speaking; 7. Inpatient in psychiatric ward.
Participants	Participants: 67 smokers (intervention n = 33, usual care n = 34) Number smoked: 17.4 CPD Age: 58.6 yrs av. Therapists: Medical students
Interventions	1. Intervention: The medical students delivered a brief (approximately 15 min) consultation with the patient that was based on principles of social cognitive theory and motivational interviewing. Materials consisted of a handbook for students provided during the motivational interviewing training, some student prompt sheets which also contained the outcomes of interest, along with videos of motivational interviewing interactions posted to the Royal College of Surgeons in Ireland (RCSI) virtual learning environment [intensity 3]. 2. Usual care: This group received whatever treatment happened as a normal part of the inpatient stay (e.g. a visit from the smoking cessation officer). In usual care, if patients request cessation services, physicians may prescribe pharmacotherapy and/or refer them to the hospital cessation officer or the national quitline (www.quit.ie, Freephone 1800 201,203).
Outcomes	Abstinence: self-reported 7-day point prevalent abstinence rates assessed at 6 months Validation: None Died: 1 in group 1, 1 in group 2
Notes	Brief cessation intervention delivered by a medical student vs usual care Funding: "Funded by the RCSI Senior Management Team, who had no role in the study design, data collection, analysis, interpretation of data or in writing the manuscript." Declarations of Interest: "FD gives one lecture on smoking to the students who participated. He has also accepted an honorarium from Abbvie for speaking on the topic of medication adherence. SS and FD obtained funding to conduct this study (see below). Other authors declare that they have no competing interests".

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Patients were block-randomised using the user-written Stata ralloc command, with random block sizes ranging from 2 to 10, by FD.
Allocation concealment (selection bias)	Low risk	Student interventionists were randomly allocated, without replacement, to each intervention patient in turn.
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Partial blinding: "AK was blind to group allocation when recruiting the patients. No other blinding was implemented."
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	AK was blind to group allocation when recruiting the patients. No other blinding was implemented; no biochemical validation

Kumar 2017 *(Continued)*

Incomplete outcome data (attrition bias) All outcomes	Low risk	< 50% lost (17/33 analysed in intervention group, and 25/34 analyzed in usual care group at 6-month follow-up); f/u and analyses ITT; LTFU clearly documented
Other bias	Low risk	No other risks of bias detected

Lacasse 2008

Study characteristics	
Methods	Country: Canada Study dates: Information not available Recruitment: patients with expected LOS >= 36 hours in 1 tertiary cardiopulmonary centre Inclusion/exclusion criteria: Eligible patients who accepted participation were immediately assigned to one group; no other information available
Participants	Participants: 196 current smokers Diagnosis: Mainly cardiology (63%) and pneumology (27%) Age: 52 yrs av. Gender: 64-68% male Willingness to quit: yes, patients in the precontemplation stage of change were excluded. Therapists: counsellors (no further definition)
Interventions	1. Intervention: strong quit smoking message from the treating physician, self-help material, brief cessation counselling with counsellor, pharmacology adjuncts. Follow-up: 4 telephone calls within 6 wks post-discharge [Intensity 4] 2. Control: usual care, no specific instructions on how to quit smoking Pharmacotherapy: NRT offered to all patients in the intervention group (18 patients used)
Outcomes	Abstinence: 7-day PP at 6 and 12 months Validation: urinary cotinine (< 200 ng/mL) but non-validated quit rates used in the meta-analysis Died: 1 in intervention group
Notes	Study stopped early because of lack of efficacy. Non-validated quit rates used in this meta-analysis instead of cotinine-validated because only half of participants had validation. Mainly cardiac and pulmonary patients but could not separate results Funding: Information not available Declarations of Interest: none

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**

Lacasse 2008 *(Continued)*

Random sequence generation (selection bias)	Low risk	"table of random numbers"
Allocation concealment (selection bias)	Unclear risk	"Those who were eligible and who accepted to participate were immediately assigned to either the intervention or the control group by one of the hospital pharmacists". Method not specified
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Participants were blinded.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Authors biochemically confirmed smoking, but we are presenting data on self-reported smoking in our review.
Incomplete outcome data (attrition bias) All outcomes	Low risk	Similar numbers lost in both groups (14/99 intervention, 13/97 usual care), "analyses were run according to the intention-to-treat principle."
Other bias	Low risk	No other risks of bias detected

Ladapo 2020

Study characteristics	
Methods	Country: USA Study dates: Information not available Recruitment: Hospitalised participants from the Veterans Affairs (VA) New York Harbor Healthcare System's Manhattan campus from July 15, 2015 to March 27, 2018 Selection: Hospitalised patients were eligible for enrolment if they were at least 18 years old, smoked tobacco during the 30 days prior to hospitalisation, had an active US phone number, resided in the New York City area or had the ability to return to the Manhattan VA for at least 1 year, were contemplating smoking cessation as assessed by readiness to quit, and were able to provide consent in English. Patients were excluded who had an anticipated discharge to an institution (i.e. a nursing home or long-term care facility) at which the patient would be subject to restrictions on smoking.
Participants	Participants: 182 past 30 d smokers (enhanced usual care n = 92, financial incentives n = 90) Number smoked: 11.5 CPD Age: 58 yrs average Therapists: Community-based and quitline-based counsellors
Interventions	1. Financial incentives: pts incentivised to participate in counselling (both community-based counselling and state Quitline counselling) and it appears pts are incentivised to take meds from quitline [intensity grade not applicable]. 2. Enhanced usual care: included hospital-directed tobacco-use screening, counselling, education, and pharmacotherapy, all at the discretion of nursing and physician staff, and referral to a state Quitline (this component represented the enhancement) [intensity 1]
Outcomes	Abstinence: Biochemically confirmed past 7-day PPA at 6 mo Validation: Salivary cotinine Died: 4 in group 1, 2 in group 2
Notes	Funding: "Robert Wood Johnson Foundation (Grant 74140) and NIH K24 DA038345"

Ladapo 2020 *(Continued)*

Declarations of Interest: None declared

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	"We employed a computer-generated block randomization design".
Allocation concealment (selection bias)	Low risk	Research staff implemented the allocation sequence using numbered, sealed opaque envelopes.
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	No data provided on blinding of personnel
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No data provided on blinding of outcome assessment
Incomplete outcome data (attrition bias) All outcomes	Low risk	72/92 participants in enhanced usual care completed 6-month follow-up; 65/90 participants in the financial incentives group completed 60-month follow-up.
Other bias	Low risk	No other risks of bias detected

Le Mao 2020

Study characteristics

Methods	Country: France Study dates: August 2012-November 2015 Recruitment: Smoking inpatients with COPD at 11 French hospitals Inclusion/exclusion criteria: "Current smokers presenting a COPD exacerbation in accordance with ATS/ERS criteria that justified a hospitalisation at least for 24 h in chest medicine or in intensive care units were eligible. Participants were smokers (≥ 10 cigarettes per day during the last year) and motivated to quit smoking. Patients who used concomitant treatment for smoking cessation at the time of inclusion or/with a past history of severe depression requiring therapy drugs within 5 years or/with 2 or more episodes of severe depression requiring medication and an attempted suicide were not included."
Participants	Participants: 81 current smokers (varenicline n = 42, placebo n = 39) Number smoked: 23.1 CPD Age: 56.8 yrs average Therapists: Not stated
Interventions	1. Varenicline: Intensive counselling consisted of a more than 10-min interview based on COPD patient counselling adapted methods. Investigators from each centre were free to choose the kind of motivational and/or behavioural approaches during interviews. In-person (in clinic) at weeks 1, 4, 8, 12, 26, 52. Phone counselling at weeks 2, 18, 34, 42 [intensity 4]. Plus varenicline x 12 weeks (presumed started in hospital) 2. Placebo: Intensive counselling consisted of a more than 10-min interview based on COPD patient counselling adapted methods. Investigators from each centre were free to choose the kind of motivational and/or behavioural approaches during interviews. In-person

Le Mao 2020 *(Continued)*

	(in clinic) at weeks 1, 4, 8, 12, 26, 52. Phone counselling at weeks 2, 18, 34, 42 [intensity 4]. Plus placebo varenicline
Outcomes	Abstinence: confirmed CAR (continuous abstainers rate (CAR) at week 52, defined by the rate of patients who presented all the following criteria: smoking cessation for weeks 8–12 (last weeks of treatment); exhaled CO level 10 ppm at each clinic visit; reported smoking fewer than 6 cigarettes up to week 52; complete smoking cessation during the seven previous days before week 52) Validation: Breath CO Died: 3 in group 1, 1 in group 2
Notes	Varenicline vs. placebo with intensive counselling provided in both groups Funding: "The study was supported by grants from the "*Programme Hospitalier de Recherche Clinique*" (French Department of Health: PHRCN-12-008-0437), Ministère de la Santé a pharmaceutical grant from Pfizer France, and the sponsor was the University Hospital of Brest. This work was also supported by Ministère de la Santé." Declarations of Interest: "All authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Dr. Couturaud reports having received research grant support from Pfizer and fees for board memberships or symposia from Bayer and Astra Zeneca and having received travel support from Bayer, Daiichi Sankyo, Leo Pharma, Intermune and Actelion. Dr. Le Mao declares he has no conflict of interest related to this research. Dr. Tromeur declares she has no conflict of interest related to this research. Dr. Paleiron declares he has no conflict of interest related to this research. Dr. Sanchez reports having received research grant support from Bayer, Daiichi Sankyo and Portola Pharmaceuticals, and fees or non-financial support for consultancy activities from Actelion, GlaxoSmithKline, Boehringer Ingelheim and Chiesi. Dr Gagnadoux declares he has no conflict of interest related to this research. Dr Jouneau reports grants from AIRB, Boehringer Ingelheim, LVL, Novartis and Roche, and personal fees from Actelion, AIRB, AstraZeneca, BMS, Boehringer Ingelheim, Chiesi, GSK, LVL, Mundipharma, Novartis, Pfizer and Roche. Dr A. Magnan reports personal fees and non-financial support from GlaxoSmithKline, Novartis, Boehringer Ingelheim, AstraZeneca, Stallerg nes, ALK, MundiPharma, Teva, Menarini and Meda Pharma, during the past 5 years. Dr Hayem-Vannimenus declares she has no conflict of interest related to this research. Dr Dansou declares she has no conflict of interest related to this research. Dr Proust reports fees for consulting from Novartis and personal fees or nonfinancial support from AstraZeneca, Boehringer, Chiesi, Mundifarma, Glaxo-Smith-Klein, Novartis, Pearl, Portola, Roche, Sanofi, and Teva. Ms Dion declares he has no conflict of interest related to this research. Dr Larhantec declares he has no conflict of interest related to this research. Ms Le Brestec declares she has no conflict of interest related to this research. Dr. Dewitte declares he has no conflict of interest related to this research. Dr. Roche declares he has no conflict of interest related to this research. Dr Leroyer reports having received research grant support from Pfizer and fees for board memberships or symposia from Bayer and Astra Zeneca and having received travel support from Bayer, Daiichi Sankyo, Leo Pharma, Intermune and Actelion."

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Investigators obtained patient randomisation numbers and treatment group assignments through a central computerised internet-based system.
Allocation concealment (selection bias)	Low risk	Investigators obtained patient randomisation numbers and treatment group assignments through a central computerised internet-based system.
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Double-blind, placebo-controlled design
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Biochemical validation: "The primary outcome was the continuous abstainers rate (CAR) at week 52, defined by the rate of patients who presented all the fol-

Le Mao 2020 *(Continued)*

		lowing criteria: smoking cessation for weeks 8–12 (last weeks of treatment); exhaled CO level ≤ 10 ppm at each clinic visit".
Incomplete outcome data (attrition bias) All outcomes	Low risk	Follow-up reported by arm and low loss to follow-up rates (37/42 participants in varenicline group and 32/39 participants in placebo group attended 12-month follow-up). Not clear how missing data were considered
Other bias	Low risk	No other risks of bias detected

Lewis 1998

Study characteristics	
Methods	Country: USA Study dates: April 1993- February 1995 Recruitment: Inpatients excluding certain cardiac conditions Inclusion/exclusion criteria: Inclusion criteria were: (1) age greater than or equal to 18 years; (2) patient report of regular cigarette use for at least 1 year immediately preceding admission; (3) patient report of smoking 10 cigarettes or more in a single day during the week prior to admission; (4) expression of a personal commitment to quit smoking; (5) a willingness to participate in the study and ability to provide informed consent; (6) clearance from the patients attending physician; and (7) medical appropriateness for nicotine patch treatment according to the ProStep nicotine patch package insert. Exclusion criteria were: (1) patient report of drug or alcohol abuse smoke; (2) history of major psychiatric illness; (3) pregnant women or women of childbearing age not using an acceptable method of birth control; (4) use of nicotine-containing products other than cigarettes
Participants	Participants: 185 current smokers (minimal care group n = 61, counselling + active nicotine patch n = 62, counseling + placebo patch n = 62) Number smoked: 24 cpd Age: 43 yrs av. 12 ICD-9 diagnostic categories Therapists: Physician and nurse
Interventions	1. Counselling + active nicotine patch (intervention): Physician advice. Counselling (1 x, total 2-3 mins, type information). NRT (patch, dose 22 mg, for 3 wks + 11 mg, for 3 wks). Self-help materials. Follow-up (4 x at 1, 3, 6 wks, 6 m by telephone) [Intensity 4] 2. Counselling + placebo patch (intervention): Physician advice. Counselling (1 x, total 2-3 mins, type information). Placebo patch. Self-help materials. Follow-up (4 x at 1, 3, 6 wks, 6 m by telephone) [Intensity 4] 3. Minimal care (control): Advice only NRT: Yes
Outcomes	Abstinence: PP at 6 m Validation: Expired air CO Died: None reported
Notes	1 vs 2 for effect of NRT. 1 + 2 vs 3 for behavioural counselling intervention analysis. Highest quit rates found in patients with respiratory disease Funding: "This research was supported by a research grant provided by the Elan Pharmaceutical Research Corporation, Gainsville, Georgia, and Athlone, Ireland." Declarations of Interest: Information not available
Risk of bias	

Lewis 1998 *(Continued)*

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	"using a predetermined computer-generated randomization code"
Allocation concealment (selection bias)	Low risk	Central allocation
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Participants were blinded.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Outcome assessment process was blinded; biochemical validation: "Patients in any of the three conditions who reported not smoking during the 7 days preceding the 24-week follow-up telephone call were asked to come to the hospital for biochemical corroboration of abstinence via expired breath carbon monoxide".
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Dropout rates not reported, but analyses conducted as ITT
Other bias	Low risk	No other risks of bias detected

Luo 2018

Study characteristics	
Methods	Country: China Study dates: January 2014-Febuary 2016 Recruitment: Inpatient smokers not interested in quitting smoking enroled at one hospital in China Inclusion/exclusion criteria: "Patients in our hospital were eligible for inclusion if they met the following criteria: (1) aged between 18 and 80 years; (2) currently being a smoker, which means had smoked ≥ 1 cigarette daily and lasted for 6 months before enrollment; (3) with documented ACS; (4) with a mobile handset and residents in Yuetan Community of Beijing; (5) not ready to quit at the time of enrollment, agreed to participate in the study after the initial counseling lasting 10–15 min by the first doctor in charge. The patients who expressed that they are not ready to quit during hospitalization or post discharge were identified as not ready to quit immediately.... Individuals were excluded if they had a tumor or multiple organ failure, enrolled in another formal smoking cessation study, had a life expectancy less than 1 year, unable to complete follow-up, or could not meet any of the above."
Participants	Participants: 320 daily smokers (intensive personalised '5As + 5Rs' intervention n = 160, 5Rs intervention n = 160) Number smoked: 21 CPD Age: 58 yrs average Therapists: Physicians
Interventions	1. Intensive personalised '5As + 5Rs' intervention: 5A's + 5Rs-based personalised counselling sessions in hospital + post-d/c counselling sessions. Weekly counselling sessions through month 3 + monthly sessions through months 4-6 [intensity 4]

Luo 2018 *(Continued)*

	2. 5Rs intervention: 5 Rs-based counselling session in hospital + post d/c counselling sessions monthly for 6 mo [intensity 4] No medications provided in either group
Outcomes	Abstinence: CO confirmed point prevalence abstinence at 24 weeks Validation: Breath CO Died: 1 in group 1, 0 in group 2
Notes	This study aims to investigate the efficacy of intensive personalised '5As + 5Rs'intervention (IPANR intervention) on smoking cessation vs lower intensity intervention in this population. Funding: "Funding for this work was provided by grants awarded by The Capital Health Research and Development of Special Funding (2014-4-7023)." Declarations of Interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Randomisation was achieved using a computer-generated list, with the sequence concealed from recruiting cardiologists.
Allocation concealment (selection bias)	Low risk	Explicitly stated that allocation was concealed, "It was conducted by eight cardiologists who were blinded to the allocation sequence."
Blinding of participants and personnel (performance bias) All outcomes	High risk	Not possible to blind participants or providers given nature of intervention & limited number of providers
Blinding of outcome assessment (detection bias) All outcomes	Low risk	The primary efficacy endpoint was self-reported continuous abstinence rate (CAR) through week 9 to week 12. It was confirmed based on exhaled carbon monoxide levels (CO, QT-200 MicroCO meter, Changminte, NanJing, China) ≤ 10 ppm, which was consistent with previous trials.
Incomplete outcome data (attrition bias) All outcomes	Low risk	High follow-up overall and similar between groups (150/160 follow-up for intensive personalised '5As + 5Rs' intervention, and 154/150 for 5Rs intervention)
Other bias	Low risk	No other risks of bias detected

Matuszewski 2020

Study characteristics

Methods	Country: USA Study dates: Information not available Recruitment: orthopaedic trauma requiring surgical intervention at 1 hospital Inclusion/exclusion criteria: "Patient eligibility included those 18 years or older, current smokers, defined as having smoked some days or every day within the last 6 months, patients having sustained orthopaedic trauma requiring surgical intervention, and those following up at our institution who lived within the state of our trauma center. Patients 80 years or older or unable to consent were excluded".

Matuszewski 2020 *(Continued)*

Participants	Participants: 266 current smokers (control n = 40, brief counselling n = 111, extended counselling n = 115) Number smoked: 13 CPD Age: 40.7 yrs average Therapists: Trained research coordinators, quitline coaches
Interventions	1. Extended counselling: standardised smoking cessation counselling session was provided by a research coordinator with training in smoking counselling. Motivational strategies were used to help incentivise cessation and included the 5 As and 5 Rs proven useful in helping patients initiate smoking cessation + referral to quitline + repeat follow-up. F/u sessions at 2, 6 weeks, 3, 6 months [intensity 4] 2. Brief counselling: standardised smoking cessation counselling session was provided by a research coordinator with training in smoking counselling. Motivational strategies were used to help incentivise cessation and included the 5 As and 5 Rs proven useful in helping patients initiate smoking cessation + referral to quitline [intensity 3]. 3. Control: control group with no counselling or support No meds provided by study in either group (presumed pts could obtain from quitline if they requested)
Outcomes	Abstinence: self-reported 7-day abstinence confirmed by exhaled carbon monoxide below 10 ppm at 6 months Validation: breath CO Died: 0 in all groups
Notes	Control (no counselling), brief counselling (inpatient counselling), or extended counselling (brief counselling plus follow-up counselling) Funding: "The trial was funded by the Maryland Department of Health, Center for Tobacco Prevention and Control (Contract ID: OPASS 17-17343 G)." Declarations of Interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Consenting patients were randomised by a web-based computer algorithm (Randomize.net) with a 1:3:3 ratio, in blocks of 14.
Allocation concealment (selection bias)	Unclear risk	Not specified
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	All healthcare providers were blinded from assignment but no information on patient blinding
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Not specified whether assessors were blinded; partial biochemical validation, "At 6 weeks, 3 months, and 6 months postinjury, 16%, 17%, and 9% of the sample had exhaled carbon monoxide confirmed 7-day abstinence, respectively".
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Loss of follow-up low (control group 37/40 analysed, brief counselling group 102/111 analysed, extended counselling group 106/115 analysed) but analyses were not ITT. There was a Consort but death not described
Other bias	Low risk	No other risks of bias detected

Meysman 2010

Study characteristics	
Methods	Country: Belgium Study dates: Information not available Recruitment: patients admitted to surgical wards in 4 university hospitals Inclusion/exclusion criteria: "Eligibility criteria were: adults between 18–70 years old with a life expectancy of > 1 year. All patients were Dutch-speaking. Patients who were physically or mentally unable to respond to the questions were excluded. Before admission, subjects smoked on average > 10 cigarettes/day to avoid occasional smokers."
Participants	Participants: 358 current smokers of > 10 cpd (experimental group n = 178, control group n = 180) Diagnosis: surgical patients (orthopaedics, traumatology, ENT, head and neck surgery and neuro-surgery) Age: 43.2 year av. Gender: 63% male Willingness to quit: all stages of change (precontemplation 25%, contemplation 56%, preparation and action 19%) Therapists: nurse and counsellor
Interventions	1. Intervention: brief nurse-delivered intervention (5 As) and referral to smoking cessation counsellor for smokers in the preparation/action stage [Intensity 2] 2. Control: booklet with information on smoking cessation Pharmacotherapy: not reported
Outcomes	Abstinence: self-reported continuous abstinence at 6 m Validation: none Died: none reported
Notes	Category: surgical patients Funding: "This study was sponsored by a grant from Pfizer Health Care." Declarations of Interest: Information not available

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Participants stratified by stage of change. Method of randomisation not specified. "To simplify processing based on these questions a web-based stage of change calculation was done and patients were randomised to two treatment groups: the control group (CG) and the experimental group (EG)."
Allocation concealment (selection bias)	Unclear risk	Not stated
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants and personnel not blinded

Meysman 2010 *(Continued)*

Blinding of outcome assessment (detection bias) All outcomes	High risk	Outcome assessment process not blinded; self-reported smoking cessation - no biochemical validation
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Patients lost to follow-up counted as smokers; exact numbers not provided
Other bias	Low risk	No other risks of bias detected

Miller 1997

Study characteristics	
Methods	Country: USA Study dates: February 1991-November 1993 Recruitment: Inpatients excluding obstetric and psychiatric patients Inclusion/exclusion criteria: "All smokers, except those admitted to obstetrical or psychiatric wards, were interviewed by project nurses regarding their motivation to quit smoking, their continued residence in the area during the succeeding year, and their history of alcohol and drug abuse. Patients who were unable to read or speak English, did not plan to remain in the San Francisco Bay Area in California over the next year, whose level of consciousness was impaired, whose hospitalization was expected to be less than 36 hours, whose medical record revealed a primary diagnosis of alcohol or drug abuse, or who were involved in a post-MI rehabilitation program called MULTIFIT were excluded. Patients who stated that they had no intention of quitting smoking or who stated that they wanted to quit on their own were also excluded."
Participants	Participants: 1942 current smokers (Intensive intervention n = 540, minimal intervention n = 480, usual care n = 942) Number smoked: 20 cpd Age: 51 yrs av. 32% with cardiovascular, 12% pulmonary diagnosis Therapists: Physician and nurse counsellor
Interventions	1. Intensive intervention: Physician advice. Counselling (1 x, total 30 mins, type behavioural). Self-help materials, relaxation tapes, video. follow-up (4 x at 48hr, 1, 3 wks, 3 m by telephone) [Intensity 4] 2. Minimal intervention: Physician advice. Counselling (1 x, total 30 mins, type behavioural). Self-help materials, relaxation tapes, video. Follow-up (1 x at 48 hr by telephone) [Intensity 3] 3. Usual care: Advice only NRT: No
Outcomes	Abstinence: Sustained abstinence at 3, 6 & 12 m Validation: Plasma cotinine or family member corroboration Died: 82 at 12 m
Notes	1 vs 3 in intensive comparison, 2 vs 3 in minimal comparison 12 months abstinence (PP) 1 + 2 vs 3 separately for cardiovascular, pulmonary and other diagnoses Funding: "This study was supported by grant HL46260 from the National Heart Lung and Blood Institute, Bethesda, Md. Dr Smith was supported with funds provided by the Canadian Cancer Society, Toronto, Ontario." Declarations of Interest: Information not available
Risk of bias	

Miller 1997 *(Continued)*

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Method of sequence generation not specified
Allocation concealment (selection bias)	Low risk	"Nurses opened sealed envelopes in front of patients to determine patients' assignments."
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants and personnel not blinded
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Outcome assessment process was blinded; biochemical validation (cotinine samples)
Incomplete outcome data (attrition bias) All outcomes	Low risk	Deaths excluded from MA denominator; all others lost to follow-up considered smokers; similar loss to follow-up across all groups (10%)
Other bias	Low risk	No other risks of bias detected

Mohiuddin 2007

Study characteristics	
Methods	Country: USA Study dates: January 2001-December 2002 Recruitment: Inpatients with diagnosis of acute coronary syndrome (including MI) or decompensated CHF, admitted to CCU of 1 hospital Inclusion/exclusion criteria: "Patients aged 30 to 75 years who were admitted to the coronary care unit at our university-affiliated teaching hospital with a diagnosis of acute coronary syndrome or decompensated heart failure were considered for participation in the study. Daily smokers who had smoked for a minimum of 5 years with a Fagerstrom score of > 7 were eligible to participate. Smokers were excluded if they did not speak and read the English language. Patients with current alcohol or illicit substance addiction were excluded."
Participants	Participants: 209 current smokers who had smoked for 5+ yrs, FTND > 7 (intensive intervention n = 109, usual care n = 100) Number smoked: 24 cpd Age: 55 yrs av. Therapists: Physician and trained tobacco counsellor or nurse
Interventions	1. Intensive intervention: Counselling (30 mins, type not specified). Self-help booklet. Free NRT and/or bupropion. Follow-up: weekly group meetings (60 min session for up to 3 m) with trained tobacco counsellor (content: behavioural counselling, social support, relaxation training, risk factor management) [Intensity 4] 2. Usual care: same inpatient component as intervention group: counselling (30 mins, type not specified). Self-help booklet. Free NRT and/or bupropion. No follow-up offered [Intensity 2] NRT: NRT or bupropion offered on an individualised basis to both groups.
Outcomes	Abstinence: Sustained abstinence at 3, 6, 12 m. (note: sustained abstinence to 24 m reported but not used in pooling) Validation: CO Died: 15 at 12 m (12 control, 3 intervention)

Mohiuddin 2007 *(Continued)*

Notes	1 vs 2 in intensity 4 subgroups. Same in-hospital intervention; differed in follow-up component only Included in CVD subcategory Funding: Information not available Declarations of Interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Method not specified "Consenting patients were then randomly assigned using simple randomization without block assignment."
Allocation concealment (selection bias)	Unclear risk	Method not specified
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants and personnel not blinded
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Outcome assessment process was blinded, biochemical validation, "subjects were classified as abstinent if they had reported not smoking during the previous evaluation period and this was confirmed by a negative result for the measurement of expired carbon monoxide."
Incomplete outcome data (attrition bias) All outcomes	Low risk	Similar number lost to follow-up in both groups (5/109 intervention, 4/100 control); participants lost to follow-up counted as smokers
Other bias	Low risk	No other risks of bias detected

Molyneux 2003

Study characteristics

Methods	Country: UK Study dates: March 1999-April 2000 Recruitment: Medical and surgical inpatients admitted to 1 hospital Inclusion/exclusion criteria: "Inclusion criteria: Male and female medical and surgical inpatients who were smokers whose last cigarette was within 28 days before admission. Able to provide written informed consent and understand English. 18 years of age or older. Expected to comply with the protocol. An acceptable level of consciousness. Expected duration of hospitalisation of at least 24 hours. Planning to remain at their current address for the next 12 months. Access to the telephone. Resident within a reasonable travelling distance from the hospital. Exclusion criteria: Pregnant (including suspected pregnancy), planned pregnancy, or breastfeeding. Admission for psychiatric care. History of alcohol and/or illicit drug abuse in the last 12 months. Terminal illness (prognosis less than 12 months). Concurrent use of another investigational medication and within 1 month of entry into this study. Hypersensitivity towards nicotine or menthol. Previous enrolment into this study. Acute cerebrovascular accident."
Participants	Participants: 274 current smokers (smoked in past month) (usual care n = 92, counselling alone n = 91, NRT plus counselling n = 91) Number smoked: 17 cpd Age: 50 yrs av.

