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Smoking cessation after acute coronary syndrome: A systematic review and meta-analysis

Running title: Smoking cessation after ACS

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Abstract

Background: Smoking cessation is an effective secondary prevention measure after acute coronary syndrome (ACS). We conducted a systematic review with the aim to better understand which patients have a greater propensity to quit smoking, and the risk factors for continued smoking after ACS.

Methods: We searched MEDLINE and EMBASE for studies that evaluated smoking cessation after ACS. The pooled rate of smoking cessation across included studies was performed. Random effects meta-analysis for different variables and their association with smoking cessation was conducted.

Results: A total of 39 studies with 11,228 patients were included in this review. The pooled rate of smoking cessation following ACS across 38 studies was 45.0%. Factors associated with greater likelihood of smoking cessation were attendance at cardiac rehabilitation (OR 1.90 95%CI 1.44-2.51), married/not alone (OR 1.68 95%CI 1.32-2.13), intention/attempt to quit smoking (OR 1.27 95%CI 1.11-1.46), diabetes mellitus (OR 1.24 95%CI 1.03-1.51) and hospitalized duration (OR 1.09 95%CI 1.02-1.15). Variables associated with a lower likelihood of smoking cessation were depression (OR 0.57 95%CI 0.43-0.75), chronic obstructive pulmonary disease/lung disease (OR 0.73 95%CI 0.57-0.93), previous admission with acute myocardial infarction/cardiac admission (OR 0.61 95%CI 0.47-0.80), cerebrovascular disease/transient ischaemic attack (OR 0.42 95%CI 0.30-0.58) and unemployment (OR 0.37 95%CI 0.17-0.80).

Conclusions: The majority of smokers with an ACS continue to smoke after admission. Patients attending cardiac rehabilitation show increased odds of quitting while people who are depressed and those with chronic lung disease were less likely to quit smoking and should be targeted for intensive smoking cessation interventions.

What is known about the topic?

- Smoking is an established risk factor for acute coronary syndrome (ACS).
- While it would be desirable that all smokers who have ACS to quit smoking, the reality is that some patients are unable to or do not want to despite healthcare support and intervention.

What does the study add?

- Our review of 39 studies with 11,228 patients showed that 45.0% of smokers with ACS quit smoking.
- Factors associated with greater likelihood of smoking cessation were attendance at cardiac rehabilitation, married/not alone, intention/attempt to quit smoking, diabetes mellitus and hospitalized duration.
- Variables associated with a lower likelihood of smoking cessation were depression, chronic obstructive pulmonary disease/lung disease, previous admission with acute myocardial infarction/cardiac admission, cerebrovascular disease/transient ischaemic attack and unemployment.

Introduction

Acute myocardial infarction (AMI) is a global problem resulting in premature death and morbidity [1]. It accounts for around 15% of mortality worldwide [2], with an estimated 7.2 million events each year [1]. The healthcare burden associated with caring for patients with AMI comes with a significant cost [3]. Our current practice is the downstream product of decades of research which includes coronary revascularisation with primary PCI and secondary prevention with antithrombotic medications [4]. After treatment, the emphasis shifts to preventing further events, part of which is to encourage a healthy lifestyle. This includes weight loss in obese and overweight patients, exercise, healthy diet and smoking cessation. In particular, smoking is a strong risk factor for initial and subsequent coronary events [5,6]. As such, there is great interest in promoting smoking cessation in patients with acute coronary syndrome (ACS).

Smoking has been shown to increase the risk of ACS through a number of mechanisms. These include impaired endothelial-dependent vasodilation, activation of proatherogenic molecules, modification of the lipid profile and platelet dysfunction [7]. Studies have shown that quitting smoking after AMI can reduce the risk of further infarction by as much as 50% [8]. Other studies suggest that the reduction in risk is around 36% [6]. Therefore, using implementing interventions and policies that encourage smoking cessation is an opportunity to reduce mortality and morbidity. While it would be desirable that all smokers who have AMI to quit smoking, the reality is that some patients are unable to or do not want to despite healthcare support and intervention. Many studies have evaluated which patients are more or less likely to continue smoking and this is important as these patients are at high risk of relapse.

This systematic review aims to determine which patients have a greater propensity to quit smoking and the risk factors or predictors for continued smoking after ACS.

Methods

This systematic review and meta-analysis was conducted in accordance of the recommendations of the MOOSE statement [9]. Ethical approval was not required for this work because it is a systematic review of the literature.

Eligibility criteria

We included studies of patients with acute coronary syndrome which reported rates of smoking cessation and factors associated with smoking cessation. We excluded studies which were only available in conference abstract form, reviews, notes, editorials, case reports and protocols.

Search strategy

The search MEDLINE and EMBASE was performed by CSK on the database platform OVID on 7th October 2020. The exact search terms were ((quitting smoking) OR (smoking cessation)) AND ((acute coronary syndrome) OR (acute myocardial infarction) OR (NSTEMI) OR (STEMI) OR (non-ST-elevation myocardial infarction) OR (ST-elevation myocardial infarction)).

Study selection and data extraction

Two reviewers (SL and CWW) checked all the title and abstracts for studies that could potentially meet the inclusion criteria. Data extraction and risk of bias assessment were performed independently by at least 2 reviewers (SL, CWW and CSK). Data was collected on study design, country, year of publication, sample size, mean age, % male patients, study inclusion criteria, rate of smoking cessation and factors associated with smoking cessation. We did not specify any particular factors beforehand but extracted those reported by the included studies. Where possible we collected data on the most adjusted odds for the association between a factor and smoking cessation and we calculated odds ratios for crude values when adjusted results were not available. Disagreements between reviewers in the screening and data extraction were resolved by discussion or by considering the view of a 3rd reviewer.

Quality assessment

We conducted a risk of bias assessment using the following criteria: prospective evaluation, reliable ascertainment of smoking cessation, low loss to follow up or missing data (<10%), use of adjustments for confounders in the association between factors and smoking cessation and evaluation of a cohort which is generalizable to a contemporary ACS or AMI cohort (must be only ACS or AMI and had to have taken place between 2001 to 2021).

Statistical analysis

The crude rates reported by studies were pooled using the methods previously described [10].

Random-effects meta-analysis was performed using RevMan 5.4 (The Nordic Cochrane Centre, The Cochrane Collaboration, Copenhagen, Denmark) to evaluate the association between individual factors and odds of smoking cessation using the inverse variance method. A random-effects models were used because they provide a more conservative estimate compared to fixed-effects models which is important because of the methodological heterogeneity among the studies. Statistical heterogeneity was associated using the I^2 statistic where values of 30% to 60% represent moderate heterogeneity [11]. Publication bias was assessed by asymmetry testing with funnel plots

if the dataset contains more than 10 studies and there is no evidence of significant heterogeneity [12]. Studies were not excluded from the meta-analysis based on quality of data. To explore sources of statistical heterogeneity, we performed leave-one-out sensitivity analysis.

Results

Study selection and description

A total of 39 studies met the inclusion criteria and were included in this review (Figure 1) [13-51].

Table 1 shows the study design, sample size, demographics and patient inclusion criteria for the included studies. A total of 34 studies were prospective cohort studies while 4 studies were retrospective and one study was a post-hoc analysis of a randomized controlled trial. There was a total of 11,228 patients in and the average age and percentage of patients that were male across 37 studies were 58 years and 77%, respectively.

Study quality assessment

The quality assessment of the included studies is shown in Table 2. There were 35 studies which prospectively collected data and all studies had self-reported determination of smoking cessation. A total of 20 had low proportion of patients that were lost to follow up or had missing data and 28 studies used an adjusted approach to analysis to reduce risk of confounding.

Pooled rate of smoking cessation

Table 3 shows the rates of smoking cessation and the relationship between factors and smoking cessation. The pooled rate of smoking cessation across 38 studies was 45.0% (4824/10,726).

Results for meta-analysis evaluating factors associated with smoking cessation

A summary of the results for the meta-analysis evaluating factors and their association with smoking cessation is shown in Table 4 and Figure 2. The strongest factor associated with smoking cessation was attendance at cardiac rehabilitation which was associated with in an increase in cessation (OR 1.90 95%CI 1.44-2.51, I^2=49%, 7 studies) (Figure 3). Other factors associated a significant increase in smoking cessation were be married/not alone (OR 1.68 95%CI 1.32-2.13, I^2=49%, 6 studies), intention/attempt to quit smoking (OR 1.27 95%CI 1.11-1.46, I^2=0%, 3 studies), diabetes mellitus (OR 1.24 95%CI 1.03-1.51, I^2=24%, 6 studies) and hospitalized duration (OR 1.09 95%CI 1.02-1.15, I^2=47%, 3 studies). A variable with a good number of studies to support its association with a lower likelihood of smoking cessation was depression (OR 0.57 95%CI 0.43-0.75, I^2=85%, 11 studies) (Figure 4). Other variables associated

with a significantly lower likelihood of smoking cessation included COPD/lung disease (OR 0.73 95%CI 0.57-0.93, I^2=0%, 3 studies), previous admission with AMI/cardiac admission (OR 0.61 95%CI 0.47-0.80, I^2=0%, 5 studies), cerebrovascular disease/transient ischaemic attack (OR 0.42 95%CI 0.30-0.58, 4 studies) and unemployment (OR 0.37 95%CI 0.17-0.80, I^2=51%, 3 studies). When pooled across more than one study, factors such as smoking intervention, obesity, greater education level, higher income, age, sex, physical inactivity and duration of smoking demonstrated no statistical difference in smoking cessation. The sensitivity analysis exploring statistical heterogeneity is shown in Supplementary Table 1.

Studies not included in the meta-analysis

Five studies could not be included in the meta-analysis. Baile et al. reported that patients who had a relapse and continued to smoke were more likely when there was less severe myocardial infarction and those requiring shorter intensive-care treatment [15]. Ding et al. evaluated a simple intervention compared to control for smoking cessation in 150 smokers found that the simple intervention did not increase the success rate of quitting smoking [23]. Another study of 80 patients suggests that smoking cessation was associated with a greater duration of hospital stay and elevated peak creatine phosphokinase and the proportion of quitters was greater for men compared to women [24]. The evaluation of 164 patients after their first myocardial infarction found that persistent smokers had significantly high levels of anxiety and depression [31]. A collection of interviews from forty patients with acute coronary syndrome who smoked found that persistent smoking was associated with lower self-efficacy and higher depression [37].

Discussion

Our systematic review of smoking cessation in ACS has several key findings. First, just under half of smokers who have ACS quit smoking. Secondly, cardiac rehabilitation is the strongest factor which is associated with nearly 2-fold reduction in odds of smoking cessation. Third, other important factors which appear to be associated with smoking cessation include being married or living with a partner, previous intention/attempts to quit smoking, diabetes mellitus and longer duration of hospitalization. Fourth, the high-risk groups for continuation of smoking are patients who are unemployed, have depression, previous stroke or transient ischaemic attack and chronic lung disease/chronic obstructive pulmonary disease. These findings suggest that smokers who have ACS carry on smoking after admission and patients should be encouraged to attend cardiac rehabilitation which is associated with a significant increase in smoking cessation.

Furthermore, patients who have depression, chronic lung disease or previous AMI are high risk groups for continued smoking so they should be proactively targeted for smoking cessation intervention.

There is strong evidence supporting the benefits of taking part in cardiac rehabilitation after AMI. Attendance in cardiac rehabilitation has been linked with decreased mortality and morbidity [52,53]. The findings of this review provide evidence of further benefit as patients who take part may be more likely to quit smoking. It remains unclear whether there are positive influences derived from the program alone, or if those smokers who attend rehabilitation are also those patients who are more motivated, have greater intention to quit or may stopped smoking already. This could introduce a form of selection bias where patients who do not intend to quit smoking are less likely to attend cardiac rehabilitation or drop out if they do initially take part [54]. Continued smoking has also been shown to be closely related to a reluctance to change other unhealthy behaviours such as sedentary lifestyle or poor diet [55,56], which may lead to lack of attendance at rehabilitation programs. The importance of cardiac rehabilitation should not however be understated as it would appear that the programs provide a positive influence and likely reinforces the counselling and education patients have received in hospital around the importance of smoking cessation post AMI.

The link between quitting smoking and marital status has been previously evaluated in the literature. Most studies suggest that being married or having a partner increases the likelihood of smoking cessation [57-59]. One explanation for this observation is the enhanced emotional and practical support that having a partner may provide. It has been suggested that having a partner may continue the message of cessation at home[25] or that the presence of a partner may results in a greater sense of responsibility which translates into increased the likelihood of abstinence from smoking [30]. There may also be a level of practical support provided by the partner, which could be in the form of helping the patient to deal with cravings or removing cigarettes and temptation [25].

The relationship between longer hospital stay and smoking cessation may reflect the patient's perception of disease severity. Those who experience complications or who have more severe disease are more likely to experience a longer period of hospitalization. Fear of a further catastrophic event would perhaps provide more motivation to stop smoking. One study which used number of newly prescribed medications as a surrogate for disease severity showed a slight increase in the odds of quitting with more medications [30]. As the ward settings of inpatient stay

for acute coronary syndrome is a smoke free environment, longer time in hospital translates to a longer period of abstinence which may contribute to permanent cessation of smoking. In addition, this period may be supplemented by interventions such as nicotine replacement therapy and varencline which can help address cravings and withdrawal symptoms and reinforced through repeated contact with healthcare professionals providing education and support.

The role of depression and anxiety in continued smoking has been reported in previous studies of acute myocardial infarction patients[60,61] and the general population [57]. Depression and mental health disorders are understood to be associated with negative health behaviours such as smoking and low levels of energy, motivation and self-esteem which may be required to make life changes. Furthermore, depression has been shown to make it more difficult to stop smoking[62] and also to maintain abstinence if achieved [63]. The outcome after acute coronary syndrome may vary from patients returning to complete independence and normal activities to heart failure and functional disability and patients may use smoking as mechanism of coping with their situation. Also, some patients may be depressed and stress may be a trigger for the acute coronary event while others may have no previous mood disorder but develop depression post event. The situation is further complicated that the depression may not be present at time of the hospitalization but develop later on after adjusting to life in the community. Furthermore, depressive symptoms lead to not taking part in cardiac rehabilitation which has positive effect on smoking cessation. Depressed patients are a risk group for continued smoking so patients who smoke prior to acute coronary syndrome should be screened for depression and addressing the depression may reduce the propensity for smoking relapse.