Molyneux 2003 *(Continued)*

	Therapists: Physician or nurse
Interventions	1. Counselling alone: brief counselling + booklet, no NRT. No follow-up. [Intensity 2] 2. NRT plus counselling: brief counselling (20 mins) + booklet + offer of open-label NRT x 6 wks (choice of gum, patch, inhalator, lozenge, nasal spray); 96% used some NRT. No follow-up. [Intensity 2] 3. Usual care NRT: Yes
Outcomes	Abstinence: Sustained abstinence at 3, 12 m Validation: CO < 10 ppm at 12 m Died: not stated
Notes	For comparison of counselling intensity 1 vs intensity 2, groups 1 + 2 were compared to group 3. For comparison of NRT effectiveness, authors compared group 2 to group 1. Deaths not stated so not excluded from main analysis Funding: "This study was supported by a grant from Pharmacia Consumer Healthcare, Helsingborg, Sweden". Declarations of Interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	"Patients were randomised ... using a list generated for each centre, allocating equally in random permuted blocks of nine".
Allocation concealment (selection bias)	Unclear risk	Not stated
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants and personnel not blinded
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Outcome assessor blinded to group, and smoking cessation was biochemically validated.
Incomplete outcome data (attrition bias) All outcomes	Low risk	Large number lost to follow-up but similar across all groups (usual care n = 38/92, counselling alone n = 34/91, NRT plus counselling n = 40/91 completed 12-month follow-up); losses to follow-up counted as continuing smokers; all losses fully detailed in flow chart
Other bias	Low risk	No other risks of bias detected

Murray 2013a

Study characteristics

Methods	Country: UK Study dates: October 2010-August 2011 Recruitment: 1 teaching hospital in UK (researchers identified all new admissions on the first weekday morning after admission and ascertained smoking status from the admission form or, if incomplete, by

Murray 2013a *(Continued)*

	direct questioning. All patients who had smoked within four weeks of admission were given written information about the study) Inclusion/exclusion criteria:: All smokers who reported that they were current smokers, or had smoked within four weeks of admission, to any of 18 medical wards at a large teaching hospital in the UK
Participants	Participants: 493 current smokers (intervention n = 264, usual care n = 229) Number smoked: not stated Age: 56.3 yrs average Therapists: Smoking cessation practitioners. These practitioners had all received either university or healthcare professional education, and were trained in intensive behavioural support (through the intensive support and advice for smoking cessation training delivered by the local NHS stop-smoking service).
Interventions	1. Intervention: Those who accepted cessation support were visited at the bedside by one of three smoking cessation practitioners. These practitioners had all received either university or healthcare professional education, and were trained in intensive behavioural support (through the intensive support and advice for smoking cessation training delivered by the local NHS stop-smoking service). Such training included awareness of smoking demographics, the health effects of smoking and stopping smoking, smoking cessation treatments and their outcome, motivational interviewing, and behavioural support techniques. The smoking cessation practitioners offered one-to-one counselling, to be delivered daily throughout admission (or as often as was acceptable to the patient). On discharge, all participants were offered referral to a local stop-smoking service for further cessation support, and contacted by telephone by the smoking cessation practitioners at least once [intensity 3]. Plus prescribed dual nicotine replacement therapy comprising a 16 hour, 21 mg transdermal patch combined with a fast acting product (chosen from gum, lozenge, inhalator, or nasal spray) according to preference. 2. Usual care: Advice to quit and offers of cessation support were then given to patients at the discretion of and in accordance with the usual practice of doctors and other health professionals involved in their care [intensity 1]. No medications provided in this group
Outcomes	Abstinence: verified continuous abstinence at 6 mo Validation: Breath CO Died: 10 in group 1, 5 in group 2
Notes	Systematic default provision of smoking cessation support to all adult smokers admitted to hospital vs. usual care (i.e. The intervention comprised systematic smoking ascertainment and default provision of behavioural support and cessation pharmacotherapy for the duration of the hospital stay for all smokers and recent ex-smokers, with follow-up and referral to community services after discharge. Usual care comprised cessation support delivered at the initiative and discretion of clinical staff). Funding: "This paper presents independent research funded by the National Institute for Health Research under its Programme Grants for Applied Research programme (RP-PG-0608-10020)". Declarations of interest: "All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf and declare: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years; no other relationships or activities that could appear to have influenced the submitted work."

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Wards (clusters) were allocated by random sequence generation to deliver either intervention or usual care.

Murray 2013a *(Continued)*

Allocation concealment (selection bias)	Unclear risk	No data provided on allocation concealment
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Clinical and research staff and patients were aware of group assignment. Although the study design precluded blinding, ward staff were unaware of the exact details of the study, and patients were specifically not informed of the components of the intervention being tested.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Clinical and research staff and patients were aware of group assignment. Although the study design precluded blinding, ward staff were unaware of the exact details of the study, and patients were specifically not informed of the components of the intervention being tested.
Incomplete outcome data (attrition bias) All outcomes	Low risk	LTFU clearly outlined in Consort diagram (intervention n = 250/264, usual care n = 219/229 analysed at 6-month follow-up)
Other bias	Low risk	No other risks of bias detected

Nagle 2005

Study characteristics	
Methods	Country: Australia Study dates: January 1997-December 1997 Recruitment: Inpatients (all diagnoses) admitted to 1 teaching hospital (excluded intensive care units) Inclusion/exclusion criteria: Inclusion: Age 18-80, admitted to the hospital for at least 24 hours during 1-year period in 1997 Exclusion: patients in Accident and Emergency, day surgery and dialysis, transplant and intensive care units
Participants	Participants: 1422 current smokers or quitters (smoked in past 12 m) (intervention n = 711, control n = 711) Age: not stated Therapists: nurse
Interventions	1. Intervention: Nurse counselling (2 x 10-min sessions, type: withdrawal symptom management, coping skills) + booklet + offer of NRT in hospital and for 5 days post-discharge (3% received in hospital). Follow-up: none. [Intensity 2] 2. Control: modified usual care (physician advice + booklet) NRT: Yes (partial)
Outcomes	Abstinence: 7-day PP at 12 m (continuous self-reported abstinence also given) Validation: Saliva cotinine <= 15 ng/mL Died: 28 at 12 m
Notes	Study included recent quitters (smoked in past year but not in past month); results not stratified by baseline smoking status. Funding: National Health and Medical Research Council Declarations of Interest: Information not available

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**

Nagle 2005 *(Continued)*

Random sequence generation (selection bias)	Low risk	Computerised. "Randomization was based on blocks of 20 patients... Stratification into recent smoker and recent quitter categories occurred prior to randomization."
Allocation concealment (selection bias)	Low risk	"Patients who reported smoking within the last 12 months were entered by the research assistant at the patient's bedside into the LAPSMOKE program on a laptop computer, which gave an immediate random allocation to either control or intervention that could not be changed."
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants and personnel not blinded
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Outcome assessment and collection process was blinded; abstinence was biochemically validated.
Incomplete outcome data (attrition bias) All outcomes	Low risk	"At 12 months no difference for completed surveys or for loss to follow-up existed between the intervention group and the control group." 28 deaths at 12 m excluded from denominator; for all other participants, missing data counted as smokers
Other bias	Low risk	No other risks of bias detected

Ortega 2011a

Study characteristics	
Methods	Country: Spain Study dates: January 2008-December 2008 Recruitment: Patients admitted to hospital from January to December of 2008 at the Virgen del Rocío Hospital in Seville, Spain Inclusion/exclusion criteria: "These were internal medicine and surgery patients, including different specialties, such as pulmonology, cardiology and cardiovascular surgery, gastroenterology, otolaryngology, ophthalmology, etc. Patients were considered to be smokers if they identified themselves as current smokers or if they answered affirmatively to the question “Do you smoke cigarettes now?” and had smoked at least 100 in their life. Patients under the age of 18 were not included in the study, nor were those patients with pathologies related to traumatology, gynecology or obstetrics, psychiatry or neurology."
Participants	Participants: 1843 current smokers (cognitive + NRT n = 924, cognitive n = 919) Number smoked: Not stated Age: 63.35 Therapists: Trained nurse
Interventions	1. Cognitive + NRT: cognitive intervention was performed by a specially-trained nurse in 30-45 min sessions every 3 days until the patients’ release. The method was standardised, and educational material was supplied. Pt could choose f/u counselling. On the one hand, the patient could attend the smoking cessation outpatient consultation where he/she would continue with the controls and behavioural therapy, reinforcing the maintenance strategies and dealing with risk factors for relapse. These visits would be at one week, 15 days, one month and then at 2, 3, 6 and 12 months. A second option was to receive telephone sessions, which would have the same frequency as the office visits. The phone calls would continue with the same training initiated at the sessions during the hospital stay. The patients were trained to try to maintain abstinence. Patients who did not take part in the study protocol simply received a phone call 12 months later to confirm whether they continued smoking [intensity 4]. Patients receiving NRT were given NRT patches or chewing gum. The dosage was adjusted to the degree

Ortega 2011a *(Continued)*

	of physical dependence of the smoker and we followed the SEPAR recommendations for the pharmacological treatment of smoking up to a maximum of 12 weeks. During the hospital stay, NRT was provided free of charge, whereas after release the patients incurred this fee. 2.Cognitive only
Outcomes	Abstinence: % abstinent at 1 year f/u (details not provided on how measured or if measure reported was verified) Validation: Breath CO collected at each visit Died:
Notes	CBT vs. CBT + NRT Funding: Information not available Declarations of Interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Computerised algorithm used for randomisation
Allocation concealment (selection bias)	Unclear risk	No details stated
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	No details stated
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No details stated on whether outcome assessors were blinded; biochemical validation (breath CO) but unclear how abstinence was defined
Incomplete outcome data (attrition bias) All outcomes	High risk	Completion rate detailed but deaths not listed and not clear primary outcome reported was biochemically verified (though CO was collected); overall, 89% of participants were available at 12-month follow-up but not clear breakdown between groups
Other bias	Low risk	No other risks of bias detected

Ortigosa 2000

Study characteristics

Methods	Country: Spain Study dates: Information not available Recruitment: Inpatients with acute MI Inclusion/exclusion criteria: Information not available
Participants	Participants: 90 current smokers Number smoked: 25 cpd Age: 57 yrs av Therapists: Physician

Ortigosa 2000 *(Continued)*

Interventions	1. Intervention: Physician advice. Follow-up (3 x at 2, 3, 4 wks by telephone) [Intensity 3] 2. Control: Usual care NRT: No
Outcomes	Abstinence: PP at 12 m Validation: Expired air CO Died: 3 at 12 m
Notes	Intervention not delivered by specialist counsellor Included in CVD subcategory Funding: Information not available Declarations of Interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Stratified randomisation; method of sequence generation not specified
Allocation concealment (selection bias)	Unclear risk	Method not specified
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants and personnel not blinded
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Outcome assessment process blinded
Incomplete outcome data (attrition bias) All outcomes	Low risk	No participants lost to follow-up; 3 deaths excluded from the analysis
Other bias	Low risk	No other risks of bias detected

Park 2015

Study characteristics

Methods	Country: Korea Study dates: May 2008-January 2010 Recruitment: Patients were enroled in this study who were indicated for hospital discharge after undergoing PCI at a general hospital in Korea Inclusion/exclusion criteria: "The detailed selection criteria included smokers older than 20 years who understood and were able to communicate the educational content and purpose of the study. They had also undergone PCI within 48 h before the study and had provided consent to participate."
Participants	Participants: 64 current smokers (experimental group n = 31, control group n = 33) Number smoked: 21.9 CPD Age: 55 yrs average

Park 2015 *(Continued)*

	Therapists: Nurses in coronary unit
Interventions	1. Experimental group: standard education for 30 min in hospital + phone counselling follow-up + SMS from trained cardiac nurses [intensity 4] 2. Control group: standard education x 30 min [intensity 2] No medication in either group
Outcomes	Abstinence: cotinine via NicCheck urine dip at 52 weeks Validation: Urinary cotinine Died: 0 in both groups
Notes	Standard 30-min educational session + phone counselling + text messages vs. standard 30-min educational session Funding: Information not available Declarations of Interest: "No conflict of interest has been declared by the authors."

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Coin toss, "To assign the willing participants randomly to the EG or CG, a coin toss was performed."
Allocation concealment (selection bias)	Unclear risk	No information provided
Blinding of participants and personnel (performance bias) All outcomes	High risk	Blinding not possible but intervention groups had very different levels of contact.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Nurse assessors not blinded (this was not described) but biochemical validation for outcome reduced risk of bias.
Incomplete outcome data (attrition bias) All outcomes	Low risk	Near-complete follow-up (30/31 experimental group, and 32/33 control group analysed at 12-month follow-up) and f/u info clearly denoted
Other bias	Low risk	No other risks of bias detected

Pedersen 2005

Study characteristics

Methods	Country: Denmark Study dates: Information not available Recruitment: Inpatients with cardiac disease Inclusion/exclusion criteria: Information not available
Participants	Participants: 105 current smokers (not defined) Age: not stated Therapists: not stated

Pedersen 2005 *(Continued)*

Interventions	1. Intervention: usual hospital protocol: advice to quit + information about NRT + NRT available. Follow-up: visits 5 times after discharge (30 min/meeting) [Intensity 4] 2. Control: usual care: advice to quit + information about NRT + NRT available NRT: Yes (partial)
Outcomes	Abstinence: Abstinence (probably PP) at 12 m Validation: none Died: not stated
Notes	Included in CVD subcategory Funding: Information not available Declarations of Interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not specified
Allocation concealment (selection bias)	Unclear risk	After enroling, patients drew an envelope containing an allocation. No further details about the envelope provided
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants and personnel not blinded
Blinding of outcome assessment (detection bias) All outcomes	High risk	Outcome assessment not clearly blinded
Incomplete outcome data (attrition bias) All outcomes	Low risk	10 participants lost to follow-up (7 intervention, 3 control) counted as smokers in final analysis
Other bias	Low risk	No other risks of bias detected

Pederson 1991

Study characteristics

Methods	Country: USA Study dates: Information not available Recruitment: Inpatients with COPD Inclusion/exclusion criteria: "Criterion for selection was previously diagnosed COPD as defined by the ACCP-ATS Joint Committee on Pulmonary Nomenclature".
Participants	Participants: 74 current smokers (treatment group n = 37, control group n = 37) Number smoked: 25 cpd Age: 53 yrs av. 43% chronic bronchitis, 57% emphysema Therapists: Non-specialist trained in counselling

Pederson 1991 *(Continued)*

Interventions	1. Treatment group: Physician advice (prior to admission). Counselling (3-9 x, total 45-160 mins, type information). Self-help materials. No follow-up [Intensity 2] 2. Control: Advice only NRT: No
Outcomes	Abstinence: PP at 6 m Validation: Serum COHb (in sample) Died: 8 at 6 m
Notes	Funding: Information not available Declarations of Interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Details not provided
Allocation concealment (selection bias)	Unclear risk	Details not provided
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	No details provided on blinding
Blinding of outcome assessment (detection bias) All outcomes	High risk	No details provided on blinding; some biochemical validation: "The accuracy of reports of smoking status was assessed using COHb analysis from blood samples drawn at 6-month follow-up examinations at the hospital. Not all patients could be examined at the hospital because of geographic distance and degree of disability from their disease. Of those who could be examined, a random sample of 20 (13 reported smokers and 7 reported nonsmokers) was drawn for this assessment".
Incomplete outcome data (attrition bias) All outcomes	Low risk	8 deaths excluded; 8 lost to follow-up included and counted as smokers. Similar number lost to follow-up in both groups (5/37 treatment group, 3/37 control group)
Other bias	Low risk	No other risks of bias detected

Pelletier 1998

Study characteristics

Methods	Country: Canada Study dates: Information not available Recruitment: Inpatients with acute MI Inclusion/exclusion criteria: Information not available
Participants	Participants: 504 current smokers Age: not stated Therapists: Nurse
Interventions	1. Intervention: Physician advice. Self-help materials [Intensity 2]

Pelletier 1998 *(Continued)*

	2. Control: Usual care NRT: No
Outcomes	Abstinence: self-reported PP at 12 m Validation: None Died: Not stated
Notes	Included in CVD subcategory Funding: Information not available Declarations of Interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Quasi-experimental design. 2 control hospitals; 1 experimental hospital
Allocation concealment (selection bias)	High risk	See above
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants and personnel not clearly blinded
Blinding of outcome assessment (detection bias) All outcomes	High risk	Outcome assessment process not blinded
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Number lost to follow-up not stated
Other bias	Low risk	No other risks of bias detected

Planer 2011

Study characteristics

Methods	Country: Israel Study dates: December 2003-May 2005 Recruitment: patients hospitalised for ACS in 2 separate campuses in Jerusalem Inclusion/exclusion criteria: "Inclusion criteria for this trial included adults hospitalized for ACS (including unstable angina and MI), weighing more than 45 kg and smoking more than 10 cigarettes/d. Patients were required to exhibit intention to quit smoking. Patients were excluded from participating if they had prior use of bupropion in the past year or nicotine replacement therapy in the past 6 months; had a known sensitivity to bupropion; had epilepsy or prior major head trauma and/or surgery; had clinical depression or were prescribed antidepressants; had been diagnosed as having anorexia nervosa and/or bulimia; exhibited liver or kidney dysfunction; or were receiving treatment with monoamine oxidase inhibitors. Pregnant or lactating women were also excluded."
Participants	Participants: 151 smokers of > 10 cpd (n = 75 bupropion, n = 76 placebo)

Planer 2011 *(Continued)*

	Diagnosis: acute coronary syndrome Age: 51.9 yrs av. Gender: 79.9% male Willingness to quit: yes, patients required to exhibit intention to quit smoking Therapists: study physician and research nurse
Interventions	1. Bupropion: counselling (at least 15 min of motivational support) during hospitalisation and continued after discharge (at least 2 visits with physician and nurse at 1 and 2 m and weekly telephone call by nurse during first and second month, then monthly telephone calls during rest of the year) + bupropion for 2 m 2. Placebo: counselling as per 1 + placebo for 2 m [Both arms: intensity 4] Pharmacotherapy: Bupropion during 2 m in the intervention group
Outcomes	Abstinence: self-reported continuous abstinence at 12 m Validation: none Died: none reported
Notes	Category: pharmacotherapy and cardiac patients Study stopped early after interim analysis indicated no benefit OR adjusted for age, sex, invasive procedure, risk factors, Fagerstrome score, cpd: 0.90 (95% CI 0.39 to 2.09) Funding: "This research was supported by a nonrestricted educational grant from GlaxoSmithKline." Declarations of Interest: "None reported"

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	"Randomized," method not specified
Allocation concealment (selection bias)	Unclear risk	Not specified
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Participants were blinded.
Blinding of outcome assessment (detection bias) All outcomes	High risk	No biochemical validation: "Primary efficacy outcome measure was self-reported continuous abstinence from smoking 1 year after the index hospitalization."
Incomplete outcome data (attrition bias) All outcomes	Low risk	1 lost to follow-up in each group

Planer 2011 *(Continued)*

Other bias	Low risk	No other risks of bias detected

Quist-Paulsen 2003

Study characteristics	
Methods	Country: Norway Study dates: February 1999-September 2001 Recruitment: Inpatients admitted to cardiac ward of 1 general hospital (Diagnoses: MI, unstable angina, post-CABG care) Inclusion/exclusion criteria: "Eligible patients had to be under 76 years of age and daily smokers. We excluded patients with serious illnesses associated with short life expectancies (cancer, chronic obstructive lung disease, renal or liver failure), serious psychiatric problems, alcoholism, and dementia".
Participants	Participants: 240 current smokers (smoked daily before symptoms began) (n = 118 intervention group, n = 122 control group) Number smoked: 15 cpd Age: 57 yrs av. Therapists: Nurse
Interventions	1. Intervention: Nurse counselling (1-2 times, time not specified, type: fear arousal, advice on using NRT); follow-up (5 x at 2, 7, 21 days, 3 m, 5 m) by telephone, clinic visit to cardiac nurse at 6 wks); NRT: Gum or patch encouraged for participants with strong urges to smoke in hospital [Intensity 4] 2. Control: usual care (advice to quit + booklet) NRT: Yes
Outcomes	Abstinence: PP at 12 m Validation: Urine cotinine < 2.0 mmol/mol creatinine Died: 5 at 12 m
Notes	Included in CVD subcategory Funding: "Vest-Agder Council for Public Health and the charity Sykehuset i vaare hender." Declarations of Interest: "None declared"

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	"Randomization was in blocks of varying sizes." Method not specified
Allocation concealment (selection bias)	Low risk	"The nurses were given a serially numbered sealed envelope from a secretary who was otherwise uninvolved in the study."
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants not blinded
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Outcome assessor was blinded; biochemical validation: "Smokers who stated that they were still smoking were classified as smokers and those who claimed they had quit and had a nicotine metabolite concentration < 2.0 mmol/mol creatinine in urine were classified as non-smokers."

Quist-Paulsen 2003 *(Continued)*

Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Meta-analysis did not include 5 deaths; all other losses to follow-up considered to be smoking but differential loss to follow-up (15/118) in intervention group (2/122) in control group
Other bias	Low risk	No other risks of bias detected

Reid 2003

Study characteristics	
Methods	Country: Canada Study dates: September 1997-April 1999 Recruitment: Inpatients with MI, CABG, coronary angioplasty, coronary angiography admitted to 1 cardiac hospital Inclusion/exclusion criteria: "Patients admitted for coronary angiography, PTCA, MI, or CABG were screened, and 1379 (16.6%) were identified as cigarette smokers. Current smoking was defined as five or more cigarettes per day during the month preceding admission. Other tobacco users (i.e. users of pipes, cigars, or smokeless tobacco exclusively) were not considered for participation in the study. The study did not include individuals with unresolved unstable angina, life-threatening arrhythmias, vasospastic diseases (Buerger's disease, Prinzmental's variant angina), pregnant or lactating women, and those who lived more than 1 hour of travel time away."
Participants	Participants: 254 current smokers (smoked in month before admission) (n = 128 minimal intervention, n = 126 stepped care) Number smoked: not stated Age: 54 yrs av. Therapists: Nurse
Interventions	1. Stepped care: Brief nurse counselling at bedside (5-10 mins) + booklet. Follow-up: nurse call at 4 wks; if smoking, offered 3 x 20-min in-person counselling sessions (wks 4, 8, 12) and NRT patch recommended for 8 wks [Intensity 4] 2. Minimal intervention: Brief nurse counselling (5-10 mins) + self-help booklet (same in hospital as intervention group) NRT: Yes
Outcomes	Abstinence: 7-day PP at 12 m Validation: Random sample of 25 self-reported non-smokers asked for CO validation; 91% validated, similar in both arms. Results not adjusted for this Died: 2 at 12 m
Notes	Included in CVD subcategory Funding: Information not available Declarations of Interest: Information not available

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	"Random numbers table", stratified by diagnosis on admission and degree of nicotine dependence
Allocation concealment (selection bias)	Low risk	"Assignment numbers were concealed until after baseline assessment and brief individual counselling."

Reid 2003 *(Continued)*

Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants not blinded
Blinding of outcome assessment (detection bias) All outcomes	High risk	Outcome assessment process not blinded; partial biochemical validation: "Abstinence was defined as a self-report of no smoking (not even a puff) in the preceding 7 days. Follow-up questionnaires and interviews began with a reminder that participants might be asked for a breath sample to validate smoking status. A breath sample was requested for carbon monoxide determination from a random subsample of 25 participants who reported not smoking at the 1-year follow-up assessment. A carbon monoxide level of 9 ppm or less was considered confirmatory for nonsmoking".
Incomplete outcome data (attrition bias) All outcomes	Low risk	19.5% in usual care and 9.5% in treatment group lost to follow-up at 12 m; participants lost to follow-up counted as smokers in analysis
Other bias	Low risk	No other risks of bias detected

Reid 2007

Study characteristics	
Methods	Country: Canada Study dates: November 2004-May 2005 Recruitment: patients admitted to 1 tertiary care cardiac facility Inclusion/exclusion criteria: "Participants were current smokers (5 cigarettes per day) over the age of 18 years, hospitalized at UOHI for acute coronary syndrome (ACS), elective PCI or diagnostic catheterization related to CHD. Patients living too far away to be available for follow-up (> 1 h) were excluded."
Participants	Participants: 99 current smokers ≥ 5 cpd (IVR group n = 50, control group n = 49) Diagnosis: ACS, elective PCI or diagnostic catheterisation related to CHD Age: 54 Gender: 61-75% male Willingness to quit: not assessed Therapists: nurse
Interventions	1. IVR: standard in-hospital treatment for smokers (personalised advice to quit smoking, access to NRT, brief bedside counselling and self-help guide) + interactive voice response system (IVR) follow-up on days 3, 14 and 30 post-discharge [Intensity 3] 2. Control: standard in-hospital treatment for smokers (personalised advice to quit smoking, access to NRT, brief bedside counselling and self-help guide) Pharmacotherapy: access to NRT during hospitalisation for both arms
Outcomes	Abstinence: 7-day PP at 12 m Validation: none Died: 1 in control group

Reid 2007 *(Continued)*

Notes	Category: post-discharge intervention Funding: "This research was funded by a partnership coordinated by the Canadian Tobacco Control Research Initiative". Declarations of Interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	"mediated through the Clinical Epidemiology Unit's data centre, using a computer generated randomization list"
Allocation concealment (selection bias)	Low risk	"Research staff were unaware of the treatment allocation prior to randomization".
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants not blinded
Blinding of outcome assessment (detection bias) All outcomes	High risk	Outcome assessment process not blinded; no biochemical validation: "The primary outcome of interest was the self-reported abstinence rate at 52 weeks."
Incomplete outcome data (attrition bias) All outcomes	Low risk	~15% lost to follow-up; similar between groups (at 52 weeks, 83.7% of participants in IVR group and 86% of participants in control group completed follow-up). 1 control death excluded; others included
Other bias	Low risk	No other risks of bias detected

Reid 2019

Study characteristics

Methods	Country: Canada Study dates: Information not available Recruitment: Participants were recruited at the University of Ottawa Heart Institute (UOHI), a smoke-free, tertiary care cardiac facility that has implemented a systematic process to identify and assist smokers admitted to the hospital (the Ottawa Model for Smoking Cessation, OMSC) Inclusion/exclusion criteria: Eligibility criteria included: smoking five or more cigarettes per day in the past month; admission for acute coronary syndrome (ACS), elective percutaneous coronary intervention (PCI), diagnostic catheterisation for CHD, or coronary artery bypass graft (CABG) surgery; availability for follow-up; and ability to read and understand English
Participants	Participants: 440 current smokers (ATF intervention n = 216, SC n = 224) Number smoked: not stated Age: 54.2 yrs average Therapists: Trained nurse-counsellors
Interventions	1. ATF intervention: participants in the ATF group received automated phone calls 3, 14, 30, 60, 90, 120, 150, and 180 days after hospital discharge [intensity 4]. 2. Standard Care (SC): trained nurse-counsellor delivered in-hospital counselling, guided by a standardised flowsheet, and provided written information about smoking cessation [intensity 1].