The relationship between comorbid illness and continued smoking after a coronary event merits further consideration. We found that chronic obstructive pulmonary disease or lung disease, cerebrovascular disease/transient ischaemic attack and previous cardiac admissions were associated with reduced odds of smoking cessation. One possible explanation could be that these patients had failed to quit despite efforts from previous admissions and they may be resistant to quitting despite efforts to foster healthy behaviours. Another reason may be that patients had mild symptoms from their previous illness and the enjoyment of smoking outweighed the health benefits. In contrast we found that patients with diabetes were more likely to quit smoking. This may be rationalized by suggestions that people with diabetes have experience of making lifestyle changes and managing illness which could make them more adaptable and more likely succeed with smoking cessation [25].

It is important to recognize that patients who manage to quit smoking may relapse. While cardiac rehabilitation has been shown in a recent meta-analysis that more than half of smokers quit smoking after cardiac rehabilitation [64], an analysis of 18,499 surveys in the Tobacco Use Supplement-Current Population Survey 2010-2011 cohort in the United States found that 6.8% former smokers reported smoking relapse and this was more common in younger people, those never married, widowed, divorced or separated and those who lived in homes that allowed smoking inside [65]. A much higher rate of relapse more than 50% at 1-year follow up has been reported by other studies which also suggest that alcohol intake, number of social contacts, younger age at cessation and shorter duration of abstinence were a influencing factor on relapse [66,67]. While our study provide evidence that taking cardiac rehabilitation may be associated with smoking cessation more studies are needed to understand whether patients relapse in the period after completing cardiac rehabilitation.

A few recent studies provide insight into ways to help support long lasting smoking cessation. Riley et al surveyed current smokers hospitalized for an acute cardiac event found that 72.5% of patients ranked smoking cessation was ranked as the greatest health change [68]. This suggests that there is a large proportion of patients who desire to quit smoking and these patients should be targeted for intervention. The benefits of smoking cessation are particularly important in young patients as among those with myocardial infarction who are 50 years or younger who were active smokers, smoking cessation within 1 year after myocardial infarction was associated with more than 50% lower risk of all-cause and cardiovascular mortality [69]. Consideration of these statistics may help persuade some young patients to quit smoking. In addition, the period of great receptivity for smoking cessation intervention is the period following an acute cardiac event and this is the time period where interventions should take place [68]. While it has been reported that rate of providing tailored evidence-based interventions is low [68], this appears to be an approach that should be encouraged to foster long term smoking cessation.

Our review has several strengths and limitations. We were able to include a large number of studies and many were prospective in design. However, the findings may be limited in terms of generalizability as some studies were derived from cohorts that do not reflect contemporary clinical practice. There was also considerable methodological heterogeneity in the reporting of predictor variables and their association with smoking cessation and the inconsistency in timing of follow up for smoking cessation evaluation. In addition, the observational nature of included studies is such that there may be risk of confounding. Also, all of the studies relied on self-

reported methods of smoking status but there is literature to suggest that it is a reliable means of ascertaining smoking status [70].

Conclusions

It remains a challenge to encourage patients to quit smoking as more than half continue to smoke after ACS. Patients who are married or living with a partner, previous intention/attempts to quit smoking, diabetes mellitus and longer duration of hospitalization show greater propensity to be successful at smoking cessation. High risk group for relapse in smoking include patients who are unemployed, depressed, with previous stroke or transient ischaemic attack and chronic lung disease/chronic obstructive pulmonary disease who should be supported should the patient desire to quit smoking. Overall, smoking cessation after ACS should be given the attention it deserves in combination with other secondary prevention measures as it identified as a major cause of morbidity and mortality.

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Authors' contribution: CSK designed the study and concept and performed the search, data extraction, data analysis and wrote the first draft of the manuscript. SL and CWW performed the screening of abstracts and data collection and SL helped write the first draft of the manuscript. All authors critically revised the manuscript and gave final approval and agree to be accountable for all aspects of the work ensuring integrity and accuracy.

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List of Figure and Tables

Table 1: Study design, patient characteristics and inclusion criteria

Study ID	Study design; Country; Year	Sample size	Mean age	% Male	Patient inclusion criteria
Abbasi 2018	Prospective cohort study; Pakistan; Aug 2016 to Feb 2017.	225	58.1	97.3	Patients aged 35 to 80 years with ACS that presented in emergency within 12 hours of symptoms with a history of smoking of >1 pack year for >5 years.
Attebring 2004	Prospective cohort study; Sweden; Sept 1995 to Sept 1999.	348	59	72	Patients with ACS below the age of 75 years and was smoking at least one cigarette, cigar or pipe per day at the time of admission or within the month prior to admission.
Baile 1982	Prospective cohort study; USA; Unclear before 1982.	66	56.6	62	Patients hospitalised with MI and current smokers at admission.
Berndt 2012	Prospective cohort study; Netherlands; 2011.	108	54.9	86	Patients aged 18 year or older who were current smokers admitted with coronary heart disease.
Brummett 2002	Prospective cohort study; USA; Mar 1986 to Jun 1990.	525	54.9	72	Patients undergoing coronary angiography, history of smoking of one or more cigarettes smoked per day for the past 6 weeks.
Chan 2008	Prospective cohort study; Canada; Dec 1999 to Feb 2003.	546	62.6	71.8	Patients hospitalised with AMI throughout Ontario. This is a substudy of the Socio-Economic and Acute Myocardial Infarction Study (SESAMI) study
Chen 2014	Prospective Cohort study; USA, Apr 2005 to Dec 2008.	477	53.9	72.2	Patients with acute MI enrolled in the TRIUMPH study.
Colivicchi 2011	Prospective Cohort study; Italy; Jan 2001 to Jun 2008.	1294	59.7	78.7	Patients admitted with STEMI or NSTEMI who were active smokers and had completely interrupted smoking since admission and declared they were motivated to permanently quit smoking.
Dawood 2008	Prospective cohort study; USA; Jan 2003 to Jun 2004.	639	54	69	Patients aged 18 years and above admitted with MI who were active smokers at time of event in the PREMIER study.

Deveci 2018	Prospective cohort study; Turkey; Published in 2018.	136	57.3	79	Patients admitted with STEMI who were active smokers at time of admission.
Ding 2010	Prospective cohort study; China; Oct 2007 to Jun 2008.	150	Not reported	Not reported	Patients admitted with ACS and smoked at least 1 cigarette per day for 1 year.
DiTulio 1991	Prospective cohort study; Italy; 1982 to 1983.	80	58.6	83.6	Patients admitted with MI, active smokers at time of admission where a smoker was defined as a patient smoking at the time of the MI or within the prior 3 months.
Gerber 2011	Prospective cohort study; Israel; Feb 1992 to Feb 1993.	768	51.3	95.1	Patients aged 65 years of less who were admitted with MI in the Israel Study of First Acute Myocardial Infarction.
Giallauria 2005	Retrospective study; Italy; 2005.	164	58.1	100	Patients with recent AMI, smoking at the time of event.
Goettler 2020	Prospective cohort study; Germany; May 2012 to Apr 2013.	104	59.1	84.6	Patients aged 18 to 79 years who were admitted with CABG, PCI, AMI or acute myocardial ischemia without infarction in the EuroAspire IV study.
Hasdai 1998	Prospective cohort study; USA; Sept 1979 to Dec 1995.	1169	56	76	Patients undergoing percutaneous coronary revascularization in the non-peri-infarction setting (no acute myocardial infarction within 24 hours of the intervention).
Holtrop 2009	Prospective cohort study; USA; Jan 2002 to Apr 2003.	111	53.3	61	Patients admitted with ACS and raised Troponin. Excluded significant mental/cognitive impairments, lack of a home telephone, or non-English speaking.
Hopner 2020	Prospective cohort study; Germany; Jun 2013 to May 2019.	372	56.8	71.2	Patients aged 25 years or more who were admitted with AMI in the RHESA-CARE 1 and 3 studies.
Huijbrechts 1996	Prospective cohort study, Netherlands; Jan 1993 to Oct 1994.	84	61.3	77.4	Patients admitted to hospital with first MI.
Imbalzano	Prospective cohort study; Italy;	231	63	39.6	Patients admitted with STEMI who underwent PCI and were active smokers.

2018	Jun 2012 to Dec 2014.				
Jaquet 2019	Prospective cohort study; Switzerland; Jan 2013 to Aug 2014.	121	62.1	79.2	Patients hospitalised with ACS in the SPUM-ACS cohort.
Kronish 2006	Prospective cohort study; USA; May 2003 to Apr 2005.	88	60.6	59	Patients aged 18 years and above hospitalised with acute MI or unstable angina in the Coronary Psychosocial Evaluation Study (COPES).
Luo 2011	Prospective cohort study; China; Oct 2003 to Oct 2010.	134	68.7	61.2	Patients admitted with first AMI.
McGee 2006	Prospective cohort study; Ireland; Jan 2003 to Oct 2003.	272	63	76	Patients admitted to intensive or coronary care units with suspected ACS.
Noureddine 2018	Prospective cohort study; Lebanon; published 2018.	40	58.6	80	Patients aged 30 years and above admitted with ACS (unstable angina or MI), elective coronary artery bypass graft surgery or elective PCI and current smoker as documented in medical records.
Ota 2002	Prospective cohort study; Japan; Aug 1999 to Jun 2000.	29	66.3	100	Patients were male inpatients who were current smokers and admitted with a new diagnosis of angina pectoris or AMI.
Perez 2008	Prospective cohort study; Brazil; Jul 2000 and Jul 2003.	403	Not reported	Not reported	Patients were smokers admitted with MI or UA.
Ramanathan 2006	Retrospective cohort study; USA; June 2000 to July 2003.	254	56	65	Patients admitted with ACS who are active smokers at admission.
Reges 2014	Prospective cohort study; Israel; Jan 2009 to Aug 2010.	165	59.8	84.5	Patients with ACS who were admitted to the coronary care unit or transferred from the internal medicine wards to the coronary care unit for urgent catheterization.
Rocha 2017a	Prospective cohort study; Portugal; Nov 2013 to Jul 2015.	65	55.7	91	Patients were aged 18 years and above admitted with ACS and smoked at least 5 cigarettes per day at the time of hospital admission.
Rocha	Prospective cohort study;	76	55	89	Patients were aged 18 years and above admitted with ACS and smoked at least 5

2017b	Portugal; Nov 2013 to Jul 2015.				cigarettes per day at the time of hospital admission.
Ronaldson 2015	Prospective cohort studies; UK; Dec 2001 to Sept 2008.	136	60.8	80.2	Patients aged 18 years and above with ACS. Excluded if have comorbid conditions that might influence either symptom presentation or mood.
Sakalaki 2019	Retrospective cohort study; Sweden; Jul 2010 to Dec 2011.	45	63.3	79.5	Patients aged 18 to 85 years at the time of their index AMI and still alive 2 years after the index event in the SEPAT study.
Schlyter 2015	Prospective cohort study; Sweden; Jul 2002 to Jan 2005.	133	55.8	69.1	Patients ages of 18 to 70 and admitted with acute MI, local to study centre.
Snaterse 2015	Post hoc analysis of RCT data; Netherlands; 2009.	324	18 to 80	77.8	Patients aged 18 to 80 years, diagnosed or hospitalised with ACS within 8 weeks prior to enrolment in the RESPONSE trial.
Sochor 2015	Retrospective cohort study; USA; 1999 to 2009.	492	55.8	73	Patients undergoing first PCI, residing within locality of study centre, consented to use of medical records for research. Smokers at time of PCI.
Sverre 2017	Prospective cohort study; Norway; 2011 to 2014.	397	58.5	75.1	Patients aged 18 to 80 years with acute myocardial infarction, coronary artery by-pass graft operation, and/or percutaneous coronary intervention.
Vilchinsky 2011	Prospective cohort study; Israel; Mar 2005 to Jul 2007.	37	56.9	100	Patients were Jewish men aged 75 or less with the diagnosis of first myocardial infarction or unstable angina, whose female partners also agreed to participate in the study.
Vogiatzis 2010	Prospective cohort study; Greece; Dec 2003 to Nov 2006.	420	58.2	76.2	Patients aged 75 years or less who were admitted with ACS and smoked at least one cigarette, cigar or pipe per day at time of admission.

Table 2: Risk of bias assessment

Study ID	Prospective evaluation	Reliable ascertainment of smoking cessation	Low (<10%) lost to follow up/missing data	Adjustments for confounders	Generalizable to current ACS/AMI population
Abbasi 2018	Yes	Yes, prospective evaluation for smoking cessation.	Yes, complete follow up.	No	Yes, contemporary ACS cohort.
Attebring 2004	Yes	Yes, prospective evaluation for smoking cessation in outpatient clinic.	No, 86 current smokers not included at 3 months follow up.	Yes	No, cohort from 1995 to 1999.
Baile 1982	Yes	Yes, self-reported through structured interview.	Yes, data available for all patients.	No	No, cohort from before 1982.
Berndt 2012	Yes	Yes, prospective evaluation, self-reported smoking status.	No, 18% lost to follow up.	Yes	No, cohort of coronary heart disease.
Brummett 2002	Yes	Yes, prospective evaluation for smoking cessation, self-reported.	Unclear.	Yes	No, cohort from 1986 to 1990.
Chan 2008	Yes	Yes, prospective evaluation for smoking cessation self-reported.	Yes, 133/1934 of had missing data.	Yes	Yes, contemporary cohort of AMI patients.
Chen 2014	Yes	Yes, prospective evaluation for smoking cessation self-reported.	Unclear.	Yes	Yes, contemporary AMI cohort.
Colvicchi, 2011	Yes	Yes, prospective evaluation for smoking cessation, self-reported telephone interview.	Yes, no lost to follow up but 97/1294 patients died within 12-month follow-up.	Yes	Yes, contemporary AMI cohort.
Dawood 2008	Yes	Yes, prospective evaluation for	No, 169 (21%) no follow up data available.	Yes	Yes, contemporary AMI