Reid 2019 *(Continued)*

	Meds in both groups: The nurse-counsellor assessed the need for nicotine replacement therapy (NRT) in the hospital based on nicotine withdrawal symptoms; participants experiencing withdrawal were provided with NRT for the duration of their hospital stay. At hospital discharge, all participants received a written recommendation to use NRT for 10 weeks. After the first 262 participants were randomised, new funding allowed us to provide a cost-free, 4-week supply of NRT to participants at discharge.
Outcomes	Abstinence: continuous abstinence rate for weeks 27-52 Validation: Breath CO in a random subset of pts Died: 4 in group 1, 3 in group 2
Notes	Automated telephone follow-up (ATF) and nurse-counselling vs. standard care (SC) Funding: "Heart and Stroke Foundation of Ontario Grant # NA5845" Declarations of Interest: "RDR and ALP have received speaking and/or consulting fees and research grants from Pfizer and Johnson & Johnson. KAM has received speaking fees from Pfizer. AGL is supported by a Canadian Institutes of Health Research–Ottawa Model for Smoking Cessation Health Impact Fellowship".

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	For allocation, the study coordinator used a computer-generated sequence and notified each participant of their intervention immediately.
Allocation concealment (selection bias)	Low risk	Following baseline assessment, participants were placed into strata according to the reason for hospital admission (i.e. ACS, PCI, catheterisation, or CABG) and randomly allocated to the ATF group or SC groups. For allocation, the study coordinator used a computer-generated sequence and notified each participant of their intervention immediately.
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Single-blinded
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Research assistants blinded to treatment allocation gathered outcome data at 26 and 52 weeks; partial biochemical validation: "Self-reports of smoking abstinence were validated in a random subsample of nonsmokers using expired carbon monoxide levels (≤ 4 ppm)."
Incomplete outcome data (attrition bias) All outcomes	Low risk	Similar follow-up rates; 52/216 in ATF intervention and 59/224 in the SC group lost to 52-week follow-up
Other bias	Low risk	No other risks of bias detected

Richter 2016

Study characteristics

Methods	Country: USA Study dates: Information not available Recruitment: Smokers admitted to two large hospitals in Kansas with dedicated tobacco treatment interventionists on staff Inclusion/exclusion criteria:

Richter 2016 *(Continued)*

	"Eligibility criteria included planning to stay quit post-discharge, smoking any cigarettes within the past 30 days, being aged ≥ 18 years, speaking English or Spanish, having access to a telephone post-discharge, having no other household member participating in the trial, not currently being pregnant, and having no comorbidity or health issue preventing full participation."
Participants	Participants: 1054 past 30-d smokers (warm hand off intervention n = 527, usual care n = 527) Number smoked: 15.7 Age: 49.89 yrs average Therapists: Hospital-based tobacco coach and quitline coaches
Interventions	1. Warm hand off intervention: Alere provided enrollees with mailed materials and up to five proactive counselling calls [intensity 3] 2. Fax referral (usual care): Staff fax-refer patients to the quitline on the day they are discharged from the hospital, to ensure patients receive a call from the quitline soon after arriving at their home or residential facility [intensity 3].
Outcomes	Abstinence: 6 mo confirmed past 7-d PPA abstinence and missing = smoking Validation: Breath CO and salivary cotinine Died: 23 in group 1, 34 in group 2
Notes	Warm handoff vs fax referral (no meds in either group) Funding: "This work was supported solely by funding from the National Heart, Lung, and Blood Institute (U01 HL105232-01)". Declarations of Interest: "None of the authors have institutional or corporate affiliations that conflict with this study, and no financial disclosures were reported by the authors of this paper."

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	No data provided on random sequence generation
Allocation concealment (selection bias)	Unclear risk	No data provided on allocation concealment
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Both RAs and Alere counsellors were blinded.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	All counsellors were blind to study arm and all quitline services were the same across study groups; biochemical validation: "Abstinence was verified via salivary cotinine, CO, or proxy".
Incomplete outcome data (attrition bias) All outcomes	Low risk	Lost to follow-up clearly noted; 82/527 warm handoff interevention and 99/527 usual care completed 6-month follow-up.
Other bias	Low risk	No other risks of bias detected

Richter 2023

Study characteristics

Richter 2023 *(Continued)*

Methods	Country: USA Study dates: September 2016-September 2020 Recruitment: Patients in a single hospital in Kansas Inclusion/exclusion criteria: "Inclusion criteria included participants who (1) were aged at least 18 years, (2) smoked 25 out of the past 30 days, (3) spoke English or Spanish, (4) had access to a phone, (5) were residents of Kansas or Missouri, (6) were medically eligible to use nicotine replacement therapy, and (7) were willing to provide a secondary phone number. Exclusion criteria included patients who (1) were pregnant and/or breastfeeding, (2) had a substantial comorbidity (life-threatening illness or altered mental status), (3) were incarcerated, (4) were receiving cessation pharmacotherapy, already treated for tobacco during the hospital stay, or currently enrolled in a cessation program, (5) were hospitalized for more than 3 days, (6) were in the process of being discharged, and/or (7) were previously screened ineligible for study."
Participants	Participants: 1000 past 30-d smokers (n = 345 opt-in group, n = 645 opt-out group) Number smoked: not stated Age: 51.5 yrs Therapists: Study staff
Interventions	1. Opt-out: Includes pharmacotherapy and counselling. 2-week starter pack of OTC combination nicotine replacement pharmacotherapy, consisting of 14 nicotine patches plus 14-day supplies of either (a) nicotine gum, or (b) nicotine lozenges. The choice of the short-acting NRT will be made based on contraindications, past history of success/failure, and personal preferences. On the day of hospital discharge, study staff will provide the sealed starter pack to the patient at the bedside, for the patient to use once they leave the hospital. In addition, patients' physician will have been asked to provide a prescription for a smoking cessation medication on the discharge orders, so that total medication use may be > 14 days. Staff provides brief practical counselling, a treatment plan and pamphlet with quit tips in hospital using OPT-OUT language (offered to all without asking for interest in staying quit after discharge). After discharge, patients receive 4 weekly counselling calls by research staff [intensity 4]. 2. Opt-in: Includes pharmacotherapy and counselling. Same as Arm 1 but only offered to patients who accepted offer of NRT at discharge: 2-week starter pack of over-the-counter quit-smoking medications. This will include 14 days of combination nicotine replacement pharmacotherapy, consisting of 14 nicotine patches plus 14-day supplies of either (a) nicotine gum, or (b) nicotine lozenges. The choice of the short-acting NRT will be made based on contraindications, past history of success/failure, and personal preferences. On the day of hospital discharge, study staff will provide the sealed starter pack to the patient at the bedside, for the patient to use once they leave the hospital. In addition, patients' physician will have been asked to provide a prescription for a smoking cessation medication on the discharge orders, so that total medication use may be > 14 days. Staff provides the same intervention as ARM 1 (OPT-OUT) but only to patients who opted in for counselling [intensity 4].
Outcomes	Abstinence: 6 mo confirmed PPA Validation: Verified with CO (<= 10 ppm or cotinine (threshold not speciified) or proxy if no biochemical sample Died: 27 in group 1, 18 in group 2
Notes	Opt-out (all pts receive txt plan, counselling, med starter kit) vs. Opt-in (txt plan, counselling, meds for those interested in quitting smoking or 4Rs only for those not interested in quitting) Funding: National Institutes of Health Declarations of Interest: Information not available This trial was found via a trial registry and the full text was shared with us by the authors prior to publication.

Risk of bias

Bias	Authors' judgement	Support for judgement

Richter 2023 *(Continued)*

Random sequence generation (selection bias)	Low risk	Tablets were used by study staff but random number sequence generation not explicitly described
Allocation concealment (selection bias)	Unclear risk	Tablets were used by study staff but allocation concealment not explicitly described
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Blinding not mentioned; interventions very similar
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Likely low risk due to biochemical validation of main outcome (at 1 and 6 m)
Incomplete outcome data (attrition bias) All outcomes	Low risk	229/270 (84%) provided f/u at 6 m in Opt-In: 420/469 (89%) did so in Opt-OUT; these are high numbers and are similar between groups, so low risk of attrition bias. However, if we use the randomised number as the denominator, then the incomplete (missing) data are much higher and the risk of attrition bias could be higher.
Other bias	Low risk	No other risks of bias detected

Rigotti 1994

Study characteristics	
Methods	Country: USA Study dates: July 1986-July 1987 Recruitment: Inpatients scheduled for CABG Inclusion/exclusion criteria: "Eligibility criteria: those who had smoked at least 1 pack of cigarettes in the past 6 months, lived in eastern Massachusetts or Rhode Island, spoke English, and were not too ill to participate."
Participants	Participants: 87 current smokers or recent quitters (38%, defined as at least 1 pack/cigarettes in previous 6 m) (intervention group n = 44, control group n = 43) Number smoked: 33 cpd Age: 58 yrs av. 82% of all CABG surgery Therapists: Nurse
Interventions	1. Intervention: Counselling (3 x, total 60 mins, type behavioural). Self-help materials, video. Follow-up (1 x at 1 wk by telephone) [Intensity 3] 2. Control: Advice only NRT: No
Outcomes	Abstinence: Sustained abstinence at 4, 8, 12 m Validation: Salivary cotinine Died: 7 at 12 m
Notes	Abstinence rates include smokers who had quit prior to surgery. Included in CVD subcategory Funding: "By the Massachusetts affiliate of the American Heart Association (13-515-845), the William F. Milton Fund of Harvard University, and a National Cancer Institute Preventive Oncology Academic Award (CA01673-01) to Dr. Rigotti."

Rigotti 1994 *(Continued)*

Declarations of Interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	"Patients were randomly assigned to control or intervention groups after surgery." Method not specified
Allocation concealment (selection bias)	Unclear risk	Not specified
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Blinding of participants not specified
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Outcome assessment blinded; biochemical validation: "The primary outcome variable was smoking behavior, assessed by self-report and validated by saliva cotinine assay".
Incomplete outcome data (attrition bias) All outcomes	Low risk	7 deaths not counted in final meta-analysis; no other patients lost to follow-up at 12 m
Other bias	Low risk	No other risks of bias detected

Rigotti 1997

Study characteristics

Methods	Country: USA Study dates: August 1994-August 1997 Recruitment: Inpatients in medical or surgical services Inclusion/exclusion criteria: "Patients admitted to the medical and surgical services who reported having smoked at least 1 cigarette in the month before admission were eligible for enrollment, regardless of their interest in quitting smoking. To assemble a cohort of newly admitted adults who were able to receive the intervention and be followed up for 6 months, we excluded patients who were younger than l8 years; transferred from another hospital; admitted for intensive care, transplantation, or terminal care; unable to speak English or to be reached by telephone; cognitively or psychologically impaired; or expected to be in the hospital for less than 48 hours. To avoid contaminating control patients with intervention materials, we excluded patients whose hospital roommate was enrolled in the study".
Participants	Participants: 650 current smokers or recent quitters (proportion not stated, defined as at least 1 cigarette in previous month) (Intervention group n = 325, control group n = 325) Number smoked: 24 cpd Age: 48 yrs av. 23% had cardiac or pulmonary diagnosis. Therapists: Research assistant and nurse
Interventions	1. Intervention group: Physician advice (prompt on chart). Counselling (1 x, total 15 mins, type behavioural). Self-help materials. Follow-up (1-3 x at 1-3 wks by telephone) [Intensity 3] 2. Control group: Usual care NRT: 'some' (around 4%)
Outcomes	Abstinence: PP at 6 m

Rigotti 1997 *(Continued)*

	Validation: Salivary cotinine Died: 35 at 12 m
Notes	50% of patients could recall being given physician advice. Funding: "This work was supported by a grant from the American Cancer Society, Atlanta, Ga, by Massachusetts Division lnc, Boston, and by Preventive Oncology Academic Award CA01673, National Cancer Institute, Bethesda, Md (Dr Rigotti)." Declarations of Interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Each day's list of eligible smokers put in random order and patients recruited consecutively in this order; randomised by research assistant
Allocation concealment (selection bias)	Unclear risk	See above
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Not clear if participants were blinded
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Outcome assessment blinded; biochemical validation: "To validate self-reported nonsmoking at 6 months of follow-up, we requested saliva samples from the 82 (85%) self-reported nonsmokers who lived in Massachusetts."
Incomplete outcome data (attrition bias) All outcomes	Low risk	73 (22.4%) lost to follow-up included in ITT analysis; no evidence of differential loss; 35 (5.4%) deaths excluded
Other bias	Low risk	No other risks of bias detected

Rigotti 2006

Study characteristics

Methods	Country: USA Study dates: October 1999-October 2002 Recruitment: Inpatients with cardiovascular disease (MI, unstable angina, CHF) or PVD admitted to 5 hospitals Inclusion/exclusion criteria: "Patients admitted with acute cardiovascular disease who were 18 years old, smoked 1 cigarette in the past month, and had an expected stay of 24 hours. Eligible admission diagnoses included acute ischemic coronary heart disease (myocardial infarction or unstable angina), coronary artery bypass graft surgery, or other cardiovascular conditions in subjects with documented coronary artery disease. Coronary disease had to be documented by typical EKG changes accompanying episodes of chest pain or by a diagnostic coronary angiography or noninvasive stress test. Subjects were excluded if they were not willing to consider smoking cessation or if they had a contraindication to bupropion, a risk of seizure, blood pressure 160/100 in hospital, heavy alcohol use (3 drinks/day), binge drinking (6 drinks for males or 5 drinks for females) at least monthly, severe hepatic or renal disease, major depression, psychosis, cognitive impairment, life expectancy of 12 months, recent illegal drug use, no telephone, residence outside a defined area, or did not speak English."

Rigotti 2006 *(Continued)*

Participants	Participants: 254 current smokers (smoked in past month) and willing to consider smoking cessation at discharge (no commitment required) (n = 127 bupropion SR + counselling, n = 127 placebo + counselling) Number smoked: 23/21 cpd Age: 56 yrs av. Therapists: Nurse
Interventions	1. Bupropion SR + counselling: Bupropion SR 300 mg/day x 12 wks, started in hospital. Nurse counselling (30-45 min, type cognitive/behavioural and relapse prevention) in hospital + booklet + follow-up telephone calls (10 min/call) 5 x at 2, 7, 21 days, 2 m, 3 m. Total counselling time: 85-90 mins 2. Placebo + counselling: As above, but placebo pill NRT: No
Outcomes	Abstinence: Continuous abstinence at 2, 4, 12, 52 wks Validation: Saliva cotinine at 12 and 52 wks, CO at 2 and 4 wks Died: 2 at 12 m
Notes	Used for bupropion comparison and CV diagnosis, not for comparison of counselling intensity because both groups had the same counselling Funding: "This study was funded by grants from NHLBI (#R01 HL 61779 and #K24-HL04440), the NIH General Clinical Research Centers Program (#M01-RR-01066) and an unrestricted research grant from GlaxoSmithKline, Inc (GSK)". Declarations of Interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	"Using a computer program, the study statistician generated a sequence of randomly-permuted blocks of 4 within strata formed by study site and daily cigarette consumption (10 vs 10)."
Allocation concealment (selection bias)	Low risk	"The study pharmacist used this sequence, concealed from enrolment staff, to assign participants to study arm. Subjects and study personnel, except the statistician and pharmacist, were blind to treatment assignment."
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Participants blinded
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Outcome assessor blinded; biochemical validation: "Self-reported abstinence was validated by saliva cotinine".
Incomplete outcome data (attrition bias) All outcomes	Low risk	"Subjects were considered smokers if they were lost to follow-up..."; same percentage (23%) lost to follow-up in both groups
Other bias	Low risk	No other risks of bias detected

Rigotti 2014a

Study characteristics

Rigotti 2014a *(Continued)*

Methods	Country: USA Study dates: August 2010-November 2012 Recruitment: 1 general hospital in Boston, MA Inclusion/exclusion criteria: "Adults aged 18 years or older who were admitted to MGH were eligible if they were current smokers (smoked ≥ 1 cigarette/day during the month before admission), received smoking cessation counseling in the hospital, stated that they planned to try to quit smoking after discharge, and agreed to accept a smoking cessation medication. Patients were excluded if they had no telephone; had an expected hospital stay of less than 24 hours; substance use in the past 12 months other than tobacco, alcohol, or marijuana, or were admitted for an alcohol or drug overdose; could not give informed consent or participate in counseling due to impaired mental status, cognitive impairment, or communication barrier; were admitted to the obstetric or psychiatric units; had an estimated life expectancy of less than 12 months; or had medical instability."
Participants	Participants: 397 daily smokers (n = 198 sustained care intervention, n = 199 standard care) Number smoked: 16.6 Age: 52.55 yrs average Therapists: Hospital-based counsellor
Interventions	1. Standard care intervention: 5 automated outbound interactive voice response telephone calls (at 2, 14, 30, 60, and 90 days after discharge) provided advice and support messages that prompted smokers to stay quit, encouraged proper use and adherence to cessation medication, offered medication refills, and triaged smokers to a return telephone call from a live counsellor for additional support. The automated telephone script encouraged participants to request a callback from a counsellor if they had low confidence in their ability to stay quit, had resumed smoking but still wanted to quit, needed a medication refill, had problems with medication, or had stopped using any medication. A trained counsellor made the return telephone calls using a standardised protocol [intensity 4]. Plus a 30-day supply of free tobacco cessation medication (any type approved by the US Food and Drug Administration) was provided at discharge and was refillable twice for up to 90 days of treatment. Medication was chosen by the patient and smoking counsellor during the inpatient visit. Treatment could include single agents (nicotine patch, gum, lozenge, bupropion, or varenicline) or a combination of these. 2. Standard Care: Standard care provided smokers with a specific post-discharge medication recommendation and advice to call a free telephone quit line (1-800-QUIT-NOW). A note in the chart advised hospital physicians to prescribe the medication upon discharge [intensity 1]. Plus inpatient medication recommendations advising inpatient doctors to prescribe at discharge.
Outcomes	Abstinence: 6 mo past 7-d confirmed PPA Validation: Breath CO and salivary cotinine Died: 4 in group 1, 4 in group 2
Notes	Sustained care (meds + behavioural support) vs. standard care Funding: "This study was supported by grants RC1 HL099668 and K24 HL004440 from the National Institutes of Health/National Heart, Lung, and Blood Institute." Declarations of Interest: "The authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Dr Rigotti reported being an unpaid consultant for Pfizer Inc and Alere Wellbeing Inc regarding smoking cessation; receiving royalties from UpToDate for reviews on smoking cessation; and receiving reimbursement for travel expenses from Pfizer to attend a consultant meeting. Dr Levy reported being a paid consultant to CVS Inc to provide expertise on tobacco policy. Dr Park reported receiving a grant from Pfizer to provide free varenicline for use in a trial funded by the National Cancer Institute. Dr Singer reported being a paid consultant for Pfizer Inc on matters separate from smoking cessation. No other disclosures were reported."

Risk of bias

Bias	Authors' judgement	Support for judgement

Rigotti 2014a *(Continued)*

Random sequence generation (selection bias)	Low risk	Permuted blocks of eight randomisation numbers
Allocation concealment (selection bias)	Low risk	Treatment assignment was concealed in sequentially numbered sealed envelopes within each stratum.
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Neither the participant nor the research staff knew participants' randomisation group before participants were enroled.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Outcome assessor and process blinded; biochemical validation: "Self-reported abstinence was considered verified if saliva cotinine level was 10 ng/mL or less or if the carbon monoxide level was less than 9 ppm."
Incomplete outcome data (attrition bias) All outcomes	Low risk	Incomplete data and attrition clearly noted in Consort diagram (164/198 sustained care group and 156/199 standard care group completed 6-month follow-up)
Other bias	Low risk	No other risks of bias detected

Rigotti 2016a

Study characteristics	
Methods	Country: USA Study dates: December 2012-July 2014 Recruitment: 3 hospitals in two states Inclusion/exclusion criteria: "Patients admitted to these hospitals were eligible if they were adults (aged ≥ 18 years), current smokers (smoked one or more cigarettes daily when smoking normally in the month before admission), had > 5 minutes of smoking-cessation counseling in the hospital, stated that they planned to try to quit smoking after discharge, and agreed to accept a smoking-cessation medication. Patients were excluded if they had no telephone, were non-English speaking, could not give informed consent or participate in counseling owing to psychiatric or cognitive impairment or communication barrier, were admitted to obstetric or psychiatric units, were admitted for intravenous drug overdose, had medical instability, or had < 1 year of estimated life expectancy."
Participants	Participants: 1359 current smokers (n = 681 sustained care, n = 678 standard care) Number smoked: 16 CPD Age: 49.7 yrs average Therapists: Telephone counselling vendor (Alere)
Interventions	1. Sustained care: Second, five automated IVR telephone calls were initiated at 2, 12, 28, 58, and 88 days after discharge. Each call prompted smokers to quit or stay quit, offered support messages, encouraged adherence to cessation medication, and offered smokers the option of a direct two-step transfer to a telephone quitline. The IVR script encouraged participants to request a transfer if they had resumed smoking but still wanted to quit, needed a medication refill, had problems with medication, or stopped using medication prematurely [intensity 4]. Plus a 30-day supply of free U.S. Food and Drug Administration–approved tobacco-cessation medication was provided at discharge, refillable twice for up to 90 days of treatment (NRT and RX meds available). 2. Standard care: brief bedside counselling [intensity 2] with inpatient medication recommendations made
Outcomes	Abstinence: Confirmed past 7-d PPA at 6 mo

Rigotti 2016a *(Continued)*

	Validation: Breath CO and salivary cotinine Died: 13 in group 1, 14 in group 2
Notes	Compared a post-discharge tobacco-cessation intervention (meds + counselling), with Standard Care amongst hospitalised adult smokers who wanted to quit smoking and received in-hospital tobacco-cessation counselling. Funding: NIH/NHLBI grant #R01-HL11821 Declarations of Interest: "Drs. Rigotti and Park receive royalties from UpToDate. Dr. Rigotti has been an unpaid consultant for Pfizer, Inc. and Alere Wellbeing, Inc., regarding smoking cessation. She has received travel expenses from Pfizer to attend a consultant meeting for which she received no honorarium. Dr. Park has a grant from Pfizer to provide free varenicline for use in a trial funded by NCI. Dr. Levy has been a paid consultant to CVS, Inc., to provide expertise on tobacco policy. Dr. Singer has been a paid consultant for Pfizer, Inc., but on matters separate from smoking cessation. Dr. Carpenter is an employee of Alere Wellbeing, Inc. No other authors have any conflicts of interest to disclose."

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Participants were randomly assigned (1:1) to sustained care or standard care in permuted blocks of eight, stratified by daily cigarette consumption (ten or fewer versus ten or more) and admitting service (cardiac versus other).
Allocation concealment (selection bias)	Low risk	Treatment assignment was concealed in sequentially numbered sealed envelopes within each stratum.
Blinding of participants and personnel (performance bias) All outcomes	High risk	The study was not blinded.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	The study was not blinded; biochemically validated: "To verify self-reported abstinence at 6 months, patients were asked to provide a mailed saliva sample to assay for cotinine, a nicotine metabolite, and compensated $50 for the sample".
Incomplete outcome data (attrition bias) All outcomes	Low risk	LTFU clearly shown in Consort diagram; similar follow-up rates between groups (n = 508/681 sustained care group and n = 513/678 reached at 6-month follow-up)
Other bias	Low risk	No other risks of bias detected

Rigotti 2022

Study characteristics

Methods	Country: USA Study dates: September 2018-March 2020 Recruitment: Patients in 3 hospitals across 3 states Inclusion/exclusion criteria: Adults (> 18 years old) admitted to these hospitals were eligible for inclusion if they smoked cigarettes daily in the month before admission, received smoking cessation counselling in the hospital, planned to try to quit smoking after discharge and agreed to accept an NRT sample at discharge. Exclusion criteria include insufficient time to complete enrolment before discharge, a patient's inability to give informed consent or participate in counselling due to a serious cognitive or psychiatric dis-

Rigotti 2022 *(Continued)*

	order (e.g. dementia, psychosis), life expectancy < 12 months, medical instability precluding study participation, pregnancy, nursing, or planning to become pregnant within 6 months, no reliable telephone access or inability to use a telephone, lack of address to receive mail, low English proficiency, hearing/speech impairment or residence in a state whose quitline operator is not participating in the study.
Participants	Participants: 1416 daily smokers (Personalized Tobacco Care Management n = 675, Quitline eReferral n = 675) Number smoked: 16 CPD Age: 52 yrs average Therapists: Hospital-based counsellor or quitline-based counsellor
Interventions	1. Personalized Tobacco Care Management: Inpatient bedside counselling + post-discharge counselling included 7 automated phone calls using interactive voice response (IVR) technology. At 3 days and 2, 4, 6, 8, 10, and 12 weeks after discharge, IVR calls monitored smoking status, encouraged medication adherence, supported cessation efforts, and offered a return call from a health system-based tobacco counsellor who provided 5-10 minutes of behavioural counselling, promoted medication adherence and coordinated medications with the outpatient provider [intensity 4]. At discharge, study participants received a free 8-week supply of their choice of NRT patch, gum, or lozenge (alone or in combination). 2. Quitline eReferral: Inpatient counselling and Quitline counselling, typically 5 calls across 3 months, though this varied by state [intensity 4]. Inpatient meds as needed and post-d/c referral to quitline where patients could receive NRT
Outcomes	Abstinence: Biochemically confirmed continuous abstinence at 6 months Validation: Breath CO and salivary cotinine Died: 19 in group 1, 24 in group 2
Notes	Health system-based tobacco treatment (8 weeks NRT with calls from hospital-based counsellor) vs. community based quitline referral Funding: "The study is funded by a grant from the National Heart Lung and Blood Institute (#2R01-HL111821)." Declarations of Interest: "NR has received royalties from UpToDate, Inc., for writing on smoking cessation topics and consulting fees from Achieve Life Sciences for development of cytisine, an investigational smoking cessation medication. She has consulted with Pfizer, Inc., the manufacturer of Chantix (varenicline) smoking cessation medication, without accepting fees. DS has consulted for Pfizer regarding anticoagulation but not regarding smoking cessation. HAT has consulted for Achieve Life Sciences on a phase III clinical trial for cytisine. HAT is a multiple PI on a cessation study of non-daily smokers (PI: Primack; 5 R01 DA034629 04) for which the active study medication (nicotine gum) was donated by the manufacturer. HAT is the project lead for a Cancer Center Support Grant Supplement (PI: Pietenpol; 3 P30 CA068485 22S3) for which Chantix (varenicline) was donated by the manufacturer. HAT has not received funds from Achieve Life Sciences, nor the drug manufacturers. These authors have no competing interests to declare: KS, AD, KG, ED, AN, JK, DEL, SR, YC." Study found in search of trial registers

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Computer-generated randomisation scheme and the REDCap randomisation module
Allocation concealment (selection bias)	Low risk	Participants were randomly assigned to PTCM vs eReferral by a computer-generated randomisation scheme created by the study. "REDCap randomisation module" Statistician for the corresponding stratum

Rigotti 2022 *(Continued)*

Blinding of participants and personnel (performance bias) All outcomes	Low risk	Investigators, but neither participants nor study staff, were blinded to study condition.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Not stated whether assessors were blinded; biochemical validation
Incomplete outcome data (attrition bias) All outcomes	Low risk	Consort diagram clearly showed this; at 6 months follow-up rates were 74% and did not differ by group .
Other bias	Low risk	No other risks of bias detected

Sherman 2016a

Study characteristics	
Methods	Country: USA Study dates: July 2011-April 2014 Recruitment: At two New York City public hospitals, every hospitalised patient identified as a smoker (based on admission records) was approached. Inclusion/exclusion criteria: Inclusion criteria were: smoked cigarettes in the past 30 days; spoke English, Spanish, or Mandarin; had a US phone number; not discharged to an institution where follow-up or smoking was limited; and not pregnant/breastfeeding.
Participants	Participants: 1618 past 30-d smokers (Quitline n = 814, intensive counselling n = 805) Number smoked: 12.4 CPD Age: 48.5 yrs average Therapists: Study staff or quitline counsellor
Interventions	1. Intensive counselling arm:Study staff — Masters-level counsellors with mental health training — reached out proactively to deliver seven sessions of telephone counselling in English, Spanish, or Mandarin. The first call was conducted in the 2 weeks after discharge (with up to ten attempts to reach the participant) and lasted approximately 15–20 minutes, and the 10 to 15–minute follow-up calls were at 1, 3, 7, 14, 30, and 42 days after the initial post-discharge contact [intensity 4]. Participants in the intensive counselling arm were also eligible for 8 weeks of NRT if they had not received an NRT prescription at discharge. 2.Quitline arm:The project director transmitted participant information by facsimile or online referral to their state Quitline, which for 95% was the New York State Smokers' Quitline (other states included California, Connecticut, the District of Columbia, Florida, Massachusetts, Pennsylvania, South Carolina, Tennessee, Virginia, and West Virginia). The standard Quitline protocol varies by state; in New York, they make up to five call attempts, and contacted participants receive one 15 to 20–minute counselling session with a follow-up call to assess quit status and ensure any requested NRT was received [intensity 3]. NRT from quitline
Outcomes	Abstinence: 30-day PPA at 6 mo Validation: None Died: 12 in group 1, 18 in group 2
Notes	Post d/c multi-session telephone counselling from study staff or referral to the state Quitline for proactive outreach and counselling

Sherman 2016a *(Continued)*

Funding: "This work was supported by a grant from the National Heart, Lung and Blood Institute (NHLBI) of NIH (#1U01HL105229) and a Hurricane Sandy Supplement (#3U01HL105229-04S1), and also in part by the New York University CTSA grant UL1TR000038 from the National Center for Advancing Translational Sciences, NIH. Dr. Sherman is also supported by a grant from the National Institute on Drug Abuse (#1K24DA038345) and by the VA New York Harbor Healthcare System."