		smoking cessation, self-reported telephone interview.			cohort.
Deveci 2018	Yes	Yes, prospective evaluation for smoking cessation, self-reported telephone interview.	Yes, follow up data for all patients.	Yes	Yes, contemporary STEMI cohort.
Ding 2011	Yes	Yes, prospective evaluation for smoking cessation, telephone interview or outpatient follow up.	Yes, follow up data for all patients.	No	Yes, contemporary ACS cohort.
DiTulio 1991	Yes	Yes, prospective evaluation for smoking cessation.	Yes, follow up data for all patients.	Yes	No, cohort from 1982 to 1983.
Gerber 2011	Yes	Yes, prospective evaluation for smoking cessation.	Yes, 768/798 patients have follow up data.	Yes	No, cohort from 1992 to 1993.
Giallauria 2005	No	Yes, self-reported questionnaire.	Yes, follow up data for all patients.	No	Yes, patients with recent AMI.
Goettler 2018	Yes	Yes, prospective evaluation, self-reported smoking status.	No, 104/124 (83.9%) participated telephone follow up.	Yes	No, cohort with myocardial ischemia.
Hasdai 1998	Yes	Yes, prospective evaluation, telephone interview.	Yes, complete data for 97.3% of all patients in initial sample.	Yes	No, cohort from 1979 to 1995.
Holtrop 2009	Yes	Yes, prospective evaluation, telephone interview.	No, 30/166 patients (18.1%) were excluded from the study due to the lack of complete follow up data.	Yes	Yes, contemporary ACS cohort.
Hopner 2020	Yes	Yes, self-reported.	Yes, 10 patients had missing data.	Yes	Yes, contemporary AMI cohort.
Huijbrechts 1996	Yes	Yes, prospective evaluation, self-	No, 96/260 (36.9%) loss to follow up or	Yes	No, cohort from 1993 to

		reported.	inconclusive data.		1994.
Imbalzano 2018	Yes	Yes, prospective evaluation, self-reported.	Yes, complete data for all participants.	No	Yes, contemporary STEMI cohort.
Jaquet 2019	Yes	Yes, prospective evaluation, self-reported.	Unclear, smokers with missing information at one year were considered as continuous smokers.	Yes	Yes, contemporary ACS cohort.
Kronish 2006	Yes	Yes, prospective evaluation, self-reported.	Yes, 492/560 participants completed follow up.	Yes	Yes, contemporary ACS cohort.
Luo 2011	Yes	Yes, prospective evaluation, telephone interview.	No, 18/162 died, 10/162 loss to follow up.	No	Yes, contemporary AMI cohort.
McGee 2006	Yes	Yes, self-reported survey.	No, 681/791 responded to survey (14%) only 447 with complete depression data at follow up and baseline.	Yes	Yes, contemporary ACS cohort.
Noureddine 2018	Yes	Yes, prospective evaluation, self-reported.	Yes, complete follow up.	No	No, ACS cohort which includes elective CABG and PCI.
Ota 2002	Yes	Yes, prospective evaluation, self-reported.	Yes, complete follow up.	Yes	No, cohort from 1999 to 2000.
Perez 2008	Yes	Yes, prospective evaluation, self-reported.	No, 628 interviewed at baseline and 403/464 completed the interview.	Yes	Yes, contemporary ACS cohort.
Ramanathan 2006	No	Yes, self-reported telephone interview or review of medical records.	Yes, data for all 254 of these active smokers on admission.	No	No, cohort 2000 to 2003.
Reges 2014	Yes	Yes, prospective evaluation, self-reported.	No, 501 interviewed at baseline, 43 (8.5%) refused follow up, 26 (5.1%) loss to follow up and	Yes	Yes, contemporary ACS cohort.

			emotional or physical state did not allow interview 7 (1.4%).		
Rocha 2017a	Yes	Yes, prospective evaluation, self-reported.	No, 110 enrolled in study and 43 lost to follow up.	No	Yes, contemporary ACS cohort.
Rocha 2017b	Yes	Yes, prospective evaluation, self-reported.	No, missing data present.	No	Yes, contemporary ACS cohort.
Ronaldson 2015	Yes	Yes, prospective evaluation, self-reported.	Yes, no loss to follow up.	Yes	Yes, contemporary ACS cohort.
Sakalaki 2019	No	Yes, prospective evaluation, structured interview.	No, 374 met inclusion criteria and 174 declined or no follow up data.	Yes	Yes, contemporary AMI cohort.
Schlyter 2015	Yes	Yes, prospective evaluation, self-reported.	No, out of 445 that met the inclusion criteria 45 of these declined and had 77 incomplete data.	Yes	Yes, contemporary AMI cohort.
Snaterse 2015	Yes	Yes, prospective evaluation in initial study, self-reported.	Unclear.	No	Yes, contemporary ACS cohort.
Sochor 2015	No	Yes, self-reported via structured interview.	Yes, no loss of follow up.	Yes	No, PCI cohort.
Sverre 2017	Yes	Yes, prospective evaluation, self-reported smoking status.	Yes, 1127 participants, 44 missing follow up.	Yes	No, AMI, CABG and PCI cohort.
Vilchinsky 2011	Yes	Yes, prospective evaluation, self-reported smoking status.	No, 86/100 couples completed follow up.	Yes	Yes, contemporary ACS cohort.
Vogiatzis 2010	Yes	Yes, prospective evaluation, self-reported smoking status.	Yes, 420/426 patients completed follow up.	Yes	Yes, contemporary ACS cohort.

ACS=acute coronary syndrome; AMI=acute myocardial infarction; PCI=percutaneous coronary intervention; CABG=coronary artery bypass graft

Table 3: Determinants of smoking cessation

Study ID	Rates of smoking cessation and follow up	Determinants of smoking cessation
Abbasi 2018	Smoking cessation rate: 37/225 (16.4%) at 12 weeks.	Smoking cessation at 12 weeks by: Age ≤65 vs >65 years: 24/152 (15.8%) vs 13/73 (17.8%). Male vs female: 33/219 (15.1%) vs 4/6 (66.7%). BMI ≥30 vs <30: 11/65 (16.9%) vs 26/160 (16.3%). Socioeconomic status high vs low/middle: 10/82 (12.2%) vs 27/143 (18.9%). Graduate/postgraduate education vs none: 9/98 (9.2%) vs 28/127 (22.0%). UA vs STEMI vs NSTEMI: 11/65 (16.9%) vs 14/78 (17.9%) vs 12/82 (14.6%).
Attebring 2004	Smoking cessation rate: 170/348 (48.9%) at 3 months.	Multivariable predictors of continued smoking at 3 months: Non-participation in heart rehabilitation programme: OR 2.25 95%CI 1.40-3.61, p=0.008. Usage of sedatives/antidepressants at index event: OR 8.40 95%CI 2.36-30.0, p=0.001. History of cerebral vascular disease: OR 7.69 95%CI 1.12-28.0, p=0.002. History of previous cardiac event: OR 1.80 95%CI 1.13-2.88, p=0.01. Cigarette consumption at index event: OR 1.33 95%CI 1.03-1.72, p=0.03. History of smoking-related pulmonary disease: OR 2.01 95%CI 1.06-3.80, p=0.03.
Baile 1987	Smoking cessation rate: 41/66 (63.1%) prior to discharge.	Comparison of post-MI smoking, quitters vs relapsers: Days in recovery unit prior to interview (mean): 4.65 SEM 0.46 vs 5.24 SEM 0.53. Peak CPK mIU/ml (mean): 596 SEM 91 vs 314.5 SEM 98.5, p<0.05. Days in CCU (mean): 5.7 SEM 0.76 vs 4.0 SEM 0.33, p<0.05. Cardiac arrest or cardioversion: 14.6% vs 0%, p<0.05. Reporting that they had a heart attack: 80.5% vs 84.0%.