Declarations of Interest: "None of the authors have any conflicts of interest to report."

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	The randomisation scheme, designed by the biostatistician, employed a computerised random number generator and stratified participants on hospital site.
Allocation concealment (selection bias)	Unclear risk	Not explicitly stated who had access to the randomization scheme prior to randomization
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants not blinded but groups theoretically had similar levels of contact (in reality, internal counselling had much higher levels of contact, so performance bias could be higher)
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	RAs making follow-up calls were blinded to treatment group assignment; no biochemical validation, "Self-reported abstinence at 6 months."
Incomplete outcome data (attrition bias) All outcomes	Low risk	High rates of follow-up that were similar between groups (536/814 Quitline, 546/805 intensive counselling reached for 6-month follow-up)
Other bias	Low risk	No other risks of bias detected

Simon 1997

Study characteristics

Methods	Country: USA Study dates: April 1993-October 1994 Recruitment: Inpatients undergoing non-cardiac surgery Inclusion/exclusion criteria: "All participants reported that theywere current cigarette smokers, defined as smoking any amount of tobacco within the 2 weeks prior to hospitalization. Patients who were terminally ill or who were judged unlikely to leave the hospital postoperatively were excluded, as were subjects with a contraindication to nicotine replacement therapy (e.g. unstable angina or a myocardial infarction within the previous 6 months)."
Participants	Participants: 324 current smokers (multicomponent intervention n = 168, self-help literature + brief counselling n = 156) Number smoked: 20 cpd Age: 54 yrs av. Most cardiovascular or respiratory disease Therapists: Public health educator

Simon 1997 *(Continued)*

Interventions	1. Intervention: Inpatient counselling (1 x, total 30-60 mins, type behavioural). Self-help materials, video. NRT if no contraindications (gum, dose not stated, for 3 m). Follow-up (5 x at 1-3 wks, 2 m, 3 m by telephone) [Intensity 4] 2. Control: Advice only NRT: Yes
Outcomes	Abstinence: PP at 12 m Validation: Serum or salivary cotinine or corroboration by significant other Died: 25 at 12 m
Notes	Approx 65% intervention and 17% control used NRT; not associated with quitting in either group Funding: "This study was supported in part by grant 3RT-0054 from the California Tobacco-Related Disease Research Program, Oakland." Declarations of Interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	"Random list of assignments"
Allocation concealment (selection bias)	Low risk	"Sealed opaque envelopes opened on formal enrolment"
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants not blinded
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Biochemical validation and blinding of outcome of assessment
Incomplete outcome data (attrition bias) All outcomes	Low risk	28 lost to follow-up included in ITT analysis; 25 deaths excluded from denominator
Other bias	Low risk	No other risks of bias detected

Simon 2003

Study characteristics

Methods	Country: USA Study dates: October 1997-March 2000 Recruitment: Inpatients (all diagnoses) admitted to 1 hospital for military veterans Inclusion/exclusion criteria: "Participants were current smokers (> 20 cigarettes during the prehospitalization week). Patients hospitalized for a psychiatric or terminal illness, or who had a contraindication to nicotine replacement, were excluded."
Participants	Participants: 223 current smokers (smoked >= 20 cigarettes in wk before admission), contemplation or action stage of change, able to use NRT. (Intensive counselling and telephone follow-up intervention + transdermal nicotine n = 107, minimal contact intervention + transdermal nicotine n = 116)

Simon 2003 *(Continued)*

	Number smoked: 23 cpd Age: 55 yrs av. Therapists: Nurse or health educator
Interventions	1. Intensive counselling and telephone follow-up intervention + transdermal nicotine: Nurse or health educator counselling (30-60 mins; type cognitive/behavioural) + booklet + NRT patches x 8 wks. Follow-up: 5 x at 1,3 wks and 1 m, 2 m, 3 m (< 30 min/call) [Intensity 4] 2. Minimal contact intervention + transdermal nicotine: brief counselling (10 mins) + booklet + NRT patches x 8 wks. No follow-up contact NRT: Yes
Outcomes	Abstinence: 7-day PP at 12 m Validation: Saliva cotinine < 15 ng/mL OR spousal corroboration Died: 14 at 12 m
Notes	Study tests marginal efficacy of counselling in setting of NRT. Funding: Information not available Declarations of Interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	"Randomly assigned using computerized algorithm"
Allocation concealment (selection bias)	Unclear risk	No details provided
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants not blinded
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Biochemical verification and blinded outcome assessment:"For participants who reported they had quit smoking at 12 months, we obtained saliva samples for cotinine testing and used levels > 15 ng/mL as an indicator of current tobacco use".
Incomplete outcome data (attrition bias) All outcomes	Low risk	7 (3%) lost to follow-up included in ITT analysis, 14 (6%) died & excluded from denominator, (102/107 in intensive counselling and telephone follow-up intervention + transdermal nicotine group, and 107/116 in minimal contact intervention + transdermal nicotine analysed at 12-month follow-up)
Other bias	Low risk	No other risks of bias detected

Simon 2009a

Study characteristics

Methods	Country: United States Study dates: January 2004-August 2006 Recruitment: patients admitted in 1 VA hospital Inclusion/exclusion criteria:

Simon 2009a *(Continued)*

	All smokers hospitalised ≥ 24 h screened for eligibility.... All participants reported that they were current smokers during the week prior to hospital admission and smoked at least 5 cigarettes/day during the previous year. Exclusion criteria: contraindication to bupropion, admitted for ACS, terminally ill, serious unstable psychiatric illness, family history of seizure, women pregnant or lactating, history of drug abuse consumption of >= 3 alcoholic beverages/day)
Participants	Participants: 85 smokers ≥ 5 cpd during previous year and smoking the week prior to admission (bupropion + counselling n = 42, placebo + counselling n = 43) Diagnosis: not specified Age: 56 yrs av. Gender: 96% male Willingness to quit: not assessed Therapists: public health educator
Interventions	1. Bupropion + counselling: Bupropion during 7 wks + counselling (1 cognitive behavioural intervention of 30-60 minutes during hospitalisation) + telephone counselling after discharge at wk 1, 3, month 1, 2, 3 2. Placebo + counselling: Placebo + counselling as above [Both arms: intensity 4] Pharmacotherapy: Bupropion in intervention group
Outcomes	Abstinence: 7-day PP at 6 m Validation: salivary cotinine Died: 2 (1 in each group)
Notes	Category: pharmacotherapy Not used in primary meta-analysis by counselling intensity as both arms received the same counselling Funding: "California Tobacco-Related Disease Research Program (12RT-0148)." Declarations of Interest: "None declared"

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	"computer algorithm to generate a random list of treatment assignments."
Allocation concealment (selection bias)	Unclear risk	"All study personnel engaged in providing interventions to participants were blinded to treatment assignment". Not explicit that this included enrolment staff
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Participants blind, and study staff blinded: "All study personnel engaged in providing interventions to participants were blinded to treatment assignment."

Simon 2009a *(Continued)*

Blinding of outcome assessment (detection bias) All outcomes	Low risk	Outcome assessment blind and biochemical verification: "For participants who reported that they had quit smoking at the end of treatment and at the 6-month telephone interview, we obtained saliva samples for cotinine testing".
Incomplete outcome data (attrition bias) All outcomes	Low risk	Similar numbers lost to follow-up in both groups; all except deaths included in MA (38/42 bupropion + counselling and 36/43 placebo + counselling analysed at 6-month follow-up)
Other bias	Low risk	No other risks of bias detected

Smith 2009b

Study characteristics	
Methods	Country: Canada Study dates: December 1999-March 2003 Recruitment: patients admitted to 4 cardiac units in a large urban hospital Inclusion/exclusion criteria: "We considered eligible patients to be those who were 18 years of age or older, used tobacco in the month before admission, had a minimum projected hospital stay of 36 hours (to allow time for the intervention), were willing to be randomly assigned to an intervention and had telephone access to receive counselling after discharge. We excluded patients who were pregnant, involved in a concurrent trial for tobacco cessation, medically unstable (as determined by a physician), lived in an institution without telephone access, could not speak English or had trouble communicating, had a history of substance abuse or psychiatric disorders, or for whom the patient's physicians refused to allow participation."
Participants	Participants: 276 patients who used tobacco in the month before admission (intensive intervention n = 137, minimal intervention n = 139) Diagnosis: acute MI or CABG Age: 54 yrs av. Gender: 82-83% male Willingness to quit: ranged from 3-7, mean 6.8 (on a 1-7 scale, with 7 = full intention) Therapists: nurse
Interventions	1. Intensive intervention: minimal intervention + 45-60 minutes of bedside education and counselling, take-home material and 7 telephone counselling sessions at 2, 7, 14, 21, 30, 45, and 60 days after discharge [Intensity 4] 2. Minimal intervention: research nurse advised smoker to quit, reviewed 2 pamphlets and asked the attending physician to give a scripted nonsmoking message Pharmacotherapy: not part of the study but available through hospital if requested
Outcomes	Abstinence: 7-day PP and continuous abstinence at 12 m Validation: proxy corroboration at 12 m only for 7-day PP only Died: 4 (2 in each group)
Notes	Category: cardiac patients For the meta-analysis, we used validated 7-day PP

Smith 2009b *(Continued)*

Funding: "This research was supported with funding by the Calgary Health Region Health Promotion Fund, Aventis Canada, Merck Frosst Canada and Pfizer Canada."

Declarations of Interest: "Patricia Smith received travel assistance from Pfizer to attend the Global Healthcare Alliance for Treatment of Tobacco Dependence in November 2008. Pfizer manufactures a nicotine-replacement product. None declared for Ellen Burgess."

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	"... randomization code using a computer random-number generator to select random permuted blocks of 10... stratified by acute MI and CABG."
Allocation concealment (selection bias)	Unclear risk	The nurse "opened the randomization envelope and informed the patients of intervention assignment (intensive or minimal)". No details of envelope
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants not blinded
Blinding of outcome assessment (detection bias) All outcomes	High risk	Outcome assessment not blinded and biochemical validation not clear; proxy corroboration only
Incomplete outcome data (attrition bias) All outcomes	Low risk	Participants lost to follow-up counted as smokers; similar percentage lost to follow-up in both groups (9.4% control, 8.8% intervention at 12-month follow-up)
Other bias	Low risk	No other risks of bias detected

Smith 2011

Study characteristics

Methods	Country: Canada Study dates: November 1998-February 2000 Recruitment: patients admitted to 3 community hospitals Inclusion/exclusion criteria: "Eligibility criteria were identical to those in the Houston Miller et al. (1997) trial: 18 plus years, tobacco use in the last 30 days, minimum 36-hour stay, telephone access in the telephone-exchange area, and willingness to be randomized and to quit (all intensive intervention trials except Hennrikus et al. [2005] have selected on intention to quit). Exclusion criteria were: enrolled in another cessation trial, pregnant, medically complicated (e.g., palliative, unstable), institutionalized, unable to speak English/communication difficulties, substance abuse, and psychiatric history."
Participants	Participants: 643 current smokers (tobacco use in the last 30 days) (intensive intervention n = 309, brief intervention n = 334) Diagnosis: diverse (CVD, pulmonary, other internal medicine, cancer, orthopaedic, gynaecology, non-cardiac surgery) Age: 49 yrs av. Gender: 49.3% male Willingness to quit: yes

Smith 2011 *(Continued)*

	Therapists: nurses
Interventions	1. Intensive intervention: brief intervention + in-hospital education, take-home materials, counselling and post-discharge telephone counselling: post-discharge telephone counselling (5-10 min/call) for the intervention group at 2, 7, 14, 21, 30, 45 and 60 days [Intensity 4] 2. Brief intervention (5 minutes): cessation advice personalised to patient's medical condition and 2 pamphlets + note on the patient's chart for the attending physician to provide a message personalised to patient's medical condition Pharmacotherapy: not provided
Outcomes	Abstinence: self-reported 7-day point-prevalence abstinence at 12 m Validation: with saliva cotinine (< 15 ng/mL) or proxy confirmation at 1 year only Died: 27 (19 in control and 8 in intervention group)
Notes	Funding: "This work was supported by the National Cancer Institute of Canada (now the Canadian Cancer Society Research Institute) with funds from the Canadian Cancer Society". Declarations of Interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Computerised random number generator
Allocation concealment (selection bias)	Unclear risk	Not specified; randomisation envelopes
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants not blinded
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Biochemical verification, "Smoking status was self-reported 7-day point prevalence at 3, 6,and 12 months post-discharge (not even a puff for the last 7 days; Ossip-Klein, Parker, Bigelow, Curry, & Kirkland, 1986) and confirmed at 1 year (saliva cotinine less than 15 ng/mL or proxy-confirmation)."
Incomplete outcome data (attrition bias) All outcomes	Low risk	Participants lost to follow-up counted as smokers but not specified; deaths excluded from final denominators (301/309 intensive intervention, 315/334 brief intervention analysed at 12-month follow-up)
Other bias	Low risk	No other risks of bias detected

Steinberg 2011

Study characteristics

Methods	Country: USA Study dates: August 2007-March 2009 Recruitment: patients admitted to 1 university-based hospital Inclusion/exclusion criteria:

Steinberg 2011 *(Continued)*

	"Patients admitted to the hospital who smoked 10 cigarettes or more per day within the past month, were not being discharged into a setting of forced abstinence (e.g. institutionalized), and could attend a 4-week outpatient follow-up visit (e.g. not moving out of the area) were included. Those who were under the age of 18 years; on dialysis; with mental illness requiring antipsychotic medications; currently using cessation medications (varenicline, bupropion, nortriptyline, or nicotine replacement medications); had previous reaction to varenicline; pregnant; or had active substance abuse, deemed clinically unstable, or life expectancy less than 6 months were excluded."
Participants	Participants: 79 smokers (smoking ≥ 10 cpd within the past month) (varenicline n = 40, placebo n = 39) Diagnosis: various diagnoses (CVD, orthopaedic, pulmonary, other) Age: 51 yrs av. Gender: 59% male Willingness to quit: not specified Therapists: tobacco treatment specialist
Interventions	1. Intervention: Varenicline (12 wks) + during hospitalisation: personalised strong quit message, printed information on behavioural change, outpatient quit resources (Quitline, Quitnet, local tobacco dependence programme) + brief behavioural treatment after discharge at a local Tobacco Dependence Treatment (weekly follow-up sessions for 6 wks after discharge followed by monthly follow-up sessions x 4 or 5 to get them out to 6 m after discharge) 2. Control: Placebo (12 weeks) + same as intervention group [Both arms: intensity 4] Pharmacotherapy: Varenicline in intervention group
Outcomes	Abstinence: sustained abstinence at 6 months (abstinent at 4 w, 12 w & 6 m visits) Validation: expired CO (< 8 ppm) Died: 0
Notes	OR adjusted for age, race, education and level of dependence, 0.34 (95% CI 0.10 to 1.23) Funding: "Role of funding sources: This trial was funded through a grant from the Robert Wood Johnson Foundation — Physician Faculty Scholars Program. Study medications and placebo as well as funding to support other research staff salary were provided by a grant from Pfizer." Declarations of Interest: "Conflict of interest: Dr. Steinberg had previously received honoraria for educational programs from Pfizer (2006–2009). The other authors declare that they have no conflicts of interest to disclose."

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	"randomized in a 1:1 ratio through centralized telephone randomization process by the study statistician and hospital research pharmacist"
Allocation concealment (selection bias)	Low risk	See above
Blinding of participants and personnel (performance bias)	Low risk	Participants and staff blinded: "The subject, research nurse, and treatment staff were blinded to treatment assignment".

Steinberg 2011 *(Continued)*

All outcomes		
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Outcome assessment process blinded; biochemical validation: "The primary outcome was biochemically confirmed abstinence at 24 weeks following discharge."
Incomplete outcome data (attrition bias) All outcomes	Low risk	ITT analysis conducted; unvalidated smoking status included where ascertained for non-attenders; lost to follow-up the same in 2 groups (n = 18 lost to follow-up for both groups)
Other bias	Low risk	No other risks of bias detected

Stevens 1993

Study characteristics	
Methods	Country: USA Study dates: Information not available Recruitment: Inpatients with stay > 36 hrs, excluding postpartum and psychiatric patients. Inclusion/exclusion criteria: "All smokers 18 years of age or older, regardless of interest in quitting smoking, were included in the study with the exception of those whose hospital stay was shorter than 36 hours, postpartum patients, the terminally ill, and those hospitalized for alcoholism, drug abuse, or mental illness."
Participants	Participants: 1119 current smokers or recent quitters (5%, defined as smoking regularly at any time in previous 3 m) (intervention n = 453, usual care n = 666) Number smoked: 20 cpd Age: 44 yrs av. 17% cardiovascular or respiratory diagnosis Therapists: Masters-level cessation counsellors
Interventions	1. Intervention: Counselling (1 x, total 20 mins, type behavioural). Self-help materials, video. Follow-up (1-2 x at 1-3 wks by telephone) [Intensity 3] 2. Control: Usual care NRT: No
Outcomes	Abstinence: Sustained abstinence at 3 and 12 m Validation: None (low success in obtaining cotinine returns) Died: None reported
Notes	No significant baseline differences between patient characteristics in intervention and control Funding: "This research was supported by the National Cancer Institute (Grant No. 5 P01 CA44648)." Declarations of Interest: Information not available

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	Not random; intervention alternated between hospitals on a monthly basis in order to avoid contamination.
Allocation concealment (selection bias)	High risk	Intervention or control status of hospital known when patients recruited

Stevens 1993 *(Continued)*

Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Participant blinding not clear
Blinding of outcome assessment (detection bias) All outcomes	High risk	Outcome assessment blinding and biochemical verification not clear; attempted to collect a cotinine sample from participants, but had little success
Incomplete outcome data (attrition bias) All outcomes	Low risk	6% loss to follow-up; no difference by group; included in ITT analysis
Other bias	Low risk	No other risks of bias detected

Stevens 2000

Study characteristics	
Methods	Country: USA Study dates: Information not available Recruitment: Inpatients with stay > 36 hours excluding postpartum and psychiatric patients Inclusion/exclusion criteria: "Those between 18 and 70 years of age who reported regular smoking anytime in the 3 months preceding hospitalization were eligible to participate in the study. Obstetrics patients, those hospitalized for psychiatric or drug or alcohol abuse diagnoses, and patients whose hospital stay was < 36 hours were excluded, as were hospice patients".
Participants	Participants: 1173 current smokers or recent quitters (proportion not stated, defined as smoking regularly at any time in previous 3 m) (usual care n = 633, bedside counselling n = 541) Numbers smoked: 19 cpd Age: 47 yrs av. Therapists: Respiratory therapist
Interventions	1. Bedside counselling (intervention): Counselling (1 x, total 20 mins, type behavioural). Self-help materials, video. Follow-up (1 x at 1 wk by telephone) [Intensity 3] 2. Control: Usual care NRT: No
Outcomes	Abstinence: Sustained abstinence at 6 and 12 m Validation: None Died: None reported
Notes	Only 68% of intervention group actually offered intervention Funding: "This research was supported by the National Cancer Institute (grant CA 44648)." Declarations of Interest: Information not available

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	High risk	"Eligible smokers in each hospital were assigned to treatment or usual care by a random digit in their HMO member number."

Stevens 2000 *(Continued)*

Allocation concealment (selection bias)	High risk	See above
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants not blinded
Blinding of outcome assessment (detection bias) All outcomes	High risk	Outcome assessment not blinded and biochemical validation not listed
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Number lost to follow-up not specified. All not contacted at 1 year were counted as smokers.
Other bias	Low risk	No other risks of bias detected

Suner-Soler 2022

Study characteristics	
Methods	Country: Spain Study dates: 2015-2018 Recruitment: 1 hospital in Spain Inclusion/exclusion criteria: "Participants were daily smokers consecutively admitted to the Dr. Josep Trueta University Hospital of Girona (Catalonia, Spain) with a diagnosis of acute stroke (ischemic or hemorrhagic)."
Participants	Participants: 196 daily smokers (brief intervention n = 194, intensive intervention n = 92) Number smoked: 21.4 CPD Age: 57.5 yrs average Therapists: Research nurses
Interventions	1. Intensive intervention: intensive anti-tobacco counselling, more than 10 minutes, given by the project's research nurses within a health education plan. This included a motivational interview lasting between 20 and 30 minutes [intensity 4]. This group (IG) received the usual pharmacological treatment for the symptoms of tobacco abstinence (nicotine replacement therapy). 2. Brief intervention: minimum anti-tobacco advice (from 3 to 5 minutes) during the hospital stay and at discharge. Furthermore, patients were again given brief advice on smoking cessation at 3 and 12 months, with standard visits for all stroke patients, and at 24 months after stroke, during the end of study visit [intensity 4]. Received nicotine replacement therapy through patches, at least during the first 3 days after diagnosis (this therapy is standard in these patients). The patients were advised to continue with the process of smoking cessation at their corresponding primary care centres (a usual practice).
Outcomes	Abstinence: 24-month CO confirmed abstinence; assumed it was PPA Validation: Breath CO Died: 3 in group 1, 5 in group 2
Notes	Brief vs. intensive counselling intervention (everyone received standard of care NRT) Funding: "This study was supported by the Instituto de Salud Carlos III (Spain) (FIS PI13/02592)". Declarations of Interest: "None declared"

Suner-Soler 2022 *(Continued)*

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	"Patients without an insular cortex lesion were randomly assigned to either the control group or the intervention group." Random sequence generation not described
Allocation concealment (selection bias)	Unclear risk	Allocation concealment not described
Blinding of participants and personnel (performance bias) All outcomes	Low risk	A single-blinded randomised clinical trial
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Biochemical validation used (breath CO measured)
Incomplete outcome data (attrition bias) All outcomes	Low risk	Figure/consort clearly showed LTFU; 87/104 brief intervention and 80/92 intensive intervention analysed at follow-up
Other bias	Low risk	No other risks of bias detected

Taylor 1990

Study characteristics	
Methods	Country: USA Study dates: January 1985-January 1987 Recruitment: Inpatients with acute MI. Inclusion/exclusion criteria: "All patients 70 years of age or younger hospitalized for treatment of acute myocardial infarction in Kaiser Foundation hospitals in Redwood City, Santa Clara, Hay ward, and San Jose, California. Myocardial infarction was documented by two or more of the following conditions: elevation of the serum creatinine phosphokinase level, a history of prolonged ischemic chest pain, and the appearance of new Q waves or evolving ST-segment changes on an electrocardiogram. Patients who reported smoking cigarettes, cigarillos, or using any other form of tobacco in the 6 months preceding myocardial infarction were classified as smokers."
Participants	Participants: 173 current smokers (within last 6 m) (intervention group n = 86, usual care group n = 87) Number smoked: 25 cpd Age: 58 yrs av. 10% previous MI Therapists: Nurse
Interventions	1. Intervention: Counselling (1 x, total not stated, type behavioural), Self-help materials, relaxation tapes. NRT (gum 'available', dose not stated, period not stated). Follow-up (6-7 x at 1-3 wks, every month for 4 m by telephone) [Intensity 4] 2. Control: Usual care NRT: Yes (partial)
Outcomes	Abstinence: Sustained abstinence at 3 and 12 m

Taylor 1990 *(Continued)*

	Validation: Serum thiocyanate, expired air CO Died: 7 at 12 m
Notes	NRT gum prescribed to 5 patients Funding: "In part by grant HL30529 from the National Heart, Lung and Blood Institute." Declarations of Interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	"A random list of odd and even numbers was generated".
Allocation concealment (selection bias)	Low risk	"a sequence of numbers sealed in envelopes was created...the nurse assessing the intervention called the nurse coordinator who opened the next envelope to determine the condition to which the patient would be assigned".
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants not blinded
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Biochemical verification used, "Expired air carbon monoxide and serum thiocyanate were measured at 26 and 52 weeks after myocardial infarction."
Incomplete outcome data (attrition bias) All outcomes	High risk	14/86 patients in the intervention group and 29/87 patients in the control group had missing data at 12 m follow-up. Higher loss to follow-up in the control group increases the apparent effect of intervention when using the ITT approach, so denominators in the MA were based on numbers followed-up.
Other bias	Low risk	No other risks of bias detected

Thomas 2016a

Study characteristics

Methods	Country: Australia Study dates: April 2012-June 2014 Recruitment: three tertiary hospitals (The Alfred, Austin Health and Barwon Health) in Australia Inclusion/exclusion criteria: "All adult patients who self-reported current smoking at the time of hospitalization (at least one cigarette in the previous week) and available for 12-month follow-up were eligible to participate. Patients with physical or mental inability to participate, unable to communicate in English or provide written informed consent, with a terminal illness, pregnant or already receiving smoking cessation therapy at the time of admission, were excluded."
Participants	Participants: 600 current smokers (intervention group n = 300, usual care group n = 300) Number smoked: not stated Age: 51 yrs Therapists: Trained study pharmacist
Interventions	1. Intervention: participants randomised to the intervention received a series of smoking cessation counselling sessions by a study pharmacist. At least three sessions were provided for each participant:

Thomas 2016a *(Continued)*

	during the hospital stay, on or immediately after discharge and 1 month post-discharge [intensity 3]. All intervention participants were encouraged to use pharmacotherapy. Those interested received a free course during hospital stay and for at least 1 week after discharge. Participants eligible for PBS subsidy were offered a free supply of pharmacotherapy (nicotine patch, bupropion or varenicline) for up to 28 days from discharge (i.e. the patient copayment was waived). 2.Usual care: brief counselling at staff discretion [intensity 0]. No meds provided
Outcomes	Abstinence: CO-validated 6-month sustained abstinence at 12 months post-discharge Validation: Breath CO Died: 0 in both groups
Notes	Multi-component hospital pharmacist-led behavioural counselling and/or pharmacotherapy provided during hospital stay, on discharge and 1 month post-discharge, with further support involving community health professionals vs. usual care comprising routine care provided by hospitals Funding: "This work was supported by the Australian Research Council through the Linkage Scheme (LP110200724) with The Alfred, Austin Health and Barwon Health as partner organizations, and an investigator-initiated research (IIR) grant from Pfizer." Declarations of Interest: "J.G., M.J.A. and B.B. hold an IIR grant from BoehringerIngelheim. M.J.A. has undertaken an unrelated consultancy for AstraZeneca. He received an honorarium for speaking at a Novartis Respiratory Symposium, assistance with attendance at the European Respiratory Society Congress from Boehringer-Ingelheim and the World Health Summit from Sanofi. No other disclosures are reported."

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Participants were randomised by the study pharmacist at each hospital to a study arm using a computer-generated block randomisation list created by an independent statistician at a 1:1 ratio. Random block sizes of four and eight were used to avoid the predictability of treatment allocation.
Allocation concealment (selection bias)	Low risk	Treatment allocations concealed in sequentially numbered sealed envelopes within a corresponding stratum were opened by the pharmacist at each hospital on enrolment of each smoker into the trial.
Blinding of participants and personnel (performance bias) All outcomes	Low risk	RA had no knowledge of group allocation.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Not specified whether assessors were blinded; biochemical validation: "The primary outcomes were carbon monoxide (CO)-validated 1-month sustained abstinence at 6 months post-discharge and CO-validated 6-month sustained abstinence at 12 months post-discharge".
Incomplete outcome data (attrition bias) All outcomes	Low risk	72-74% retention rate, analyses ITT (292/300 intervention group and 294/300 usual care group included in 12-month analysis)
Other bias	Low risk	No other risks of bias detected

Vial 2002

Study characteristics	
Methods	Country: Australia Study dates: February 1999-March 2000 Recruitment: Inpatients (medical and surgical wards) of 1 teaching hospital Inclusion/exclusion criteria: "People selected for inclusion in this study were smokers of at least 10 cigarettes per day, over the age of 18 years and were inpatients of selected wards in medical or surgical divisions of TQEH. Smokers could be of either sex and usually had existing illness. The caring physician was contacted and was free to exclude patients on medical grounds as appropriate. Patients were excluded if they had documented adverse events from prior nicotine patch use, multiple drug dependencies, including current intravenous drug use and/or alcohol abuse, significant psychiatric history or terminal illness with a prognosis of less than twelve months. Those who did not wish to stop smoking or chose to use other quitting strategies were also excluded".
Participants	Participants: 102 current smokers (>= 10 cpd) (hospital arm n = 35, community pharmacy arm n = 34, minimal intervention arm n = 33) Number smoked: not stated Age: not stated Therapists: Pharmacist
Interventions	1. Hospital arm: Pharmacist consultation about NRT use (30-45 mins) + booklet + up to 16 wks patches at half-price. Follow-up: weekly visits x <= 16 to obtain patches from hospital pharmacist 2. Community pharmacy arm: Intervention as above, but follow-up patches supplied by community-based pharmacist [Arms 1 and 2: intensity 4] 3. Control: usual care: advice to quit + booklet NRT: Yes
Outcomes	Abstinence: Sustained abstinence at 3, 6, 12 m Validation: CO test 'whenever possible' - frequency not stated Died: not stated
Notes	Smoking cessation counselling not clearly done (pharmacist consultation about NRT); deletion of study did not change results; 1 & 2 compared to 3 in both the intensity analysis and the NRT efficacy analysis Funding: "This research project was made possible by the generous financial support of The Anti-Cancer Foundation of South Australia, The Queen Elizabeth Hospital Research Foundation and the University of South Australia." Declarations of Interest: Information not available

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	"consenting patients were randomized in blocks of ten using computer-generated random numbers".
Allocation concealment (selection bias)	Low risk	Centralised; see above
Blinding of participants and personnel (performance bias) All outcomes	High risk	Participants not blinded

Vial 2002 *(Continued)*

Blinding of outcome assessment (detection bias) All outcomes	High risk	No details on outcome assessment blinding and outcomes not biochemically validated
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Follow-up incomplete due to time constraints; analysis, therefore, did not include all participants randomised; six out of 102 participants included in 12 m data, 19 of whom lost to follow-up
Other bias	Low risk	No other risks of bias detected

Warner 2016a

Study characteristics	
Methods	Country: USA Study dates: May 2012-August 2014 Recruitment: The study was conducted in the two Mayo Clinic hospitals in Rochester, MN. As a part of standard clinical care, every patient was asked by a nurse about tobacco use, a brief tobacco use history was obtained, and current users were offered both nicotine-replacement therapy (NRT) and a consult with a TTS. Inclusion/exclusion criteria: "Eligible patients included those who lived in the areas covered by ZIP codes within Olmsted County, MN (55901–55906). This included all residents of Olmsted County and some who resided just outside of the county. This design minimized referral bias and facilitated follow-up. Other inclusion criteria included age ≥ 18 years, 4100 cigarettes lifetime consumption and history of smoking any cigarettes within the prior week, and telephone access. Exclusion criteria included current tobacco use treatment initiated before hospitalization and inability to provide consent (e.g., patients unable to communicate because of acute illness)."
Participants	Participants: 600 past week smokers (control n = 300, quitline n = 300) Number smoked: 14.4 cpd Age: 46.35 yrs av. Therapists: Quitline counsellor
Interventions	1. Quitline: brief (5 min) intervention to facilitate connection to quitline plus warm handoff vs. fax referral [intensity 1]. NRT prescribed in hospital per institutional protocol and 2-week free sample given 2. Control: 5-min cessation advice [intensity 1]. NRT prescribed in hospital per institutional protocol and 2-week free sample given
Outcomes	Abstinence: 7-day PPA point prevalence abstinence by self-report, confirmed by urine anabasine < 2.0 ng/mL at 6 months Validation: Urine anabasine Died: 0 in both groups
Notes	A control group brief (~5-minute) cessation advice; vs. an intervention group with brief (~5-minute) quitline facilitation intervention + either warm handoff or faxed referral to a national quitline provider Funding: "This work was supported by grant RC-2012-0001 from ClearWay Minnesota." Declarations of Interest: "No financial disclosures were reported by the authors of this paper."

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**

Warner 2016a *(Continued)*

Random sequence generation (selection bias)	Low risk	Data management system well described "Subjects were randomized using dynamic randomization allocation based on the Mayo Clinic Study Data Management System, a proprietary web application for data entry and management. Randomization was stratified based on nursing unit to ensure the number of subjects assigned to each of the two intervention groups remained balanced within that unit, enhancing the homogeneity of admitting diagnoses between groups."
Allocation concealment (selection bias)	Low risk	Data management system described "Subjects were randomized using dynamic randomization allocation based on the Mayo Clinic Study Data Management System, a proprietary web application for data entry and management. Randomization was stratified based on nursing unit to ensure the number of subjects assigned to each of the two intervention groups remained balanced within that unit, enhancing the homogeneity of admitting diagnoses between groups."
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Participants and providers not blinded to treatment assignment, but interventions were matched on time (both very brief)
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Outcome assessment blinding not described, biochemical validation "urine anabasine levels were used to verify smoking status among those patients reporting abstinence at 6 months, with levels of urine anabasine less than 2 ng/mL required to confirm abstinence."
Incomplete outcome data (attrition bias) All outcomes	Low risk	Follow up was ~70-75% and similar between arms (209/300 intervention group and 222/300 control group available at 6-month follow-up).
Other bias	Low risk	No other risks of bias detected

Windle 2018

Study characteristics	
Methods	Country: Canada, USA Study dates: Information not available Recruitment: hospital admission for acute coronary syndrome, including myocardial infarction and unstable angina with clinically significant coronary artery disease at 1 hospital Inclusion/exclusion criteria: To be eligible, patients had to be motivated to quit and have smoked 10 or more cigarettes per day for the past year. Patients with a history of mental illness were excluded.
Participants	Participants: 302 current smokers (varenicline n = 151, placebo n = 151) Number smoked: 21.4 cpd Age: 55 yrs av. Therapists: Not stated
Interventions	1. Varenicline: varenicline tartrate (0.5 mg daily for 3 days, then 0.5 mg twice daily for 4 days, followed by 1.0 mg for 11 weeks), counselling for smoking cessation and relapse prevention telephone calls at weeks 1, 2 and 8, and clinic visits at weeks 4, 12, 24 and 52 [intensity 4] 2. Placebo: placebo and same counselling as above [intensity 4]

Windle 2018 *(Continued)*

Outcomes	Abstinence: Continuous abstinence (abstinent if they abstained from smoking through a self-report of 0 cigarettes smoked per day), confirmed by exhaled carbon monoxide levels of 10 ppm or less at 52 weeks Validation: Breath CO Died: 3 in group 1, 0 in group 2
Notes	Varenicline tartrate vs. placebo Funding: "EVITA was an investigator-initiated trial that received funding and the study drug and placebo from Pfizer Inc. Pfizer had no role in the design, conduct, analysis, interpretation of data, or reporting of the EVITA trial." Declarations of Interest: Information not available

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Computer-generated list of permuted blocks of 2 and 4
Allocation concealment (selection bias)	Unclear risk	Not specified
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Study personnel and participants were unaware of treatment allocation until the conclusion of the trial, with participant guesses of treatment assignment no better than chance (49.1% in the varenicline group and 48.8% in the placebo group correctly guessed their treatment assignment at week 12).
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Study personnel and participants were unaware of treatment allocation until the conclusion of the trial; biochemical validation "Point-prevalence abstinence was defined as self-reported abstinence in the past week (no smoking, not even a puff), with exhaled carbon monoxide levels of 10 ppm or less."
Incomplete outcome data (attrition bias) All outcomes	Low risk	75% follow-up and analyses ITT (148/151 varenicline group and 151/151 placebo group analysed at 52-week follow-up)
Other bias	Low risk	No other risks of bias detected

Intensity of intervention:
1. Single contact in hospital lasting ≤ 15 mins, no follow-up support
2. One or more contacts in hospital lasting in total > 15 mins, no follow-up support
3. Any hospital contact plus follow-up ≤ 1 month
4. Any hospital contact plus follow-up > 1 month

Abbreviations:
ACS: acute coronary syndrome
ADAU: alcohol and drug assessment unit
ALT: alanine aminotransferase
AMI: acute myocardial infarction
AO: advice only
AR + AVI: assisted referral + interactive voice recognition
AST: aspartate aminotransferase
ATF: automated telephone follow-up
ATS: American Thoracic Society
av: average
BAT-CS: Behavioural Activation Treatment for Cardiac Smokers
C: counselling

CABG/S: coronary artery bypass graft/surgery
CAGE: Cut, Annoyed, Guilty, and Eye-opener
CAR: continuous abstainer rate
CAT: COPD Assessment Test
CBT: cognitive behavioural therapy
CCC: Counselling with Care Coordination
CCU: coronary care unit
CG: control group
CHD: coronary heart disease
CHF: congestive heart failure
CI: confidence interval
CK-MB: creatine kinase-myocardial band
CO: carbon monoxide
COHb: carboxyhemoglobin
COPD: Chronic Obstructive Pulmonary Disease
CPD: cigarettes per day
CT: computed tomography
CVD: cardiovascular disease
d/c: discharge
dx: diagnosis
ECG or EKG: electrocardiogram
EG: experimental group
ENT: ear, nose, throat and neck
ERS: European Respiratory Society
FTND: Fagerstrom Test for Nicotine Dependence
f/u: follow-up
HES: Health Education Department
HMO: health maintenance organisation
ICD: International Classification of Diseases
ICU: intensive care unit
IG: intervention group
INT: intervention
IPANR: intensive personalised '5As + 5Rs'intervention
ITT: intention-to-treat
IVR: interactive voice response
LOS: length of stay
LTFU: lost to follow-up
m/mo: month(s)
MA: meta-analyses
MAO: monoamine oxidase
MI: myocardial infarction
NHS: National Health Service
NRT: nicotine replacement therapy
OTC: over the counter
OR: odds ratio
PBS: Pharmaceutical Benefits Scheme
PCI: percutaneous coronary intervention
PHQ-9: Patient Health Questionnaire-9
PI: principal investigator
PP(A): point prevalence (abstinence)
ppm: parts per million
pt: participant
PTCA: percutaneous transluminal coronary angioplasty
PTCM: Personalized Tobacco Care Management:
PVD: peripheral vascular disease
RA: research assistant
RCSI: Royal College of Surgeons in Ireland
RX: prescription
SC: standard care
SF: Staying Free
SI: short intervention
SMS: short message/messaging service

SR: sustained-release
SR: self-reported
ST segment: interval between ventricle depolarisation and repolarisation
std: standard
TAU: treatment-as-usual
TDU: Tobacco Detoxification Unit
TIA: transient ischaemic attack
TTS: tobacco treatment specialist
UC: usual care
VA: Veterans Affairs
vs: versus
VT: varenicline tartrate
w/: with
WATI: web-assisted tobacco interventions
yrs: years
5A: Ask, Assess, Advise, Assist and Arrange
5R: relevance, risks, rewards, roadblocks and repetition

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Adamuz 2015	Ineligible intervention
Chen 2021	Ineligible outcome
Johns 2017	Ineligible setting
Jones 2012	Ineligible outcome
Kadda 2015	Ineligible population
Lepage 2014	Ineligible outcome
Molina Ruiz 2014	Ineligible intervention
Pathak 2013	Ineligible outcome
Pfaeffli 2015	Ineligible outcome
Sarna 2012	Ineligible outcome
Schulte 2016	Ineligible outcome
Septauli 2021	Ineligible outcome
Sienkiewicz-Jarosz 2014a	Ineligible setting
Stockings 2014	Ineligible population
Suhaj 2016	Ineligible outcome
Van Nostrand 2014	Ineligible outcome
Wong 2012	Ineligible population
Yujie 2014a	Ineligible outcome

Characteristics of ongoing studies *[ordered by study ID]*

ACTRN12620001255976

Study name	Use of text messaging support to aid smoking cessation in patients presenting for surgery (TextPOP)
Methods	This project will utilise delivering an m-Health smoking cessation intervention opportunistically targeted to a time point at which patients have been shown to be particularly receptive to behaviour change (before a surgical procedure). Inclusion criteria will be patients booked for surgical procedures in a large metropolitan hospital who have a self-reported history of smoking. Inclusion criteria include access to an active mobile phone and ability to understand written English. Participants will be randomised 1:1 in a single-blinded randomised control trial to either usual care, or usual care plus a 12-week smoking cessation intervention delivered via 4 SMS messages per week. SMS messages will include 24 smoking cessation messages and 24 general messages which include 1) healthy lifestyle (i.e. diet and physical activity) and 2) information specific to Westmead Hospital pre-admission and surgical services (e.g. parking locations, typical clinic duration, items to bring, etc.)
Participants	Participants will be randomised 1:1 in a single-blinded randomised control trial to either usual care, or usual care plus a 12-week smoking cessation intervention delivered via 4 SMS messages per week.
Interventions	SMS messages will include 24 smoking cessation messages and 24 general messages, which include 1) healthy lifestyle (i.e. diet and physical activity) and 2) information specific to Westmead Hospital pre-admission and surgical services (e.g. parking locations, typical clinic duration, items to bring, etc.)
Outcomes	Number of participants who have successfully ceased smoking pre-operatively. Assessed using questionnaires specifically designed for this study 12 weeks after intervention commenced. If smoking not ceased - change in willingness to quit. Assessed via post-intervention questionnaire - specifically "are you more ready to quit now than you were 12 weeks ago?", with set responses; no, unsure, yes, 12 weeks after intervention commenced
Starting date	21 September 2020
Contact information	Dr Kelly O'Shea
Notes	Funding: Primary Sponsor Name: University of Sydney Declarations of interest: not stated

Almonacid 2020

Study name	Effectiveness of counseling interventions to modify risk behaviors in patients at the Hospital San Ignacio
Methods	Design: controlled clinical trial with random assignment Population: patients candidates for scheduled surgery or diagnostic procedures in surgery rooms between 19 and 64 years attending the pre-anaesthetic consultation of the Hospital Universitario de San Ignacio. Interventions: brief behavioural intervention to modify risk behaviours versus information material on healthy lifestyles Measurements: the characteristics of the study population will be described and the intervention and control groups will be compared in their basic conditions. The level of advance in the stage of change in the intervention and control arm, the proportion of people with the presence of the risk factor, as well as the decrease in the consumption of tobacco and alcohol will be compared.

Almonacid 2020 *(Continued)*

	Expected duration: 28 months
Participants	Estimated enrolment of 440 participants ages 19 years to 64 years, candidates for scheduled surgery with a hospital stay of 3 days or less (including ambulatory surgeries) or who attend outpatient diagnostic procedures performed in surgery rooms, current smokers (any tobacco product in the last month and more than 100 cigarettes in life) or risky alcohol drinkers (more than 4 or 5 alcohol standard drinks during the last year and AUDIT score between 8-15 points), patients with contact information, patients that want to participate
Interventions	Experimental brief counselling interventions: For smoking patients, the brief intervention is 5As model for motivated patients and 5Rs for not motivated patients. For risky alcohol drinkers, the brief intervention is simple advice for motivated patients and brief intervention for not motivated patients. Control group: written informative material about healthy lifestyles
Outcomes	Primary outcome is the level of progress in the stage of behavioural change [time frame: one and three months after the intervention]. Secondary outcome is the proportion of smokers and risky alcohol drinkers [time frame: one and three months after the intervention] and the proportion of smokers and risky alcohol drinkers in each arm of the study.
Starting date	15 April 2018
Contact information	Luz H Alba, MDHospital San Ignacio
Notes	Funding: "Hospital Universitario de San Ignacio y la Pontificia Universidad Javeriana" Declarations of interest: no authors reported conflicts of interest ("Ninguno de los autores de este protocolo declara conflictos de intereses")

Chu 2019

Study name	Tobacco cessation mobile app intervention (Just Kwit! study)
Methods	We will conduct an open randomised controlled trial with parallel groups. Participants will be selected from hospitalised patients and must be aged 18–30 years, interested in cessation, smoked > 5 cigarettes/day over the past 30 days, and own an Apple or Android smartphone. Participants who are eligible will be randomised to either a smartphone experimental group or patient-initiated follow-up (usual care). As this study seeks to assess feasibility, the primary data will include (1) recruitment rates, (2) retention rates, and (3) adherence, measured through user engagement with the app.
Participants	Participants will be recruited from hospitalised patients from UPMC Montefiore, a large, general hospital located in the mid-Atlantic region of the USA. The inclusion criteria are: young adult smoker, aged 18–30 years, interested in cessation, smoked > 5 cigarettes/day over the past 30 days, and must own an Apple or Android smartphone. Potential participants will be excluded if they are already receiving pharmacological and/or behavioural interventions or counselling for tobacco cessation, are unable to provide informed consent, or do not speak English.
Interventions	For the intervention arm, the Kwit app will be installed on the participant's phone by a research team member. The team member will help the participant create an account and explain the functions of the Kwit app. App use will be tracked for the 30 days between the baseline and follow-up surveys. The control arm is the current standard of care, which is a TTS consult with patient-initiated follow-up after discharge.
Outcomes	The primary data will include (1) recruitment rates, (2) retention rates, and (3) adherence, measured through user engagement with the app.

Chu 2019 *(Continued)*

Starting date	11 June 2018
Contact information	Kar-Hai Chu; chuk@pitt.edu
Notes	Funding: "The University of Pittsburgh serves as the sponsor of the clinical trial. The study is supported by grants from the Agency for Healthcare Research and Quality (AHRQ) and the National Cancer Institute (NCI). The funders had no role in the study design, data collection and analysis, decision to publish or preparation of the manuscript." Declarations of interest: "The authors declare that they have no competing interests."

Cossette 2012

Study name	A pilot randomized trial of a smoking cessation nursing intervention in cardiac patients after hospital discharge
Methods	This pilot randomised study explored the feasibility, acceptability and preliminary efficacy of a smoking cessation intervention delivered by a Smoking Cessation Nurse Specialist (SCNS) to cardiac patients after hospital discharge.
Participants	The sample was drawn from patients who were hospitalised for any diagnosis in an adult acute-care cardiovascular centre in Montreal, Canada. To be eligible, patients had to: a) report daily cigarette smoking prior to hospital admission, b) have the cognitive and physical capacity to answer a questionnaire and provide informed consent, c) be able to communicate by telephone, d) be able to communicate in French or English, and e) have received “usual care” smoking cessation nursing support during hospitalisation.
Interventions	Post-discharge experimental group: It included a weekly telephone call for the first month, and one call at the end of the second and third months. The smoking cessation counsellor specialist was also available to receive calls from study participants during months three to six. At each telephone call, the counsellor evaluated the participant’s stage of change, and level of motivation and conviction, and intervened accordingly, as in the in-hospital intervention. Post-discharge usual care: Those randomised to usual care were automatically referred to the community smoking cessation programme, which contacted them in the following days. This programme includes a free, interactive website, a telephone help line, and smoking cessation centres located in all regions of the province of Quebec (www.iquitnow.qc.ca). Participants were also encouraged to call the programme themselves, as soon as possible. No other contact was offered.
Outcomes	Primary outcome was to evaluate the preliminary efficacy of the intervention on smoking cessation by comparing the rate of smoking between the experimental and control groups at six months. Comparison of the two groups was also made on secondary outcomes including other cardiac risk factors, such as diet and physical exercise, as they may be modified by smoking cessation interventions, and progression through the stages of change, which is one theoretical component of the intervention tested.
Starting date	Not stated
Contact information	Sylvie Cossette, Montreal Heart Institute Research Centre, R-2231, 5000, Bélanger est, Montreal, QC H1T 1C8. Email: sylvie.cossette.inf@umontreal.ca
Notes	Funding: "Montreal Heart Institute (Institut de cardiologie de Montréal) (Canada)" Declarations of interest: not stated

CTRI/2019/09/021406

Study name	To determine the best behavioral change strategy for tobacco cessation when provided in hospital to tobacco users
Methods	A two-arm randomised controlled trial (RCT) in a tertiary healthcare hospital will be performed. A total of 360 tobacco users attending NCD clinics in four departments, cardiology, neurology, pulmonary medicine, and ENT (otolaryngology), will be recruited over a period of 3 months. After ascertaining the eligibility criteria, they will be followed up to 6 months (1, 3, 6) for their tobacco use status, readiness to quit, nicotine dependence, stage of behaviour change, and self-reported and biochemical validation (urine cotinine) for tobacco abstinence. Assignment of intervention including allocation concealment, sequence generation, and blinding will be done as per SPIRIT guidelines for RCT protocols.
Participants	Participants will be included who are above 18 years of age, using tobacco for the last one month and at least a 10-pack a year equivalent tobacco use history, being able to read and understand English, Hindi or Punjabi, agreeing to smoking cessation status verification by a significant other (e.g. family member, friend), having mobile and using Whatsapp Messenger, willing to give consent.
Interventions	Intervention: face-to-face counselling (of patient and their caregivers), motivational videos, patient information leaflet and standard care plus telephone counselling, text messages and short videos using social media Control: face-to-face counselling/bedside counselling (of patient and their caregivers), motivational videos, patient information leaflet and standard care
Outcomes	Primary outcome: biochemically verified 7-day point prevalence tobacco abstinence at 12 months Secondary outcomes: self-reported point prevalence abstinence, progression in stage of behaviour change, level scores of nicotine dependence in two intervention groups, number of quit attempts and relapses within 12 months after initiation of intervention (all at 1, 3, 6, 12 months)
Starting date	01 October 2019
Contact information	Dr Sonu Goel ; sonugoel007@yahoo.co.in; Department of Community Medicine and School of Public Health, PGIMER, Chandigarh
Notes	Funding: "Indian Council of Medical Research" Declaration of interest: not stated

DRKS00013466

Study name	Implementation and evaluation of the effectivity of an inpatient smoking cessation therapy by a mobile applicable therapy team
Methods	Not stated
Participants	Not stated
Interventions	Intervention group: inpatient 9-day behaviour-therapeutic smoking cessation in groups (~ 9 hours of therapy) at the Breisgau-Klinik Bad Krozingen, accompanied by supportive interventions (nutrition counselling, therapeutic exercise) Control group: outpatient weekly behaviour-therapeutic smoking cessation in groups located nearby (~ 9 hours of therapy)

DRKS00013466 *(Continued)*

Outcomes	Primary outcome: comparison of constant tobacco abstinence after 6 and 12 months in both groups Secondary outcomes: 7-day point abstinence after 6 and 12 months (including cotinin-assessment for biovalidation); smoking status after completing the therapy; use of nicotine replacement therapies/medication; number and reasons for discontinuation of therapy; reasons for relapses; date of smoking the first cigarette; number of cigarettes and days smoking; number and duration of attempts to regain abstinence; change of the degree of smoking dependence
Starting date	Not stated
Contact information	Not stated
Notes	Funding: not stated Declarations of interest: not stated

Gobarani 2022

Study name	The efficacy and safety of varenicline alone versus in combination with nicotine lozenges for smoking cessation among hospitalised smokers (VANISH)
Methods	This is a multicentre, randomised, placebo-controlled trial. Adults with a history of smoking ≥ 10 cigarettes per day on average in the 4 weeks prior to their hospitalisation will be recruited. Participants will be randomly assigned to either the intervention group and will receive varenicline and NRT lozenges, or the control group and will receive varenicline and placebo lozenges. All participants will be actively referred to behavioural support from telephone Quitline. Participants are followed up at 1 and 3 weeks and 3, 6 and 12 months from the start of treatment.
Participants	Patients eligible for the trial are: adults ≥ 18 years, admitted to participating hospitals with a history of smoking ≥ 10 cigarettes per day on average in the 4 weeks prior to their hospital admission, interested in quitting smoking, willing to use pharmacotherapy, available for a 12-month follow-up post-treatment initiation and willing/capable to provide written informed consent.
Interventions	Participants randomised to the control group will receive varenicline plus placebo (mint) lozenges while participants randomised to the intervention arm will receive varenicline plus NRT lozenges.
Outcomes	The primary outcome is carbon monoxide-validated prolonged abstinence from 2 weeks to 6 months after treatment initiation. Secondary outcomes include self-reported and biochemically validated prolonged and point prevalence abstinence at 3, 6 and 12 months, self-reported adverse events, withdrawal symptoms and cravings, adherence to treatment, Quitline sessions attended and others.
Starting date	Not stated
Contact information	Dr Johnson George; johnson.george@monash.edu
Notes	Funding: Global Research Awards for Nicotine Dependence Declaration of interest: not stated