		Reporting cigarettes harmful to the heart: 58.5% vs 40%, p<0.15. Reporting craving cigarettes in CCU: 26.8% vs 36.0%. Years smoked (mean): 38.9% SEM 1.41 vs 38.4% SEM 2.7. Cigarettes smoked per day: 32% SEM 2.7 vs 34.2% SEM 4.5. Age years (mean): 56.7% SEM 1.41 vs 56.5% SEM 2.24. Sex, male: 68.3% vs 52.0%. Race, white: 92.7% vs 88.0%.
Berndt 2012	Smoking cessation rate: 72/108 (66.6%) at 1 month.	Independent predictors of continued abstinance from smoking 1 month after discharge: Age: OR 0.96 95%CI 0.92-1.00, p=0.097. Previous cardiac admission vs no previous cardiac admission: OR 0.35 95%CI 0.10-1.21, p=0.097. HADS Anxiety: OR 0.91 95%CI 0.80-1.03, p=0.121. Intention to quit at baseline: OR 1.35 95%CI 1.08-1.69, p=0.009.
Brummet 2002	Smoking cessation rate: 210/525 (40%) at average of 25.5 months.	Generalised estimating equation models for demographic, clinical and psychosocial measures associated with continued smoking at average of 25.5 months: Education: OR 0.61 95%CI 0.44-0.84, p=0.003. Marital status: OR 0.80 95%CI 0.54-1.20, p=0.28. Male vs female: OR 1.13 95%CI 0.77-1.66, p=0.53. Age: OR 0.99 95%CI 0.97-1.00, p=0.14. Disease severity: OR 0.58 95%CI 0.40-0.84, p=0.004. CABG: OR 0.60 95%CI 0.43-0.85, p=0.004. PTCA: OR 1.02 95%CI 0.80-1.31, p=0.86. Hostility: OR 2.36 95%CI 1.46-3.84, p=0.001. Concern about health: OR 1.90 95%CI 1.33-2.74, p=0.001. Tension: OR 1.60 95%CI 1.12-2.30, p=0.012.

		Depression: OR 1.60 95%CI 1.12-2.27, p=0.010. Lack of energy: OR 1.41 95%CI 0.98-2.03, p=0.060.
Chan 2008	Smoking cessation rate: 161/546 (29.4%) at 1 month.	Smoking cessation at 1 month by socio-economic status: Highest vs lowest income tertiles: OR 0.36 95%CI 0.21-0.63, p=0.001. Highest and lowest education: OR 0.98 95%CI 0.57-1.67, p=0.94.
Chen 2014	Smoking cessation rate: 215/477 (43.3%) at 12 months.	Smoking cessation at 12 months predicted by: Age: OR 1.06 95%CI 1.05-1.08, p<0.001. Sex: OR 0.67 95%CI 0.48-0.93, p=0.019. CHRNA5 rs16969968 A allele (dominant model): OR 0.70 95%CI 0.53-0.94, p=0.019.
Colivicchi 2011	Smoking cessation rate: 481/1294 (37.2%) at 12 months.	Independent predictors of smoking relapse at 12 months: Age (per year): HR 1.034 95%CI 1.028-1.039, p=0.001. Female gender: HR 1.23 95%CI 1.09-1.42, p=0.03. Enrolled in cardiac rehab: HR 0.74 95%CI 0.51-0.91, p=0.02. Diabetes: HR 0.79 95%CI 0.68-0.94, p =0.03.
Dawood 2008	Smoking cessation rate: 297/639 (46%) at 6 months.	Independent predictors of smoking cessation at 6 months: Age (per 10 year increment): OR 1.00 95%CI 0.83-1.19. White vs not white: OR 0.78 95%CI 0.48-1.26. Male vs female: OR 0.83 95%CI 0.55-1.25. Married vs not: OR 1.48 95%CI 0.96-2.26. Economic burden (avoiding healthcare due to cost): OR 1.02 95%CI 0.65-1.60. History of alcohol abuse: OR 0.71 95%CI 0.42-1.18. History of cocaine use: OR 0.26 95%CI 0.09-0.75. Diabetes mellitus as comorbidity: OR 0.92 95%CI 0.57-1.49. Lung disease as comorbidity: OR 0.88 95%CI 0.47-1.64.

		Congestive heart failure as comorbidity: OR 0.51 95%CI 0.20-1.31. Prior MI: OR 0.77 95%CI 0.41-1.44. Prior PCI: OR 0.88 95%CI 0.46-1.68. Prior CABG: OR 1.19 95%CI 0.57-2.48. STEMI: OR 1.17 95%CI 0.80-1.73. PHQ depression score >10: OR 0.57 95%CI 0.36-0.90. Social support (per ESSI score increment, higher scores = higher support): OR 1.01 95%CI 0.97-1.04. Referral to Cardiac rehab: OR 1.80 95%CI 1.17-2.75. Individual smoking cessation counselling: OR 0.80 95%CI 0.51-1.25. Smoking cessation program at hospital: OR 1.71 95%CI 1.03-2.83.
Deveci, 2018	Smoking cessation rate: 81/136 (59.6%) at 12 months.	Multivariable predictors of quitting smoking at 12 months: Female sex: OR 2.99 95%CI 1.10-8.17, p=0.033. Pain to door time: OR 1.22 95%CI 1.00-1.49, p=0.046. Transradial access vs Femoral Access: OR 1.34 95%CI 1.07-1.69, p=0.011.
Ding 2010	Smoking cessation rate: 95/150 (63.3%) at 6 months.	Intervention group (n=87), patients completed fagerstrom test for nicotine dependence (FTND) and 3 mins of smoking cessation education and control group (n=63), FTND questionnaire not done and no specific smoking cessation education. Odd ratios for continued smoking at 6 months: FTND (per increase in 1 score): OR 1.205 95%CI 1.028-1.412. FTND 4 points and above vs less than 4 points: OR 5.167 95%CI 1.835-14.546, p<0.002.
DiTulio 1991	Smoking cessation rate: 53/80 (66.3%) at 18 months.	Multivariable analysis of smoking cessation at 18 months: CPK: β 1.089 SE 0.630, χ^2 2.99 p=0.08. Hospital stay: β 1.780 SE 0.620, χ^2 8.24 p=0.004. CCU stay: β -0.745 SE 0.73, χ^2 1.04 p=0.31. Age: β 0.0I6 SE 0.033, χ^2 0.24 p=0.63.