NCT01413516

Study name	A two-part pilot study of dosing, safety and efficacy of varenicline initiated during an acute smoke-free hospitalization and continued post-hospitalization
Methods	Using a double-blinded, placebo-controlled, randomised design, participants will receive varenicline (0.5 mg twice a day as tolerated) or placebo during their hospitalisation (Part 1) and will continue their study medication (placebo or active drug) for 4 weeks post-hospitalisation (Part 2). Abstinence status will be examined at 4 weeks post-hospitalisation.
Participants	The sample, 40 women and 40 men, will be hospitalised patients recruited from Stanford Hospital and Clinics who report smoking at least 10 cigarettes per day prior to hospitalisation, have confirmed tobacco use by cotinine testing, and an expected hospitalisation of at least 3 days duration from the date of study enrolment. Intention to quit smoking will not be required for study participation.
Interventions	Receive varenicline (0.5 mg twice a day as tolerated) or placebo during their hospitalisation (Part 1) and will continue their study medication (placebo or active drug) for 4 weeks post-hospitalisation (Part 2). Both groups will receive counselling by a tobacco treatment specialist.
Outcomes	Primary outcome is 7-day point prevalence abstinence from all forms of tobacco 4 weeks after beginning study
Starting date	August 2011
Contact information	Judith Prochaska, Stanford University; jodi.prochaska@stanford.edu
Notes	Funding: not stated Declaration of interest: not stated

NCT02099097

Study name	Quit IT: preliminary testing of a web-based, 3D coping skills game to increase quitting self-efficacy for maintaining smoking abstinence following hospitalization
Methods	Randomised controlled trial to develop and test a web-based game called Quit It that is designed to help smokers who have quit smoking cope with any smoking urges they may have. The purpose of the game is to help people quit and stop people from smoking again.
Participants	Targeted enrolment of 50 participants Inclusion criteria: • Age ≥ 18 years old • English-speaking • Cancer (solid tumour) diagnosis or mass suspicious of cancer within past six months as per clinical judgement • Cancer treatment expected plan to include hospitalisation for surgical treatment for at least 2 days at MSKCC as per the patients' clinical team • Referred to MSK's Tobacco Cessation Program • Patient-reported cigarette use within the past 30 days • Have sufficient sensory acuity (i.e. auditory, visual) and manual dexterity to use a computer game as per judgement of clinician or consenting professional • Can be reached by telephone
Interventions	Intervention: Smoking Cues Coping Skills Game (SC + SCCS/Quit IT). Smokers randomly assigned to SC + SCCS/Quit IT will receive all the components of standard care. The patient will be orient-

NCT02099097 *(Continued)*

	ed and trained face-to-face (during their hospitalisation) on use of the game by study staff using an iPad. The orientation and training session will comprise: 1) overview of the game and its objectives; 2) discussion of the rules of the game; 3) watching a 10-minute tutorial given by the game narrator (avatar); 4) answering all patient questions; and 5) evaluation of the patient's comprehension of game play via a 17 question survey. Once patients have access to QuitIT, they will also receive a set of coping cards. Control: Usual care, which consists of four (face-to-face or telephone) counselling sessions with a trained nurse who has expertise in helping cancer patients quit smoking. This is the same as the treatment an MSK patient who enrols in the MSK smoking cessation program would receive.
Outcomes	Primary outcome is quitting smoking self-efficacy [time frame: 1 year] as measured by the Confidence Questionnaire to assess changes in confidence in being able to resist urges to smoke in everyday situations.
Starting date	24 March 2014
Contact information	Jamie Ostroff, PhD; Memorial Sloan Kettering Cancer Center
Notes	Funding: not stated Declaration of interest: not stated

NCT02106637

Study name	Early in-hospital initiation of pharmacotherapy for smoking cessation, patients after ACS
Methods	Participants will be randomly allocated to study groups and will receive, varenicline or placebo, which will be initiated on the last day of hospitalisation and continued for 12 weeks after discharge. Additionally, a structured nurse-led behavioural support programme for smoking cessation will be initiated during hospitalisation, followed by telephone calls that will provide motivational support and an interview exploring protocol adherence, side effects, changes in health status and smoking status. All patients will be re-assessed at one, 3 and 12-months post-discharge. Follow-up visits will comprise a physical examination, adverse event assessment and CO breath testing.
Participants	Inclusion criteria: • Stable clinical condition following a recent (< 10 days) ACS event • Active smoking status 30 days prior to ACS • Age > 21 • Life expectancy >1 year
Interventions	Varenicline vs placebo
Outcomes	The primary efficacy outcome measure is continuous abstinence rate at 1 year after hospitalisation as assessed by self-reporting and verified by CO breath test.
Starting date	October 2016
Contact information	Contact: Ilan Goldenberg, MD 972-5302848 ilan.goldenberg@sheba.health.gov.il
Notes	Funding: not stated Declaration of interest: not stated

NCT02470923

Study name	In-patient smoking cessation intervention using counseling, spirometry and nicotine replacement therapy
Methods	The objective of the study is to assess the effect of in-hospital intensive counselling and NRT (nicotine replacement therapy) vs usual care, on smoking cessation or enrolment to smoking cessation behavioural intervention. This is a prospective randomised clinical trial. The study population will include smokers (participants admitted to internal medicine departments at Soroka University Medical Center). The study population will be divided randomly into three arms according to intervention intensity (ratio 1:1:1).
Participants	Anticipating enroling 90 participants. Inclusion criteria: 1. Admitted to Internal Medicine at Soroka University Medical Center; 2. Current cigarette smokers (≥ 10 cigarettes per day); 3. Provided written informed consent.
Interventions	Group 1 - Usual care including medical advice to quit and confrontation with abnormal spirometry results if relevant Group 2 - Intensive counselling (15 minutes) by a smoking cessation counsellor including confrontation with abnormal spirometry results if relevant, and follow-up for at least 5 weeks after discharge (will be done weekly by phone for five consecutive weeks) Group 3 - Intensive counselling (15 minutes) by a smoking cessation counsellor including confrontation with abnormal spirometry results if relevant, offering and providing nicotine replacement therapy (NRT) and follow-up (will be done weekly by phone for five consecutive weeks).
Outcomes	Primary outcomes: enrolment in a cessation behavioural intervention programme according to participation in first two meetings of group therapy or personal counselling; smoking cessation validated by CO exhale test < 5 ppm [time frame: within six months since discharge]
Starting date	August 2015
Contact information	Tali Shafat, MD; 2li.shafat@gmail.com
Notes	Funding: not stated Declaration of interest: not stated

NCT04590404

Study name	Metabolism Informed Smoking Treatment: the MIST RCT
Methods	This phase 3 randomised controlled trial will test Metabolism-Informed Smoking Treatment (MIST), a precision approach to smoking treatment that biologically tailors medication selection to nicotine metabolism versus usual care (UC) interventions.
Participants	Targeting enrolment of 1000 participants Inclusion criteria: • be 18 years or older;

NCT04590404 *(Continued)*

	• be enroled in an insurance plan that supports prescription coverage for smoking cessation medication (such as Medicare part D, Medicaid, or private insurance) to facilitate bedside delivery of medications prior to hospital discharge; • have a regular provider/PCP; • agree to quit or try to quit smoking upon hospital discharge; • be a daily smoker when smoking normally during the month prior to entering the hospital; • be medically eligible to use varenicline; • be medically eligible to use nicotine replacement therapy; • have received discharge medication recommendations from a tobacco counsellor; • agree to take smoking cessation medication (i.e. varenicline OR nicotine replacement therapy) home and consider using it; • have a cell phone or landline that can be reached directly (i.e. without transfer); • have a permanent address where they live and can receive mail; • estimated life expectancy of at least one year or greater.
Interventions	Intervention - MIST (Metabolism-Informed Smoking Treatment): At hospital discharge, participants randomised to the MIST precision care arm will receive a prescription for medication (either varenicline or NRT). Post-discharge, participants will receive automated phone calls via TelASK to promote continued engagement. Medication prescriptions will be informed by nicotine metabolism (i.e. NMR result) such that faster metabolisers are prescribed varenicline and slower metabolisers are prescribed NRT. Control (usual care): At hospital discharge, participants randomised to the usual care arm will receive a prescription for medication (either varenicline or NRT). Post-discharge, participants will receive automated phone calls via TelASK to promote continued engagement. Medication prescription will not be informed by nicotine metabolism.
Outcomes	Primary outcome is biochemically-validated past 7-day point prevalence tobacco abstinence [time frame: 6 months]
Starting date	17 November 2020
Contact information	Hilary Tindle, MD; Vanderbilt-Ingram Cancer Center (Contact: Paula Harlow 615-875-4251 paula.a.harlow@vumc.org)
Notes	Funding: not stated Declaration of interest: not stated

NCT05192031

Study name	Implementation of smoking cessation support during lung cancer workup
Methods	The aim of the present project is to implement smoking cessation support in hospital-based lung cancer workup. The effect on 1) patients' smoking cessation attempts, motivation, quality of life and psychosocial consequences of lung cancer workup as well as 2) hospitals' number of referrals to municipality-based smoking cessation programmes will be evaluated in a pragmatic, cluster-randomised controlled setup, where participating hospitals will be assigned to the intervention arm (implementation of smoking cessation support) or the control arm (usual practice). Patients' and healthcare professionals' experiences with and barriers towards smoking cessation support will be explored in an interview-based, qualitative study.
Participants	Targeting enrolment of 295 participants Inclusion criteria:

NCT05192031 *(Continued)*

	• Referred to lung cancer workup at participating hospital; • Able to speak and understand Danish.
Interventions	Intervention: training healthcare professionals to deliver smoking cessation support as part of hospital-based lung cancer workup Usual care: defined as no treatment
Outcomes	Primary outcome: proportion of patients making an attempt at smoking cessation during lung cancer workup [time frame: 6 weeks after baseline]. Binary outcome (attempt: yes, no)
Starting date	9 March 2022
Contact information	Ingeborg Farver-Vestergaard, PhD +45 79409832 ingeborg.farver@rsyd.dk
Notes	Funding: not stated Declaration of interest: not stated

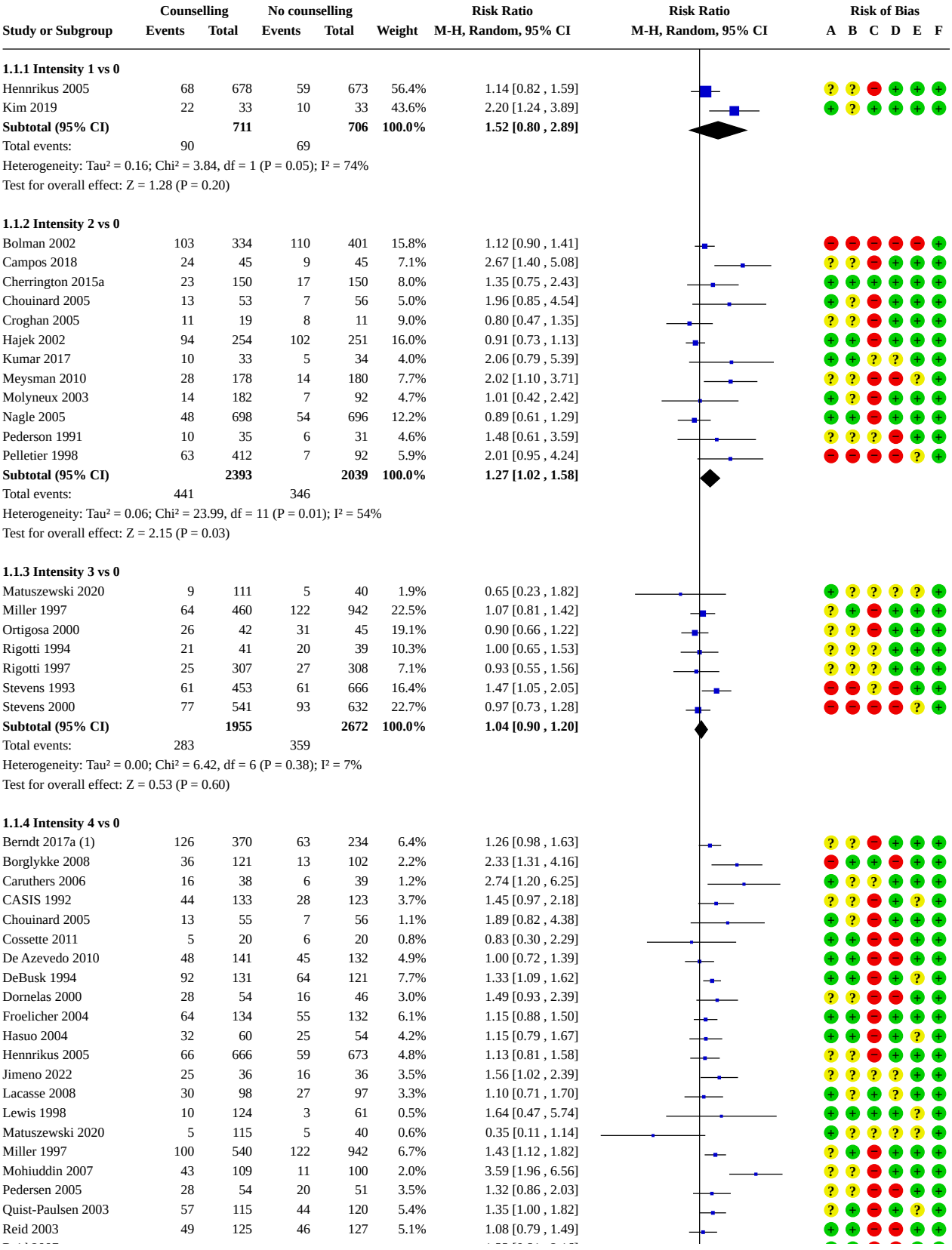
5As: ask, advise, assess, assist and arrange
5Rs: relevance, risks, rewards, roadblocks and repetition
ACS: acute coronary syndrome
App: application
AUDIT: Alcohol Use Disorders Identification Test
CO: carbon monoxide
ENT: ear, nose, throat and neck
MIST: Metabolism-Informed Smoking Treatment
MSK (CC): Memorial Sloan Kettering (Cancer Center)
NCD: noncommunicable diseases
NMR: nicotine metabolite ratio
NRT: nicotine replacement therapy
PCP: primary care physician
PGIMER: Postgraduate Institute of Medical Education and Research
RCT: randomised controlled trial
SC + SCCS: Standard Care + Smoking Cues Coping Skills
SCNS: smoking cessation nurse specialist
SMS: short message/messaging service or texting
SPIRIT: Standard Protocol Items: Recommendations for Interventional Trials
TTS: Tobacco Treatment Specialist
UC: usual care
UPMC: University of Pittsburgh Medical Center
vs: versus

DATA AND ANALYSES

Comparison 1. Smoking cessation counselling versus no smoking cessation counselling, grouped by intensity of counselling intervention

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1.1 Quit at longest follow-up (6 + months)	45		Risk Ratio (M-H, Random, 95% CI)	Subtotals only
1.1.1 Intensity 1 vs 0	2	1417	Risk Ratio (M-H, Random, 95% CI)	1.52 [0.80, 2.89]
1.1.2 Intensity 2 vs 0	12	4432	Risk Ratio (M-H, Random, 95% CI)	1.27 [1.02, 1.58]
1.1.3 Intensity 3 vs 0	7	4627	Risk Ratio (M-H, Random, 95% CI)	1.04 [0.90, 1.20]
1.1.4 Intensity 4 vs 0	28	8234	Risk Ratio (M-H, Random, 95% CI)	1.36 [1.24, 1.49]

Analysis 1.1. Comparison 1: Smoking cessation counselling versus no smoking cessation counselling, grouped by intensity of counselling intervention, Outcome 1: Quit at longest follow-up (6 + months)



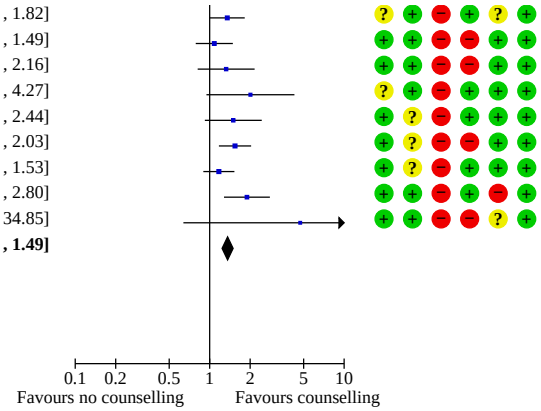
Study or Subgroup	Counselling Events	Counselling Total	No counselling Events	No counselling Total	Weight	Risk Ratio M-H, Random, 95% CI	Risk of Bias A B C D E F
1.1.1 Intensity 1 vs 0							
Hennrikus 2005	68	678	59	673	56.4%	1.14 [0.82 , 1.59]	? ? − + + +
Kim 2019	22	33	10	33	43.6%	2.20 [1.24 , 3.89]	+ ? + + + +
Subtotal (95% CI)		**711**		**706**	**100.0%**	**1.52 [0.80 , 2.89]**	
Total events:	90		69				
Heterogeneity: Tau² = 0.16; Chi² = 3.84, df = 1 (P = 0.05); I² = 74%							
Test for overall effect: Z = 1.28 (P = 0.20)							
1.1.2 Intensity 2 vs 0							
Bolman 2002	103	334	110	401	15.8%	1.12 [0.90 , 1.41]	− − − − − +
Campos 2018	24	45	9	45	7.1%	2.67 [1.40 , 5.08]	? ? − + + +
Cherrington 2015a	23	150	17	150	8.0%	1.35 [0.75 , 2.43]	+ + + + + +
Chouinard 2005	13	53	7	56	5.0%	1.96 [0.85 , 4.54]	+ ? − + + +
Croghan 2005	11	19	8	11	9.0%	0.80 [0.47 , 1.35]	? ? − + + +
Hajek 2002	94	254	102	251	16.0%	0.91 [0.73 , 1.13]	+ + − + + +
Kumar 2017	10	33	5	34	4.0%	2.06 [0.79 , 5.39]	+ + ? ? + +
Meysman 2010	28	178	14	180	7.7%	2.02 [1.10 , 3.71]	? ? − − ? +
Molyneux 2003	14	182	7	92	4.7%	1.01 [0.42 , 2.42]	+ ? − + + +
Nagle 2005	48	698	54	696	12.2%	0.89 [0.61 , 1.29]	+ + − + + +
Pederson 1991	10	35	6	31	4.6%	1.48 [0.61 , 3.59]	? ? ? − + +
Pelletier 1998	63	412	7	92	5.9%	2.01 [0.95 , 4.24]	− − − − ? +
Subtotal (95% CI)		**2393**		**2039**	**100.0%**	**1.27 [1.02 , 1.58]**	
Total events:	441		346				
Heterogeneity: Tau² = 0.06; Chi² = 23.99, df = 11 (P = 0.01); I² = 54%							
Test for overall effect: Z = 2.15 (P = 0.03)							
1.1.3 Intensity 3 vs 0							
Matuszewski 2020	9	111	5	40	1.9%	0.65 [0.23 , 1.82]	+ ? ? ? ? +
Miller 1997	64	460	122	942	22.5%	1.07 [0.81 , 1.42]	? + − + + +
Ortigosa 2000	26	42	31	45	19.1%	0.90 [0.66 , 1.22]	? ? − + + +
Rigotti 1994	21	41	20	39	10.3%	1.00 [0.65 , 1.53]	? ? ? + + +
Rigotti 1997	25	307	27	308	7.1%	0.93 [0.55 , 1.56]	? ? ? + + +
Stevens 1993	61	453	61	666	16.4%	1.47 [1.05 , 2.05]	− − ? − + +
Stevens 2000	77	541	93	632	22.7%	0.97 [0.73 , 1.28]	− − − − ? +
Subtotal (95% CI)		**1955**		**2672**	**100.0%**	**1.04 [0.90 , 1.20]**	
Total events:	283		359				
Heterogeneity: Tau² = 0.00; Chi² = 6.42, df = 6 (P = 0.38); I² = 7%							
Test for overall effect: Z = 0.53 (P = 0.60)							
1.1.4 Intensity 4 vs 0							
Berndt 2017a (1)	126	370	63	234	6.4%	1.26 [0.98 , 1.63]	? ? − + + +
Borglykke 2008	36	121	13	102	2.2%	2.33 [1.31 , 4.16]	− + + − + +
Caruthers 2006	16	38	6	39	1.2%	2.74 [1.20 , 6.25]	+ ? ? + + +
CASIS 1992	44	133	28	123	3.7%	1.45 [0.97 , 2.18]	? ? − + ? +
Chouinard 2005	13	55	7	56	1.1%	1.89 [0.82 , 4.38]	+ ? − + + +
Cossette 2011	5	20	6	20	0.8%	0.83 [0.30 , 2.29]	+ + − − + +
De Azevedo 2010	48	141	45	132	4.9%	1.00 [0.72 , 1.39]	+ + − − + +
DeBusk 1994	92	131	64	121	7.7%	1.33 [1.09 , 1.62]	+ + − + ? +
Dornelas 2000	28	54	16	46	3.0%	1.49 [0.93 , 2.39]	? ? − − + +
Froelicher 2004	64	134	55	132	6.1%	1.15 [0.88 , 1.50]	+ + − + + +
Hasuo 2004	32	60	25	54	4.2%	1.15 [0.79 , 1.67]	+ + − + ? +
Hennrikus 2005	66	666	59	673	4.8%	1.13 [0.81 , 1.58]	? ? − + + +
Jimeno 2022	25	36	16	36	3.5%	1.56 [1.02 , 2.39]	? ? ? ? + +
Lacasse 2008	30	98	27	97	3.3%	1.10 [0.71 , 1.70]	+ ? + ? + +
Lewis 1998	10	124	3	61	0.5%	1.64 [0.47 , 5.74]	+ + + + ? +
Matuszewski 2020	5	115	5	40	0.6%	0.35 [0.11 , 1.14]	+ ? ? ? ? +
Miller 1997	100	540	122	942	6.7%	1.43 [1.12 , 1.82]	? + − + + +
Mohiuddin 2007	43	109	11	100	2.0%	3.59 [1.96 , 6.56]	? ? − + + +
Pedersen 2005	28	54	20	51	3.5%	1.32 [0.86 , 2.03]	? ? − − + +
Quist-Paulsen 2003	57	115	44	120	5.4%	1.35 [1.00 , 1.82]	? + − + ? +
Reid 2003	49	125	46	127	5.1%	1.08 [0.79 , 1.49]	+ + − − + +

Analysis 1.1. (Continued)

Quist-Paulsen 2003	57	115	44	120	5.4%	1.35 [1.00 , 1.82]
Reid 2003	49	125	46	127	5.1%	1.08 [0.79 , 1.49]
Reid 2007	23	50	17	49	2.9%	1.33 [0.81 , 2.16]
Simon 1997	20	157	9	142	1.4%	2.01 [0.95 , 4.27]
Simon 2003	30	102	21	107	2.9%	1.50 [0.92 , 2.44]
Smith 2009b	73	135	48	137	5.9%	1.54 [1.17 , 2.03]
Smith 2011	85	301	76	315	6.1%	1.17 [0.90 , 1.53]
Taylor 1990	47	72	20	58	3.9%	1.89 [1.28 , 2.80]
Vial 2002	9	42	1	22	0.2%	4.71 [0.64 , 34.85]
Subtotal (95% CI)		**4098**		**4136**	**100.0%**	**1.36 [1.24 , 1.49]**
Total events:	1204		873			

Heterogeneity: Tau² = 0.02; Chi² = 41.01, df = 27 (P = 0.04); I² = 34%

Test for overall effect: Z = 6.37 (P < 0.00001)



Footnotes

(1) Two intervention arms of similar intensity combined

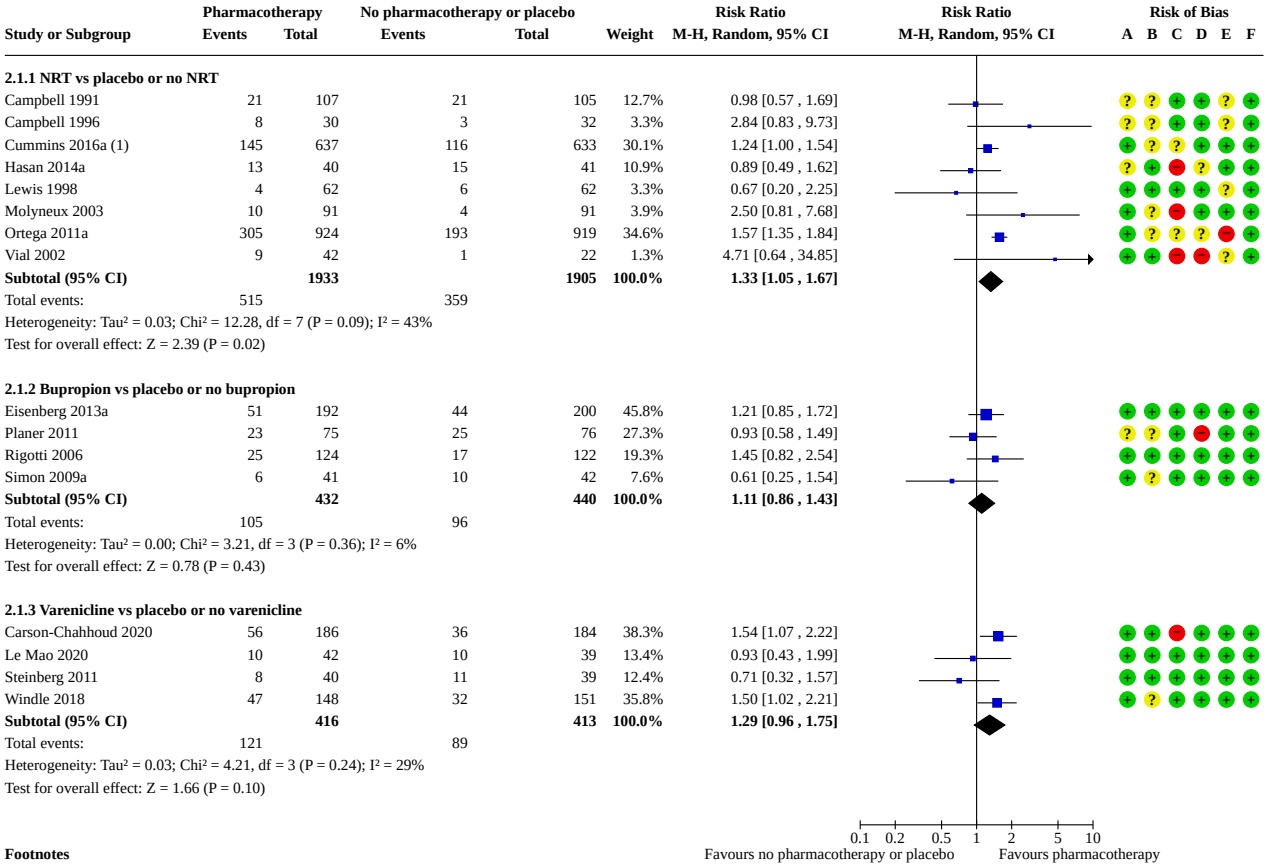
Risk of bias legend

(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias)
(E) Incomplete outcome data (attrition bias)
(F) Other bias

Comparison 2. Pharmacotherapy versus no pharmacotherapy or placebo (systematically varied by group)