		Gender: β 1.605 SE 0.919, χ^2 3.05 p=0.08.
Gerber 2011	Smoking cessation rate: 269/768 (35%) at 10-13 years.	Multivariable adjusted odds ratios for continued smoking at 10-13 years: Age (per 5 years): OR 0.88 95%CI 0.82-0.95, p=0.001. Female: OR 0.71 95%CI 0.47-1.07, p=0.11. Education, years of schooling (4 years): OR 0.80 95%CI 0.69-0.93, p=0.003. Below average income: OR 1.41 95%CI 1.07-1.86, p=0.02. Lack of a steady partner: OR 2.06 95%CI 1.38-3.06, p=0.001. Neighbourhood Socioeconomic status, higher score denotes better SES (1 SD): OR 0.89 95% CI 0.78-1.01, p=0.07. Smoking duration (per 5 years): OR 1.19 95%CI 1.08-1.30, p=0.001. Pre MI smoking intensity (per 5 cigarettes): OR 1.12 95%CI 1.08-1.17, p=<0.001. Hypertension as risk factor: OR 1.31 95%CI 0.98-1.75, p=0.07. Diabetes as risk factor: OR 0.63 95%CI 0.44-0.89, p=0.009. Dyslipidaemia as risk factor: OR 0.99 95%CI 0.76-1.29, p=0.93. Body mass index ≥30kg/m2 as risk factor: OR 0.83 95%CI 0.60-1.16, p=0.28. Physical inactivity as risk factor: OR 0.95 95%CI 0.70-1.31, p=0.77. Q wave MI: OR 0.84 95% CI 0.62-1.14, p=0.25. Anterior MI: OR 0.92 95%CI 0.70-1.20, p=0.54. Thrombolytic therapy: OR 1.02 95%CI 0.78-1.33, p=0.91. CABG within 45 days: OR 0.73 95%CI 0.40-1.32, p=0.29. PTCA within 45 days: OR 0.92 95%CI 0.65-1.29, p=0.62. Self-rated health, rated 1-5, 5 being excellent health (per unit): OR 0.93 95%CI 0.82-1.05, p=0.22. Killip class (HF score) >1: OR 0.96 95%CI 0.67-1.38, p=0.84. Angina pectoris within 45 days: OR 0.85 95%CI 0.66-1.09, p=0.20. Hospitalisation duration (5 days): OR 0.82 95%CI 0.72-0.94, p=0.005.

		Sense of coherence: OR 0.77 95%CI 0.62-0.97, p=0.03. Depression: OR 1.32 95%CI 1.05-1.65, p=0.02. Social support: OR 0.88 95%CI 0.58-1.32, p=0.54. Anxiety: OR 1.04 95%CI 0.82-1.31, p=0.77.
Giallauria 2005	Smoking cessation rate: 112/164 (68%) at 12 months.	Continued smoking at 12 months: Other household smokers vs no other household smokers: 25/66 (38%) vs 27/98 (27%), p<0.01 Adherence to Cardiac Rehabilitation Programme (CRP): Group A (no enrolment in CRP) vs Group B (8-week CRP) vs Group C (8-week CRP plus 10 months home based CRP): 30/54 (55%) vs 16/55 (29%) vs 6/55 (11%), Group C vs Group A p<0.0001, Group C vs Group B p<0.001.
Goettler 2020	Smoking cessation rate: 65/104 (62.5%) at 3.5 years.	Multivariable logistic regression factors associated with smoking cessation at mean of 3.5 years: Age (per year): OR 1.03 95%CI 0.97-1.08, p=0.36. Female sex: OR 1.28 95%CI 0.34-4.77, p=0.71. High educational level (High school complete, university degree, postgrad degree): OR 0.39 95%CI 0.13-1.17, p=0.09. No CABG vs CABG: OR 0.63 95% CI 0.15-2.68, p=0.53. Diabetes as comorbidity: OR 2.56 95% CI 0.89-7.34, p=0.08. Depressed mood: OR 0.37 95%CI 0.13-1.08, p=0.07. Cardiac rehabilitation program: OR 5.19 95%CI 1.87-14.46, p=0.002.
Hasdai 1998	Smoking cessation rate: 435/1169 (37.2%) at mean of 5.2 years.	Multivariable predictors of continued smoking at mean of 5.2 years: Prior cigarette consumption: OR 1.009 95%CI 1.004-1.014. Other risk factors for CAD (unspecified 1 or more): OR 1.49 95%CI 1.15-1.93. Age: OR 0.98 95%CI 0.97-0.99. Unstable angina: OR 0.69 95%CI 0.52-0.91.
Holtrop 2009	Smoking Cessation rate: 63/111 (56.8%)	Multinominal Logistic regression comparing smokers to successful quitters at 8 months: Household income ($15000+ vs <$15000): OR 4.72 95% CI 1.69-12.87.

	at 8 months.	History of depression (yes): OR 0.42 95%CI 0.16-1.41. Smokers in household (yes): OR 0.20 95%CI 0.08-0.55. Intensity of smoking (moderate to heavy vs Light): OR 0.20 95%CI 0.04-0.99.
Hopner 2020	Smoking cessation rate: 191/372 (51.3%) at 6 weeks.	Variables and adjusted association with smoking continuation at 6 weeks: Age (per 5 years): OR 1.00 95%CI 0.98-1.02. Male: OR 1.07 95%CI 0.65-1.75. Income (per €500): OR 0.82 95%CI 0.72-0.94. Education (high vs low): OR 0.76 95%CI 0.26-2.19. Life partner (yes vs no): OR 0.56 95%CI 0.34-0.95. Hypertension: OR 1.44 95%CI 0.84-2.49. Diabetes mellitus: OR 1.11 95%CI 0.64-1.94. Previous AMI (yes vs. no): OR 2.19 95%CI 1.10-4.38. Intension to quit smoking (yes vs. no): OR 0.83 95%CI 0.48-1.43. Fear of death (yes vs. no): OR 0.86 95%CI 0.45-1.65. STEMI (yes vs. no): OR 1.07 95%CI 0.66-1.73. Intervention (yes vs. no): OR 1.53 95%CI 0.66-3.54. Complication (yes vs. no): OR 0.37 95%CI 0.12-1.12. New prescribed drugs (per 1 drug): OR 0.86 95%CI 0.75-0.98. Hospitalisation duration (per 3 days): OR 0.95 95%CI 0.87-1.02.
Huijbrechts 1996	Smoking cessation: 45/74 (60.8%) at 5 months.	Standardized canonical discriminant function coefficient: Depression (HAD) by age: -0.70. Depression (POMS): 0.57. State-anxiety (ZBV): 0.50. Somatization (ABV) by age: -0.44.

		Anxiety (HAD) by age: -0.43.
Imbalzano 2018	Smoking cessation rate: 178/231 (77.1%) at 3.5 years.	Type D vs non type D personality and stop smoking: 23/78 vs 135/153.
Jaquet 2019	Smoking cessation rate: 54/121 (44.6%) at 1 year.	Smoking cessation according to socioeconomic status (high income): OR 3.82 95%CI 1.58-9.24, p=0.003.
Kronish 2006	Smoking cessation rate: 41/88 (46.6%) at 3 months.	Quitting smoking at 3 months vs persistently nondepressed: Remittent depressed: OR 1.89 95%CI 0.45-7.97. Persistently depressed: OR 0.23 95%CI 0.05-0.97.
Luo 2011	Smoking cessation rate: 57/134 (42.5%) at 2-7 years.	Smoking cessation rates only.
McGee 2006	Smoking cessation rate: 150/272 (55.1%) at 1 year.	Continued smoking at 1 year Depressed mood: OR 2.4 95%CI 1.4-4.1, p =0.003. Continued smoking at 1 year, as per depression score: HADS-D: OR 1.6 95%CI 0.6-4.3, p=0.38. BDI-FS: OR 2.6 95%CI 1.4-5.2, p=0.007.
Noureddine 2018	Smoking cessation rate: 13/40 (32.5%) at 1 year.	Continued smoking vs stopped smoking: Self-efficacy scores at 6 months: 25.65 vs 92.56, p=0.001. Depression scores at 6 months (PHQ 9): 11.69 vs 9.71, p=0.008.
Ota 2002	Smoking cessation rate: 19/29 (66%) at	Failure in smoking cessation 30 weeks after discharge: TDS score (≥6): OR 15.8 95%CI 1.3-191, p=0.03.