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
2.1 Quit at longest follow-up (6 + months)	16		Risk Ratio (M-H, Random, 95% CI)	Subtotals only
2.1.1 NRT vs placebo or no NRT	8	3838	Risk Ratio (M-H, Random, 95% CI)	1.33 [1.05, 1.67]
2.1.2 Bupropion vs placebo or no bupropion	4	872	Risk Ratio (M-H, Random, 95% CI)	1.11 [0.86, 1.43]
2.1.3 Varenicline vs placebo or no varenicline	4	829	Risk Ratio (M-H, Random, 95% CI)	1.29 [0.96, 1.75]

Analysis 2.1. Comparison 2: Pharmacotherapy versus no pharmacotherapy or placebo (systematically varied by group), Outcome 1: Quit at longest follow-up (6 + months)



Footnotes

(1) Factorial trial: combining arms with and without adjunct counselling

Risk of bias legend

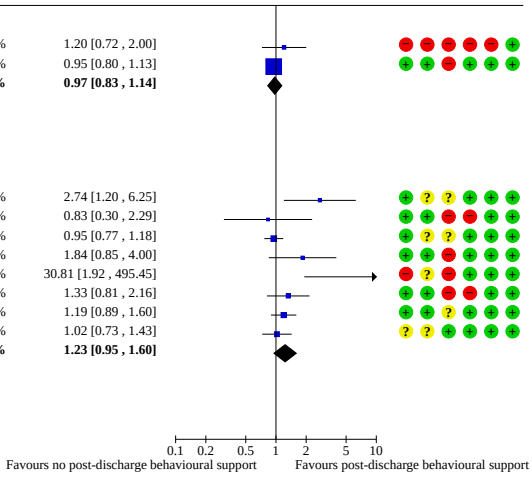
(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias)
(E) Incomplete outcome data (attrition bias)
(F) Other bias

Comparison 3. Hospital-only intervention versus intervention that continues after hospital discharge

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
3.1 Behavioural support	10		Risk Ratio (M-H, Random, 95% CI)	Subtotals only
3.1.1 Asynchronous	2	1598	Risk Ratio (M-H, Random, 95% CI)	0.97 [0.83, 1.14]
3.1.2 Synchronous	8	2299	Risk Ratio (M-H, Random, 95% CI)	1.23 [0.95, 1.60]
3.2 Combined (pharmacotherapy + behavioural) support versus no support post-discharge	7	5610	Risk Ratio (M-H, Random, 95% CI)	1.23 [1.09, 1.38]

Analysis 3.1. Comparison 3: Hospital-only intervention versus intervention that continues after hospital discharge, Outcome 1: Behavioural support

Study or Subgroup	Post-discharge behavioural support Events	Total	No post-discharge behavioural support Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
3.1.1 Asynchronous						
Garcia-Pazo 2021	24	61	16	49	10.2%	1.20 [0.72 , 2.00]
Harrington 2016	190	748	198	740	89.8%	0.95 [0.80 , 1.13]
Subtotal (95% CI)		**809**		**789**	**100.0%**	**0.97 [0.83 , 1.14]**
Total events:	214		214			
Heterogeneity: Tau² = 0.00; Chi² = 0.76, df = 1 (P = 0.38); I² = 0%						
Test for overall effect: Z = 0.34 (P = 0.74)						
3.1.2 Synchronous						
Caruthers 2006	16	38	6	39	7.3%	2.74 [1.20 , 6.25]
Cossette 2011	5	20	6	20	5.3%	0.83 [0.30 , 2.29]
Cummins 2016a (1)	127	634	134	636	24.0%	0.95 [0.77 , 1.18]
Hornnes 2014a	15	57	8	56	8.0%	1.84 [0.85 , 4.00]
Park 2015	14	31	0	33	0.8%	30.81 [1.92 , 495.45]
Reid 2007	23	50	17	49	14.2%	1.33 [0.81 , 2.16]
Reid 2019 (2)	69	216	60	224	21.1%	1.19 [0.89 , 1.60]
Suner-Soler 2022 (3)	38	92	42	104	19.3%	1.02 [0.73 , 1.43]
Subtotal (95% CI)		**1138**		**1161**	**100.0%**	**1.23 [0.95 , 1.60]**
Total events:	307		273			
Heterogeneity: Tau² = 0.06; Chi² = 15.32, df = 7 (P = 0.03); I² = 54%						
Test for overall effect: Z = 1.60 (P = 0.11)						
Test for subgroup differences: Chi² = 2.35, df = 1 (P = 0.12), I² = 57.5%						

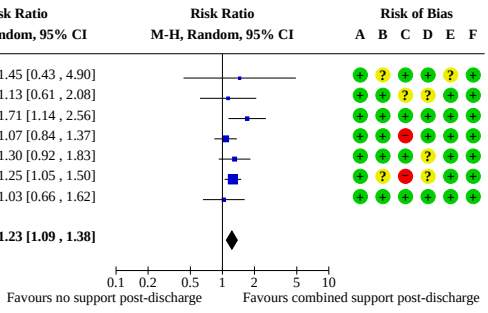


Footnotes
(1) Factorial trial: collapsed arms receiving NRT
(2) Contained both synchronous and asynchronous
(3) All participants received post-discharge support. Comparing more vs less intensive support

Risk of bias legend
(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias)
(E) Incomplete outcome data (attrition bias)
(F) Other bias

Analysis 3.2. Comparison 3: Hospital-only intervention versus intervention that continues after hospital discharge, Outcome 2: Combined (pharmacotherapy + behavioural) support versus no support post-discharge

Study or Subgroup	Combined support post-discharge Events	Total	No support post-discharge Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
Brandstein 2012	6	64	4	62	1.0%	1.45 [0.43 , 4.90]
Brunner-Frandsen 2012	16	49	13	45	3.8%	1.13 [0.61 , 2.08]
Rigotti 2014a	51	198	30	199	8.6%	1.71 [1.14 , 2.56]
Rigotti 2016a	113	681	105	678	23.8%	1.07 [0.84 , 1.37]
Rigotti 2022	69	708	53	708	12.0%	1.30 [0.92 , 1.83]
Sherman 2016a	207	804	167	814	44.0%	1.25 [1.05 , 1.50]
Thomas 2016a	34	300	33	300	6.9%	1.03 [0.66 , 1.62]
Total (95% CI)		**2804**		**2806**	**100.0%**	**1.23 [1.09 , 1.38]**
Total events:	496		405			
Heterogeneity: Tau² = 0.00; Chi² = 4.64, df = 6 (P = 0.59); I² = 0%						
Test for overall effect: Z = 3.37 (P = 0.0008)						
Test for subgroup differences: Not applicable						



Risk of bias legend
(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias)
(E) Incomplete outcome data (attrition bias)
(F) Other bias

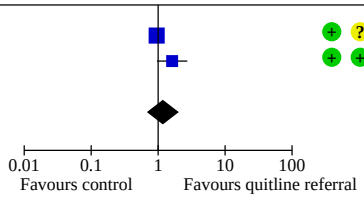
Comparison 4. Telephone quitlines versus control

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
4.1 Quitline referral vs control	2	1870	Risk Ratio (M-H, Random, 95% CI)	1.17 [0.70, 1.96]
4.2 Health system telephone counselling vs quitline	3	3260	Risk Ratio (M-H, Random, 95% CI)	1.23 [1.00, 1.51]

Analysis 4.1. Comparison 4: Telephone quitlines versus control, Outcome 1: Quitline referral vs control

Study or Subgroup	Quitline referral Events	Quitline referral Total	Control Events	Control Total	Weight	Risk Ratio M-H, Random, 95% CI
Cummins 2016a (1)	127	634	134	636	60.2%	0.95 [0.77 , 1.18]
Warner 2016a	34	300	21	300	39.8%	1.62 [0.96 , 2.72]
Total (95% CI)		**934**		**936**	**100.0%**	**1.17 [0.70 , 1.96]**
Total events:	161		155			

Heterogeneity: Tau² = 0.10; Chi² = 3.45, df = 1 (P = 0.06); I² = 71%
Test for overall effect: Z = 0.62 (P = 0.54)
Test for subgroup differences: Not applicable



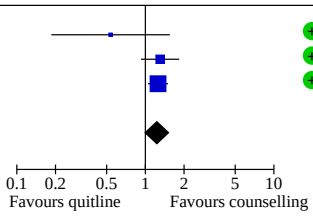
Footnotes
(1) Factorial trial: collapsed arms receiving NRT

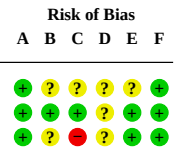
Risk of bias legend
(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias)
(E) Incomplete outcome data (attrition bias)
(F) Other bias

Analysis 4.2. Comparison 4: Telephone quitlines versus control, Outcome 2: Health system telephone counselling vs quitline

Study or Subgroup	Telephone counselling Events	Telephone counselling Total	Quitline Events	Quitline Total	Weight	Risk Ratio M-H, Random, 95% CI
Matuszewski 2020	5	115	9	111	3.8%	0.54 [0.19 , 1.55]
Rigotti 2022	69	708	53	708	29.1%	1.30 [0.92 , 1.83]
Sherman 2016a	207	804	167	814	67.1%	1.25 [1.05 , 1.50]
Total (95% CI)		**1627**		**1633**	**100.0%**	**1.23 [1.00 , 1.51]**
Total events:	281		229			

Heterogeneity: Tau² = 0.01; Chi² = 2.49, df = 2 (P = 0.29); I² = 20%
Test for overall effect: Z = 1.93 (P = 0.05)
Test for subgroup differences: Not applicable





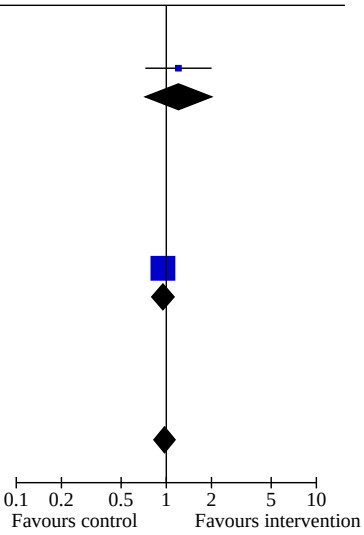
Risk of bias legend
(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias)
(E) Incomplete outcome data (attrition bias)
(F) Other bias

Comparison 5. Subgroup analyses: interest in quitting smoking

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
5.1 Asynchronous behavioural support	2	1598	Risk Ratio (M-H, Random, 95% CI)	0.97 [0.83, 1.14]
5.1.1 Interested in quitting	1	110	Risk Ratio (M-H, Random, 95% CI)	1.20 [0.72, 2.00]
5.1.2 Not selected for interest in quitting	1	1488	Risk Ratio (M-H, Random, 95% CI)	0.95 [0.80, 1.13]
5.2 Bupropion vs placebo or no bupropion	4	872	Risk Ratio (M-H, Random, 95% CI)	1.11 [0.86, 1.43]
5.2.1 Not selected for interest in quitting	3	480	Risk Ratio (M-H, Random, 95% CI)	1.02 [0.67, 1.54]
5.2.2 Interested in quitting	1	392	Risk Ratio (M-H, Random, 95% CI)	1.21 [0.85, 1.72]
5.3 Varenicline vs placebo or no varenicline	4	829	Risk Ratio (M-H, Random, 95% CI)	1.29 [0.96, 1.75]
5.3.1 Not selected for interest in quitting	2	449	Risk Ratio (M-H, Random, 95% CI)	1.14 [0.54, 2.38]
5.3.3 Interested in quitting	2	380	Risk Ratio (M-H, Random, 95% CI)	1.33 [0.88, 2.00]
5.4 Combined (pharmacotherapy + behavioural) support vs neither	7	5610	Risk Ratio (M-H, Random, 95% CI)	1.23 [1.09, 1.38]
5.4.1 Not selected for interest in quitting	4	2438	Risk Ratio (M-H, Random, 95% CI)	1.22 [1.04, 1.43]
5.4.2 Interested in quitting	3	3172	Risk Ratio (M-H, Random, 95% CI)	1.28 [0.99, 1.67]

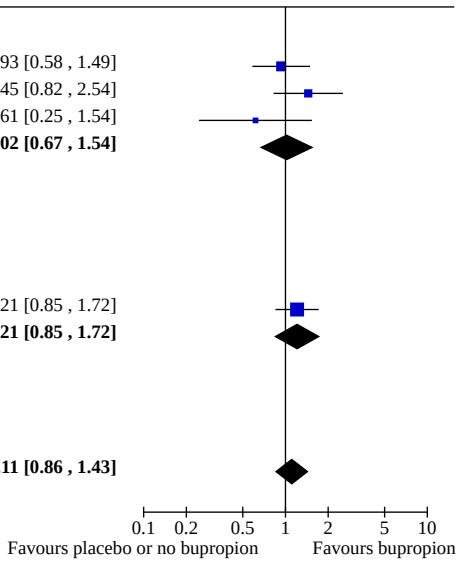
Analysis 5.1. Comparison 5: Subgroup analyses: interest in quitting smoking, Outcome 1: Asynchronous behavioural support

Study or Subgroup	Intervention Events	Intervention Total	Control Events	Control Total	Weight	Risk Ratio M-H, Random, 95% CI
5.1.1 Interested in quitting						
Garcia-Pazo 2021	24	61	16	49	10.2%	1.20 [0.72 , 2.00]
Subtotal (95% CI)		**61**		**49**	**10.2%**	**1.20 [0.72 , 2.00]**
Total events:	24		16			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.72 (P = 0.47)						
5.1.2 Not selected for interest in quitting						
Harrington 2016	190	748	198	740	89.8%	0.95 [0.80 , 1.13]
Subtotal (95% CI)		**748**		**740**	**89.8%**	**0.95 [0.80 , 1.13]**
Total events:	190		198			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.60 (P = 0.55)						
Total (95% CI)		**809**		**789**	**100.0%**	**0.97 [0.83 , 1.14]**
Total events:	214		214			
Heterogeneity: Tau² = 0.00; Chi² = 0.76, df = 1 (P = 0.38); I² = 0%						
Test for overall effect: Z = 0.34 (P = 0.74)						
Test for subgroup differences: Chi² = 0.76, df = 1 (P = 0.38), I² = 0%						



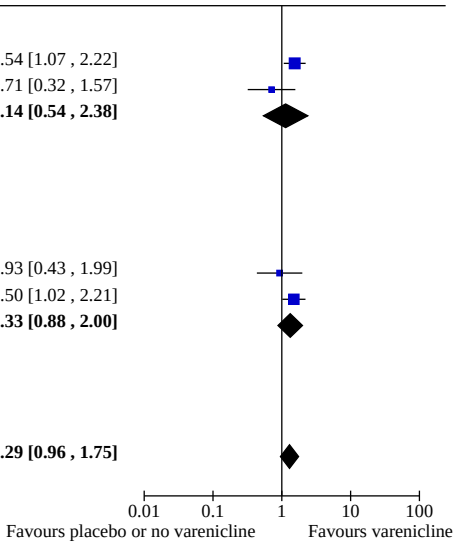
Analysis 5.2. Comparison 5: Subgroup analyses: interest in quitting smoking, Outcome 2: Bupropion vs placebo or no bupropion

Study or Subgroup	Bupropion Events	Bupropion Total	Placebo or no bupropion Events	Placebo or no bupropion Total	Weight	Risk Ratio M-H, Random, 95% CI
5.2.1 Not selected for interest in quitting						
Planer 2011	23	75	25	76	27.3%	0.93 [0.58 , 1.49]
Rigotti 2006	25	124	17	122	19.3%	1.45 [0.82 , 2.54]
Simon 2009a	6	41	10	42	7.6%	0.61 [0.25 , 1.54]
Subtotal (95% CI)		**240**		**240**	**54.2%**	**1.02 [0.67 , 1.54]**
Total events:	54		52			
Heterogeneity: Tau² = 0.04; Chi² = 2.80, df = 2 (P = 0.25); I² = 29%						
Test for overall effect: Z = 0.09 (P = 0.93)						
5.2.2 Interested in quitting						
Eisenberg 2013a	51	192	44	200	45.8%	1.21 [0.85 , 1.72]
Subtotal (95% CI)		**192**		**200**	**45.8%**	**1.21 [0.85 , 1.72]**
Total events:	51		44			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.05 (P = 0.29)						
Total (95% CI)		**432**		**440**	**100.0%**	**1.11 [0.86 , 1.43]**
Total events:	105		96			
Heterogeneity: Tau² = 0.00; Chi² = 3.21, df = 3 (P = 0.36); I² = 6%						
Test for overall effect: Z = 0.78 (P = 0.43)						
Test for subgroup differences: Chi² = 0.38, df = 1 (P = 0.54), I² = 0%						



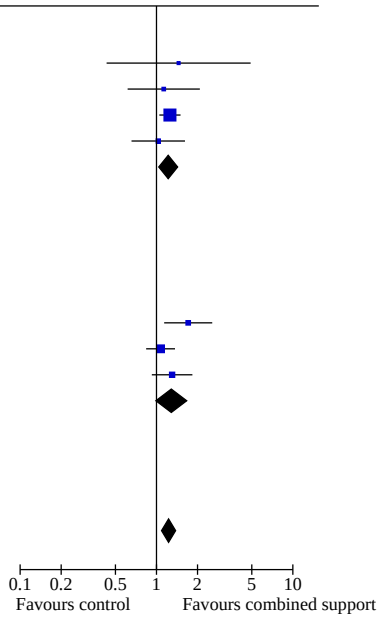
Analysis 5.3. Comparison 5: Subgroup analyses: interest in quitting smoking, Outcome 3: Varenicline vs placebo or no varenicline

Study or Subgroup	Varenicline Events	Total	Placebo or no varenicline Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
5.3.1 Not selected for interest in quitting						
Carson-Chahhoud 2020	56	186	36	184	38.3%	1.54 [1.07 , 2.22]
Steinberg 2011	8	40	11	39	12.4%	0.71 [0.32 , 1.57]
Subtotal (95% CI)		**226**		**223**	**50.7%**	**1.14 [0.54 , 2.38]**
Total events:	64		47			
Heterogeneity: Tau² = 0.20; Chi² = 3.00, df = 1 (P = 0.08); I² = 67%						
Test for overall effect: Z = 0.34 (P = 0.74)						
5.3.3 Interested in quitting						
Le Mao 2020	10	42	10	39	13.4%	0.93 [0.43 , 1.99]
Windle 2018	47	148	32	151	35.8%	1.50 [1.02 , 2.21]
Subtotal (95% CI)		**190**		**190**	**49.3%**	**1.33 [0.88 , 2.00]**
Total events:	57		42			
Heterogeneity: Tau² = 0.02; Chi² = 1.21, df = 1 (P = 0.27); I² = 17%						
Test for overall effect: Z = 1.35 (P = 0.18)						
Total (95% CI)		**416**		**413**	**100.0%**	**1.29 [0.96 , 1.75]**
Total events:	121		89			
Heterogeneity: Tau² = 0.03; Chi² = 4.21, df = 3 (P = 0.24); I² = 29%						
Test for overall effect: Z = 1.66 (P = 0.10)						
Test for subgroup differences: Chi² = 0.13, df = 1 (P = 0.72), I² = 0%						



Analysis 5.4. Comparison 5: Subgroup analyses: interest in quitting smoking, Outcome 4: Combined (pharmacotherapy + behavioural) support vs neither

Study or Subgroup	Combined support Events	Total	Control Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
5.4.1 Not selected for interest in quitting						
Brandstein 2012	6	64	4	62	1.0%	1.45 [0.43 , 4.90]
Brunner-Frandsen 2012	16	49	13	45	3.8%	1.13 [0.61 , 2.08]
Sherman 2016a	207	804	167	814	44.0%	1.25 [1.05 , 1.50]
Thomas 2016a	34	300	33	300	6.9%	1.03 [0.66 , 1.62]
Subtotal (95% CI)		**1217**		**1221**	**55.6%**	**1.22 [1.04 , 1.43]**
Total events:	263		217			
Heterogeneity: Tau² = 0.00; Chi² = 0.77, df = 3 (P = 0.86); I² = 0%						
Test for overall effect: Z = 2.44 (P = 0.01)						
5.4.2 Interested in quitting						
Rigotti 2014a	51	198	30	199	8.6%	1.71 [1.14 , 2.56]
Rigotti 2016a	113	681	105	678	23.8%	1.07 [0.84 , 1.37]
Rigotti 2022	69	708	53	708	12.0%	1.30 [0.92 , 1.83]
Subtotal (95% CI)		**1587**		**1585**	**44.4%**	**1.28 [0.99 , 1.67]**
Total events:	233		188			
Heterogeneity: Tau² = 0.03; Chi² = 3.86, df = 2 (P = 0.15); I² = 48%						
Test for overall effect: Z = 1.89 (P = 0.06)						
Total (95% CI)		**2804**		**2806**	**100.0%**	**1.23 [1.09 , 1.38]**
Total events:	496		405			
Heterogeneity: Tau² = 0.00; Chi² = 4.64, df = 6 (P = 0.59); I² = 0%						
Test for overall effect: Z = 3.37 (P = 0.0008)						
Test for subgroup differences: Chi² = 0.11, df = 1 (P = 0.74), I² = 0%						

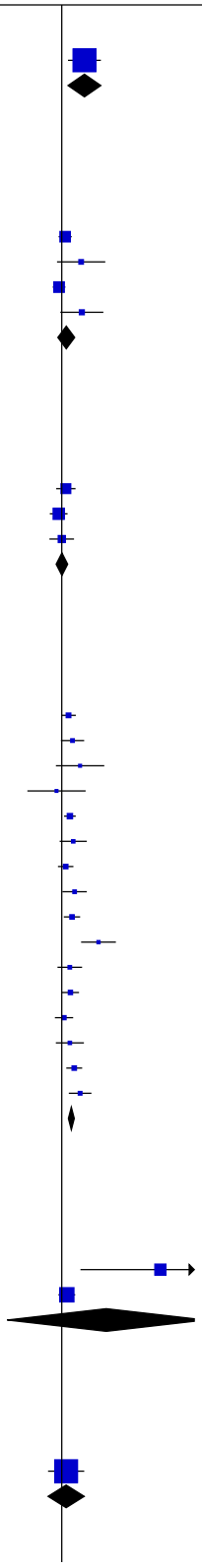


Comparison 6. Intervention versus control, by intervention intensity within diagnostic subgroups

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
6.1 Patients with cardiovascular disease	29		Risk Ratio (M-H, Random, 95% CI)	Subtotals only
6.1.1 Intensity 1 vs intensity 0	1	66	Risk Ratio (M-H, Random, 95% CI)	2.20 [1.24, 3.89]
6.1.2 Intensity 2 vs intensity 0	4	1853	Risk Ratio (M-H, Random, 95% CI)	1.17 [0.87, 1.57]
6.1.3 Intensity 3 vs intensity 0	3	615	Risk Ratio (M-H, Random, 95% CI)	1.01 [0.82, 1.23]
6.1.4 Intensity 4 vs intensity 0	16	3495	Risk Ratio (M-H, Random, 95% CI)	1.40 [1.26, 1.55]
6.1.5 Post-discharge intervention	2	504	Risk Ratio (M-H, Random, 95% CI)	4.70 [0.15, 146.71]
6.1.6 Nicotine replacement therapy vs no placebo or no NRT	1	85	Risk Ratio (M-H, Random, 95% CI)	1.16 [0.62, 2.18]
6.1.7 Bupropion vs no placebo or no bupropion	3	789	Risk Ratio (M-H, Random, 95% CI)	1.16 [0.90, 1.49]
6.1.8 Varenicline vs no placebo or no varenicline	1	299	Risk Ratio (M-H, Random, 95% CI)	1.50 [1.02, 2.21]
6.2 Patients with respiratory disease	6		Risk Ratio (M-H, Random, 95% CI)	Subtotals only
6.2.1 Counselling	3	715	Risk Ratio (M-H, Random, 95% CI)	1.28 [0.71, 2.33]
6.2.2 Nicotine replacement therapy	2	173	Risk Ratio (M-H, Random, 95% CI)	1.38 [0.37, 5.16]
6.2.3 Varenicline vs placebo or no varenicline	1	81	Risk Ratio (M-H, Random, 95% CI)	0.93 [0.43, 1.99]
6.3 Patients with stroke	3		Risk Ratio (M-H, Random, 95% CI)	Subtotals only
6.3.1 Post-discharge behavioural intervention	2	309	Risk Ratio (M-H, Random, 95% CI)	1.24 [0.72, 2.13]
6.3.2 Post-discharge pharmacotherapy + behavioural intervention	1	94	Risk Ratio (M-H, Random, 95% CI)	1.13 [0.61, 2.08]

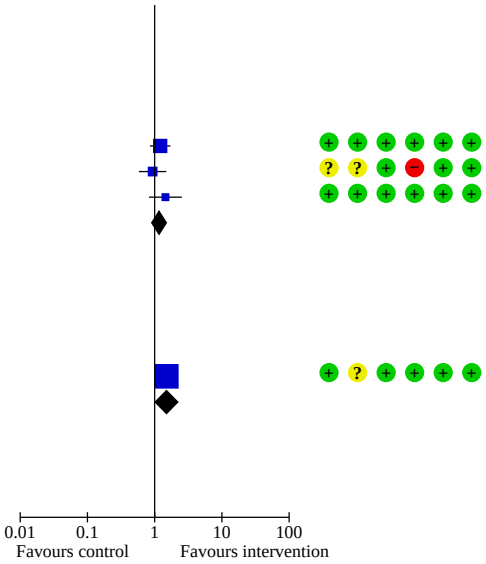
Analysis 6.1. Comparison 6: Intervention versus control, by intervention intensity within diagnostic subgroups, Outcome 1: Patients with cardiovascular disease

Study or Subgroup	Intervention Events	Intervention Total	Control Events	Control Total	Weight	Risk Ratio M-H, Random, 95% CI
6.1.1 Intensity 1 vs intensity 0						
Kim 2019	22	33	10	33	100.0%	2.20 [1.24 , 3.89]
Subtotal (95% CI)		**33**		**33**	**100.0%**	**2.20 [1.24 , 3.89]**
Total events:	22		10			
Heterogeneity: Not applicable						
Test for overall effect: Z = 2.71 (P = 0.007)						
6.1.2 Intensity 2 vs intensity 0						
Bolman 2002	103	334	110	401	38.9%	1.12 [0.90 , 1.41]
Chouinard 2005	13	53	7	56	9.8%	1.96 [0.85 , 4.54]
Hajek 2002	94	254	102	251	39.5%	0.91 [0.73 , 1.13]
Pelletier 1998	63	412	7	92	11.8%	2.01 [0.95 , 4.24]
Subtotal (95% CI)		**1053**		**800**	**100.0%**	**1.17 [0.87 , 1.57]**
Total events:	273		226			
Heterogeneity: Tau² = 0.04; Chi² = 7.18, df = 3 (P = 0.07); I² = 58%						
Test for overall effect: Z = 1.05 (P = 0.29)						
6.1.3 Intensity 3 vs intensity 0						
Miller 1997	38	138	74	310	35.6%	1.15 [0.82 , 1.61]
Ortigosa 2000	26	42	31	45	42.4%	0.90 [0.66 , 1.22]
Rigotti 1994	21	41	20	39	22.0%	1.00 [0.65 , 1.53]
Subtotal (95% CI)		**221**		**394**	**100.0%**	**1.01 [0.82 , 1.23]**
Total events:	85		125			
Heterogeneity: Tau² = 0.00; Chi² = 1.27, df = 2 (P = 0.53); I² = 0%						
Test for overall effect: Z = 0.05 (P = 0.96)						
6.1.4 Intensity 4 vs intensity 0						
Berndt 2017a (1)	126	370	63	234	10.2%	1.26 [0.98 , 1.63]
CASIS 1992	44	133	28	123	5.2%	1.45 [0.97 , 2.18]
Chouinard 2005	13	55	7	56	1.4%	1.89 [0.82 , 4.38]
Cossette 2011	5	20	6	20	1.0%	0.83 [0.30 , 2.29]
DeBusk 1994	92	131	64	121	13.4%	1.33 [1.09 , 1.62]
Dornelas 2000	28	54	16	46	4.0%	1.49 [0.93 , 2.39]
Froelicher 2004	64	134	55	132	9.5%	1.15 [0.88 , 1.50]
Jimeno 2022	25	36	16	36	4.8%	1.56 [1.02 , 2.39]
Miller 1997	62	182	74	310	8.9%	1.43 [1.07 , 1.89]
Mohiuddin 2007	43	109	11	100	2.6%	3.59 [1.96 , 6.56]
Pedersen 2005	28	54	20	51	4.7%	1.32 [0.86 , 2.03]
Quist-Paulsen 2003	57	115	44	120	8.2%	1.35 [1.00 , 1.82]
Reid 2003	49	125	46	127	7.6%	1.08 [0.79 , 1.49]
Reid 2007	23	50	17	49	3.8%	1.33 [0.81 , 2.16]
Smith 2009b	73	135	48	137	9.2%	1.54 [1.17 , 2.03]
Taylor 1990	47	72	20	58	5.5%	1.89 [1.28 , 2.80]
Subtotal (95% CI)		**1775**		**1720**	**100.0%**	**1.40 [1.26 , 1.55]**
Total events:	779		535			
Heterogeneity: Tau² = 0.01; Chi² = 19.67, df = 15 (P = 0.19); I² = 24%						
Test for overall effect: Z = 6.39 (P < 0.00001)						
6.1.5 Post-discharge intervention						
Park 2015	14	31	0	33	42.1%	30.81 [1.92 , 495.45]
Reid 2019	69	216	60	224	57.9%	1.19 [0.89 , 1.60]
Subtotal (95% CI)		**247**		**257**	**100.0%**	**4.70 [0.15 , 146.71]**
Total events:	83		60			
Heterogeneity: Tau² = 5.31; Chi² = 6.23, df = 1 (P = 0.01); I² = 84%						
Test for overall effect: Z = 0.88 (P = 0.38)						
6.1.6 Nicotine replacement therapy vs no placebo or no NRT						
Campbell 1991	15	44	12	41	100.0%	1.16 [0.62 , 2.18]
Subtotal (95% CI)		**44**		**41**	**100.0%**	**1.16 [0.62 , 2.18]**
Total events:	15		12			
Heterogeneity: Not applicable						



Analysis 6.1. (Continued)

Total events:	15		12			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.48 (P = 0.63)						
6.1.7 Bupropion vs no placebo or no bupropion						
Eisenberg 2013a	51	192	44	200	51.2%	1.21 [0.85 , 1.72]
Planer 2011	23	75	25	76	28.9%	0.93 [0.58 , 1.49]
Rigotti 2006	25	124	17	122	19.9%	1.45 [0.82 , 2.54]
Subtotal (95% CI)		**391**		**398**	**100.0%**	**1.16 [0.90 , 1.49]**
Total events:	99		86			
Heterogeneity: Tau² = 0.00; Chi² = 1.49, df = 2 (P = 0.48); I² = 0%						
Test for overall effect: Z = 1.17 (P = 0.24)						
6.1.8 Varenicline vs no placebo or no varenicline						
Windle 2018	47	148	32	151	100.0%	1.50 [1.02 , 2.21]
Subtotal (95% CI)		**148**		**151**	**100.0%**	**1.50 [1.02 , 2.21]**
Total events:	47		32			
Heterogeneity: Not applicable						
Test for overall effect: Z = 2.04 (P = 0.04)						
Test for subgroup differences: Chi² = 13.86, df = 7 (P = 0.05), I² = 49.5%						



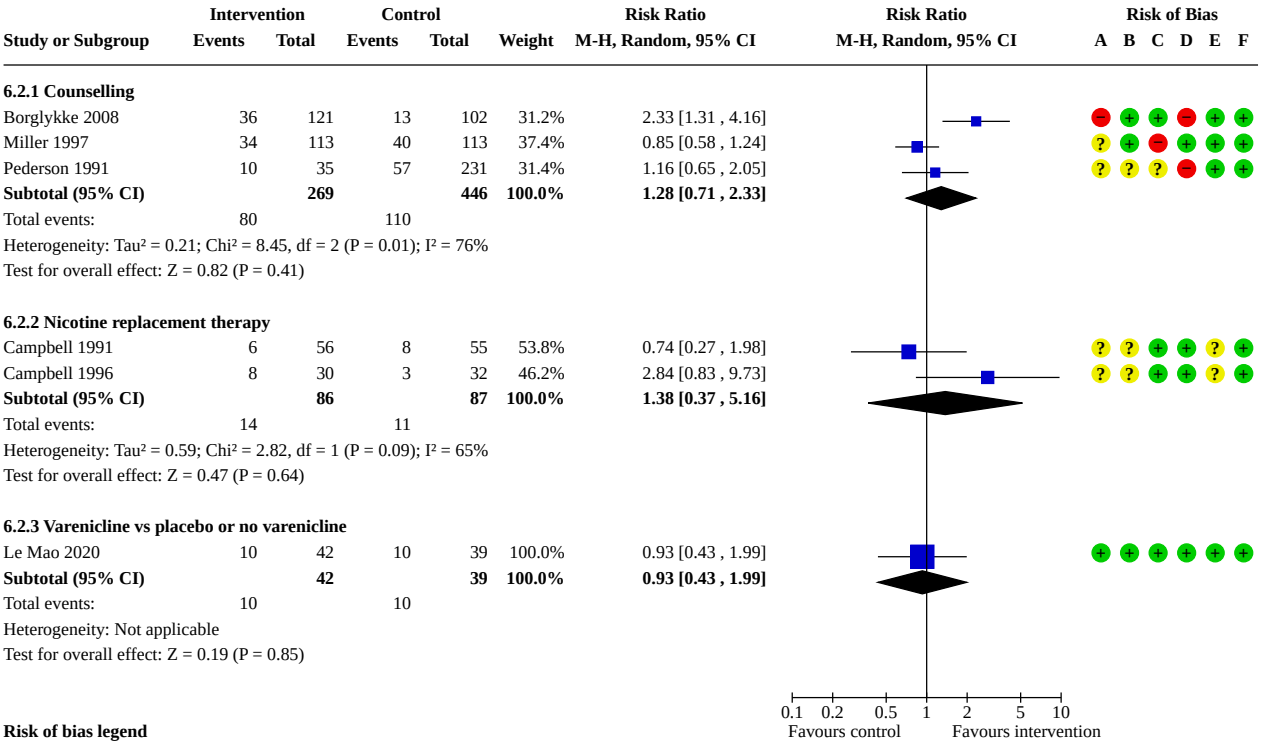
Footnotes

(1) Two intervention arms of similar intensity combined

Risk of bias legend

(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias)
(E) Incomplete outcome data (attrition bias)
(F) Other bias

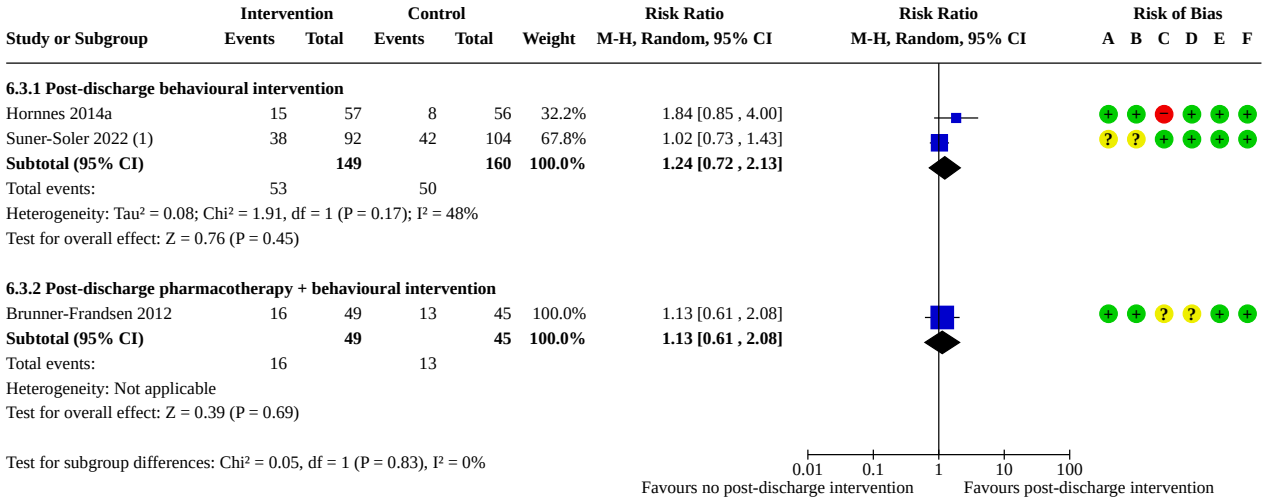
Analysis 6.2. Comparison 6: Intervention versus control, by intervention intensity within diagnostic subgroups, Outcome 2: Patients with respiratory disease



Risk of bias legend

(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias)
(E) Incomplete outcome data (attrition bias)
(F) Other bias

Analysis 6.3. Comparison 6: Intervention versus control, by intervention intensity within diagnostic subgroups, Outcome 3: Patients with stroke



Footnotes

(1) All participants received post-discharge support. Comparing more vs less intensive support

Risk of bias legend

(A) Random sequence generation (selection bias)
(B) Allocation concealment (selection bias)
(C) Blinding of participants and personnel (performance bias)
(D) Blinding of outcome assessment (detection bias)
(E) Incomplete outcome data (attrition bias)
(F) Other bias

ADDITIONAL TABLES

Table 1. Summary data on serious adverse events[a]

Treatment	Number of participants (studies) contributing data	Relative effect (95% credibility interval)	Anticipated absolute effect without intervention	Anticipated absolute effect with intervention	Anticipated absolute difference	Certainty of the evidence (using GRADE)
Varenicline	13,407 (42 RCTs)	**OR 1.18** (0.93 to 1.49)	3 per 100	3 per 100 (2 to 4)	0 per 100 (-1 to 1)	Low (downgraded two levels due to imprecision: CrIs encompassed clinically significant benefit as well as clinically significant harm).
Nicotine patch	12,602 (27 RCTs)	**OR 0.96** (0.71 to 1.29)	3 per 100	3 per 100 (2 to 3)	0 per 100 (-1 to 0)	Low (downgraded two levels due to imprecision: CrIs encompassed clinically significant benefit as well as clinically significant harm).
Fast-acting NRT	5551 (18 RCTs)	**OR 1.07** (0.75 to 1.54)	3 per 100	3 per 100 (2 to 4)	0 per 100 (-1 to 1)	Low (downgraded two levels due to imprecision: CrIs encompassed clinically significant benefit as well as clinically significant harm).

Table 1. Summary data on serious adverse events[a] *(Continued)*

Bupropion	7231 (22 RCTs)	**OR 1.35** (0.97 to 1.92)	3 per 100	4 per 100 (3 to 5)	1 per 100 (0 to 2)	Moderate (downgraded one level due to imprecision: CrIs encompassed no difference as well as clinically significant harm).

[a]Taken from Lindson 2023, component network meta-analysis
Abbreviations
CrIs: credibility interval; **NRT:** nicotine replacement therapy; **OR:** odds ratio; **RCTs:** randomised controlled trials

APPENDICES

Appendix 1. Details of search strategies for Tobacco Addiction Register and CINAHL

Search strategy for the Tobacco Addiction specialised register:
(hospital and patient*) or hospitali* or inpatient* or admission* or admitted

Search strategy for CINAHL (EBSCO):
S14 S4 and S5 and S13
S13 S6 or S7 or S8 or S9 or S10 or S11 or S12
S12 MH Placebos
S11 TX RCT
S10 MH (Random assignment OR Clinical Trials+ OR Quantitative Studies)
S9 TX "control group*"
S8 TX "treatment arm"
S7 TX (trial and (control* OR comparative))
S6 TX (random* OR factorial* OR placebo* OR assign* OR allocat*
S5 MJ (smok* OR tobacco OR nicotine)
S4 S1 or S2 or S3
S3 MJ (hospitali* OR inpatient*)
S2 TI (hospitali* OR inpatient* OR admission* OR admitted) or AB (hospitali* OR inpatient* OR admission* OR admitted)
S1 TI (hospital with patient*) or AB (hospital with patient*)

Appendix 2. Glossary of tobacco-specific terms

Term	Definition
Abstinence	A period of being quit (i.e. stopping the use of cigarettes or other tobacco products). May be defined in various ways; see also: point prevalence abstinence; prolonged abstinence; continuous/sustained abstinence
Biochemical verification	Also called 'biochemical validation' or 'biochemical confirmation': a procedure for checking a tobacco user's report that he or she has not smoked or used tobacco. It can be measured by testing levels of nicotine or cotinine or other chemicals in blood, urine, or saliva, or by measuring levels of carbon monoxide in exhaled breath or in blood.
Bupropion	A pharmaceutical drug originally developed as an antidepressant, but now also licenced for smoking cessation; trade names Zyban, Wellbutrin (when prescribed as an antidepressant)
Carbon monoxide (CO)	A colourless, odourless, highly poisonous gas found in tobacco smoke and in the lungs of people who have recently smoked, or (in smaller amounts) in people who have been exposed to tobacco smoke. May be used for biochemical verification of abstinence
Cessation	Also called 'quitting'. The goal of treatment to help people achieve abstinence from smoking or other tobacco use; also used to describe the process of changing the behaviour

(Continued)

Continuous abstinence	Also called 'sustained abstinence'. A measure of cessation often used in clinical trials involving avoidance of all tobacco use since the quit day until the time the assessment is made. The definition occasionally allows for lapses. This is the most rigorous measure of abstinence.
'Cold Turkey'	Quitting abruptly, and/or quitting without behavioural or pharmaceutical support
Craving	A very intense urge or desire [to smoke]. See Shiffman 2004.
Dopamine	A neurotransmitter in the brain, which regulates mood, attention, pleasure, reward, motivation and movement
Efficacy	Also called 'treatment effect' or 'effect size': the difference in outcome between the experimental and control groups (Hughes 2003)
Harm reduction	Strategies to reduce harm caused by continued tobacco/nicotine use, such as reducing the number of cigarettes smoked, or switching to different brands or products (e.g. potentially reduced exposure products (PREPs), smokeless tobacco)
Lapse/slip	Terms sometimes used for a return to tobacco use after a period of abstinence. A lapse or slip might be defined as a puff or two on a cigarette. This may proceed to relapse, or abstinence may be regained. Some definitions of continuous, sustained or prolonged abstinence require complete abstinence, but some allow for a limited number or duration of slips. People who lapse are very likely to relapse, but some treatments may have their effect by helping people recover from a lapse.
nAChR	[neural nicotinic acetylcholine receptors]: areas in the brain that are thought to respond to nicotine, forming the basis of nicotine addiction by stimulating the overflow of dopamine
Nicotine	An alkaloid derived from tobacco, responsible for the psychoactive and addictive effects of smoking
Nicotine Replacement Therapy (NRT)	A smoking cessation treatment in which nicotine from tobacco is replaced for a limited period by pharmaceutical nicotine. This reduces the craving and withdrawal experienced during the initial period of abstinence while users are learning to be tobacco-free. The nicotine dose can be taken through the skin, using patches, by inhaling a spray, or by mouth using gum or lozenges.
Outcome	Often used to describe the result being measured in trials that is of relevance to the review. For example, smoking cessation is the outcome used in reviews of ways to help smokers quit. The exact outcome in terms of the definition of abstinence and the length of time that has elapsed since the quit attempt was made may vary from trial to trial.
Pharmacotherapy	A treatment using pharmaceutical drugs (e.g. nicotine replacement therapy [NRT], bupropion)
Point prevalence abstinence (PPA)	A measure of cessation based on behaviour at a particular point in time, or during a relatively brief specified period (e.g. 24 hours, 7 days). It may include a mixture of recent and long-term quitters (cf. prolonged abstinence, continuous abstinence).
Prolonged abstinence	A measure of cessation which typically allows a 'grace period' following the quit date (usually of about two weeks), to allow for slips/lapses during the first few days when the effect of treatment may still be emerging
Relapse	A return to regular smoking after a period of abstinence
Secondhand smoke	Also called passive smoking or environmental tobacco smoke [ETS]. A mixture of smoke exhaled by smokers and smoke released from smouldering cigarettes, cigars, pipes, bidis, etc. The smoke mixture contains gases and particulates, including nicotine, carcinogens and toxins.
Self-efficacy	The belief that one will be able to change one's behaviour (e.g. to quit smoking)

(Continued)

SPC [Summary of Product Characteristics]	Advice from the manufacturers of a drug, agreed with the relevant licencing authority, to enable health professionals to prescribe and use the treatment safely and effectively
Tapering	A gradual decrease in dose at the end of treatment, as an alternative to abruptly stopping treatment
Titration	A technique of dosing at low levels at the beginning of treatment, and gradually increasing to full dose over a few days, to allow the body to get used to the drug. It is designed to limit side effects.
Withdrawal	A variety of behavioural, affective, cognitive and physiological symptoms, usually transient, which occur after use of an addictive drug is reduced or stopped See: Shiffman 2004.

WHAT'S NEW

Date	Event	Description
21 May 2024	New citation required and conclusions have changed	New comparisons added; certainty strengthened for some other key comparisons. Specifically, the prior review concluded that there was insufficient evidence regarding the benefit of adding varenicline or bupropion to counselling. However, the present review had sufficient studies on varenicline and buproprion, to conclude that varenicline added to counselling was effective for promoting tobacco cessation at follow-up. It is important to note that the evidence for varenicline is only moderate-certainty due to imprecision.
21 May 2024	New search has been performed	The latest search date was 7 September 2022. We added 36 new included studies (new total participants 42,273). The authorship has changed since the publication of the last review, with some new authors added and some previous authors removed. We also made edits to the methods (see Differences between protocol and review for full description of all changes).

HISTORY

Protocol first published: Issue 4, 1999
Review first published: Issue 2, 2001

Date	Event	Description
29 March 2012	New search has been performed	Updated with the addition of 17 new included studies
29 March 2012	New citation required and conclusions have changed	Main conclusions unchanged. Small changes to the conclusions about the effects of pharmacotherapies as adjuncts to counselling
1 August 2008	Amended	Converted to new review format
20 May 2007	New citation required but conclusions have not changed	Updated for issue 3, 2007. Sixteen new trials added to the seventeen trials previously included. Most of the new trials tested intensive counselling interventions. Three of the new trials tested

Date	Event	Description
		pharmacotherapy (nicotine replacement or bupropion) as an adjunct to behavioural counselling.
26 August 2002	New citation required but conclusions have not changed	Updated for issue 1, 2003. Two new trials were included, both of a moderately intensive intervention conducted during the hospital stay.

CONTRIBUTIONS OF AUTHORS

[2023 update] All authors agreed with the protocol for the review update. NR and JHB conceptualised the review. NR and JS are the guarantors of the current review. NR, JHB, JLB, and JS designed the review. JS coordinated the review. JLB ran the searches. JS, NR, JHB, JLB, HT and CC conducted screening to select studies for inclusion in the review. JS, NR, HT and CC conducted data extraction to collect data for the review and risk of bias assessments for included studies. CSM assisted with risk of bias assessments and reference formatting. JS, NR, JHB, and JLB conducted analyses. JHB and JLB led the assessment of certainty in the body of evidence. JHB, JLB, NR, and JS interpreted the data. JS and NR led the writing of the review. All authors (JS, NR, JHB, JLB, HT, CC, CSM, and MM) edited and approved the review.

DECLARATIONS OF INTEREST

JS has no known conflicts.

NAR has co-authored Cochrane Reviews of e-cigarettes for smoking cessation, and has received royalties from UpToDate (WoltersKluwer.com), an online medical textbook, for writing sections on smoking cessation treatment (personal payment). She received consulting fees from Achieve Life Sciences for the development of cytisinicline (also known as cytisine, an investigational smoking cessation medication that is not discussed in this review) and for serving as a member of Data Safety Monitoring Boards for 2 clinical trials (personal payments). Her institution (MGH) received funding from Achieve Life Sciences to conduct a clinical trial of the medication for smoking cessation and a Small Business grant from NIH/NIDA with NAR as one of two Principal Investigators to conduct a clinical trial of the medication for cessation of nicotine e-cigarette use. She was the site PI and overall PI for both studies.

NAR was involved in six studies, all randomised controlled trials, included in this review. The studies and their funders are listed below. None of the funders had a role in study design, conduct, analysis, or decision to publish. NAR was not involved in study selection, data extraction, assessment of risk of bias or rating the certainty of the evidence for these studies (these tasks were performed by two independent review authors - JS and CC).

1. Rigotti 1994 - Funder: American Heart Association
2. Rigotti 1997 - Funder: research grant from the Massachusetts Department of Public Health, USA
3. Rigotti 2006 - Funder: Grant from National Heart Lung and Blood Institute (NHLBI) of the National Institutes of Health, USA
4. Rigotti 2014a - Funder: Grants from NHLBI
5. Rigotti 2016a - Funder: Grant from NHLBI
6. Rigotti 2022 - Funder: Grant from NHLBI

JLB is an Associate Editor with Cochrane. He was not involved in the editorial process for this review. JLB has no conflicts of interest.

HT has served as an unpaid consultant for Achieve Life Sciences (specifically, volunteered scientific input into the design of a phase 3 trial) and has received nonfinancial support from Pfizer for a clinical study (specifically, donated varenicline medication for cancer patients who smoked at her institution). She also served as a multiple Principal Investigator or co-investigator on studies that were included in this review (Rigotti 2022; Rigotti 2016a - funder as above). HT was not involved in study selection, data extraction, assessment of risk of bias or rating the certainty of the evidence for these studies (these tasks were performed by two independent review authors - JS and CC). HT is a healthcare professional and member of the faculty, Department of Medicine, Vanderbilt University Medical Center.

CC works as General Internist at Unisanté, Lausanne, Switzerland. CC declares that she has received honoraria from Elli-Lilly and Septodont for two presentations in 2023 (these presentations were not related to smoking cessation; they were clinical courses on the impact of sex and gender on health); paid to institution but CC benefited.

MRM has received grant funding from Pfizer through their Investigator-Initiated Research programme.

CS-M: has no known conflicts.

JHB has received grant funding from Cancer Research UK and the National Institute for Health Research on related topics, but that have not directly supported this work (paid to institution). She is an Editor with the Cochrane Tobacco Addiction Group but was not involved in the editorial process for this review.

SOURCES OF SUPPORT

Internal sources

- Nuffield Department of Primary Care Health Sciences, Oxford University, UK

  This is the host department of the Cochrane Tobacco Addiction Review Group, who supported this review.

External sources

- National Institute on Drug Abuse (NIDA) , USA

  NIDA K12DA043490 is a training grant awarded to Nancy Rigotti, which supports Joanna Streck.
- National Institutes of Health (NIH)/National Heart, Lung, and Blood Institute (NHLBI) , USA

  NHLBI grant R01-HL111821 is a large research grant that supports Dr Rigotti's and Dr Tindle's effort on the current update of the review.

DIFFERENCES BETWEEN PROTOCOL AND REVIEW

This review is an update of one last published in 2012 (Rigotti 2012). Since the 2012 publication, we revisited our review plan and made some a priori decisions regarding the introduction of new comparisons. These were agreed by all authors prior to commencing the review update. We also made some post hoc revisions to the agreed methods (described in detail in the Methods section), including the following deviations to the agreed plans that we had made in 2022.

- We planned to extract data on serious adverse events (SAEs) from pharmacotherapies. However, upon reflection, the author team decided a more pragmatic and simultaneously more inclusive approach would be to describe results from a wider Cochrane analysis (e.g. also including non-hospitalised settings) looking at SAE profiles of different smoking cessation pharmacotherapies; SAE analyses are underpowered even when not restricted to hospital settings, so we felt this approach was likely to be most expedient in identifying potential concerns about these medications.
- We noted that we planned to extract information (but no data) on the other outcomes reported by the study authors in our characteristics of included studies table. As this information was never intended for use in analysis, we did not extract this information for the sake of expediency, and to keep table size more concise.
- We stated that we would not assess performance bias for unblinded studies of behavioural interventions. However, we have done so for consistency across studies included in this review (many of which involve pharmacotherapy).
- We specified that, when needed, authors of papers lacking a missing smoking analysis would be contacted to obtain this information. We did not need to do this as we had complete information.
- We stated that we would remove studies where clustering had not been accounted for in sensitivity analyses. As these studies were judged to be at high risk of bias, this was a redundant statement (these studies would by their nature be removed in sensitivity analyses anyway), so we did not report this as a separate sensitivity analysis in the main review.

For the original review (Rigotti 2001), we searched the Centers for Disease Control Smoking and Health database as specified in our protocol, but since it did not retrieve any additional studies, we did not include this source in our search methods from 2012 onwards.

Differences between the last update and this review

Below is a description of the specific differences between the 2012 update and the current review.

Authors

Lindsay F Stead was an author on Rigotti 2012, but is not an author on this review version. Joanna Streck was not an author on Rigotti 2012, but is the lead author on the current review version. Nancy Rigotti is now a co-author, not a lead author. Hilary Tindle, Jonathan Livingstone-Banks, and Jamie Hartmann-Boyce were all added as co-authors on this latest review version, but were not authors on Rigotti 2012.

Types of participants

We excluded three previously included studies because they were conducted in rehabilitation settings rather than hospitals. For the current review, we decided not to include rehabilitation settings, given our focus on acute care settings, and because we did not identify new studies in predominantly rehabilitation centres. We also included trials that recruited all hospitalised smokers and those limited to patients who planned to quit smoking after hospital discharge because we wanted to be inclusive and have a generalisable and representative sample of hospitalised patients who smoke. This is different to the prior review version, Rigotti 2012, where we included only studies where

participants were currently smoking (defined as having smoked within one month of hospital admission) or had recently quit (defined as having quit more than one month before hospital admission).

Search strategy

While our search methods did not differ from the previous update of this review (Rigotti 2012), our search of the Cochrane Tobacco Addiction Group Specialised Register now includes the following trial registries, which are now indexed in CENTRAL and thus the Register:

- US National Institutes of Health Ongoing Trials Register ClinicalTrials.gov (www.clinicaltrials.gov, searched via CENTRAL); and
- World Health Organization (WHO) International Clinical Trials Registry Platform (apps.who.int/trialsearch, searched via CENTRAL).

Subgroup analyses

In the prior 2012 review, we evaluated the effects of interventions on patients admitted to hospital because of the following diagnoses: cardiovascular disease, respiratory disease and cancer (Rigotti 2012). For this update, given the lack of data on cancer found previously, we decided to conduct a subgroup analysis by stroke instead. Stroke is also a major condition that causes smoking-related hospitalisations.

INDEX TERMS

Medical Subject Headings (MeSH)

*Bias; Bupropion [therapeutic use]; *Counseling [methods]; *Hospitalization; *Randomized Controlled Trials as Topic; Smoking [therapy]; *Smoking Cessation [methods]; Smoking Cessation Agents [therapeutic use]; Tobacco Use Cessation Devices

MeSH check words

Humans