	30 weeks.	Angina pectoralis vs myocardial infarction: OR 15.1 95%CI 1.3-182, p=0.033. Short briefing on smoking cessation at bedside: OR 0.6 95%CI 0.1-6.4, p=0.65. T test for abstainers vs non-abstainers: Age mean (years) :66.6 SD 10.8 vs 66.6 SD 6.2, p=0.92. Number of cigarettes per day mean: 32.6 SD 18.1 vs 25.5 SD 8.3, p=0.16. Years of smoking mean: 43.7 SD10.8 vs 44.7 SD 10.3, p=0.81. Nicotine dependence score FTQ mean: 6.2 SD 1.2 vs 6.3 SD 1.7, p=0.80. Nicotine dependence score TDS mean: 4.4 (2.2) 6.5 (1.3) p=0.009.
Perez 2008	Smoking cessation rate: 240/403 (59.6%) at 6 months.	Predictors of smoking relapse at 6 months: Major depression: OR 2.549 95%CI 1.519-4.275, p=0.004. Precontemplation (as a state of change): OR 7.798 95%CI 2.442-24.898, p=0.0005. Action (as a state of change): OR 0.065 95%CI 0.008-0.532, p=0.010. Previous CABG: OR 4.062 95%CI 1.356-12.169, p=0.012. Previous anxiolytic use: OR 2.365 95%CI 1.095-5.107, p=0.028. Diagnosis of MI: OR 0.575 95%CI 0.361-0.916, p=0.019. Duration of hospitalisation: OR 0.935 95%CI 0.98-0.973, p=0.001. Smoking onset age: OR 0.952 95%CI 0.910-0.994, p=0.028. Attempts to quit smoking (Number of): OR 0.808 95%CI 0.678-0.964, p=0.018.
Ramanathan 2006	Smoking cessation rate: 125/254 (49.2%) at 6 months.	Characteristics of smokers vs quitters 6 months after admission for ACS: Diagnosis STEMI: 37/129 (29%) vs 41/125 (33%), p=0.48. Diagnosis NSTEMI: 56/129 (43%) vs 57/125 (46%), p=0.73. Diagnosis UA: 36/129 (28%) vs 27/125 (22%), p=0.25. Mean age (years) : 55 vs 57, p=0.23. Male: 80/129 (62%) vs 86/125 (68.8%), p= 0.26.

		Body mass index (kg/m^2): 28 vs 29, p=0.39. History of angina: 43/129 (33%) vs 38/125 (30%), p=0.62. History of myocardial infarction: 47/129 (36%) vs 38/125 (30%), p=0.31. History of TIA/CVA: 16/129 (12%) vs 9/125 (7%), p=0.17. History of congestive heart failure: 7/129 (5%) vs 9/125 (7%), p=0.56. History of percutaneous coronary intervention: 32/129 (25%) vs 26/125 (21%), p=0.45. History of coronary artery bypass graft: 16/129 (12%) vs 15/125 (12%), p=0.92. History of diabetes mellitus: 20/129 (16%) vs 21/125 (17%), p=0.78. History of hypertension: 75/129 (59%) vs 82/125 (66%), p=0.25. History of hyperlipidaemia: 79/129 (61%) vs 67/125 (54%), p=0.22. History of peripheral vascular disease: 16/129 (12%) vs 15/125 (12%), p=0.92. Presentation chest pain: 82/129 (64%) vs 68/125 (54%), p=0.90. Presentation of cardiac arrest: 2/129 (1.6%) vs 4/125 (3.2%), p=0.39. Mangement cardiac catheterisation: 99/129 (77% vs 105/125 (84%), p=0.15. Management PCI: 65/129 (50%) vs 62/125 (50%), p=0.90. Management CABG: 8/129 (6%) vs 23/125 (18%), p=0.003. Management ETT: 13/129 (10%) vs 14/125 (11%), p=0.77. Management echocardiography: 33/129 (26%) vs 51/125 (41%), p=0.010. Management PA catheter: 9/129 (7%) vs 19/125 (15%), p<0.001. Management IABP: 5/129 (4%) vs 6/125 (5%), p=0.72. Management pacemaker: 5/129 (4%) vs 7/125 (6%), p=0.52 Management ventilator: 7/129 (5%) vs 26/125 (21%), p<0.001. Counseled to quit smoking: 71/129 (55%) vs 59/125 (47%), p=0.26. Referal to cardiac rehab: 25/129 (19%) vs 37/125 (27%), p=0.063.

Reges 2014	Smoking cessation rate: 68/165 (41.2%) at 6 months.	Persistant smoking in Arabs vs Jews: OR 1.31 95%CI 0.59-2.93, p=0.51.
Rocha 2017a	Smoking cessation rate: 47/65 (72.3%) at 12 months.	Logistic regression predicting smoking 12 months after clinical discharge: Autonomous self-regulation: OR 1.27 95%CI 0.31-5.17, p=0.74. Perceived competence: OR 0.11 95%CI 0.02-0.60, p=0.011. Depressive symptoms: OR 1.44 95%CI 1.01-2.05, p=0.42.
Rocha 2017b	Smoking cessation rate: 44/76 (57.9%) at 6 months.	Logistic regression predicting smoking six months after clinical discharge: Perceived competence: OR 0.58 95%CI 0.38-0.89. Meaning in life: OR 0.84 95%CI 0.70-1.01. T-test for quitters vs smokers at 6 months: Family support: 1.04 95%CI -0.46-1.45. Autonomous self-regulation (mean): 1.48 95%CI -0.13-0.89. Percieved competance (mean): 3.05 95%CI 0.28-1.35. Depressive symptoms HADS score (mean): -0.55 95%CI -2.21-1.25. Meaning in life (mean): 2.41 95%CI 0.31-3.26.
Ronaldson 2015	Smoking cessation rate: 96/136 (70.5%) at 12 months.	Optimism predicted a reduction in smoking after 12 months : OR 0.84 95%CI 0.73-0.96, p=0.01.
Sakalaki 2019	Smoking cessation rate: 20/45 (44.4%) at 2 years.	Achieved non-smoking at 2 years: Sex, male: OR 0.17 95%CI 0.02-1.34, p=0.09. Age < 65 years: OR 0.24 95%CI 0.07-0.74, p=0.013. Unemployed: OR 0.23 95%CI 0.06-0.82, p=0.023.
Schlyter 2015	Smoking cessation	Smoking cessation at 2 years following acute MI:

	rate: 74/133 (55.6%) at 2 years.	Depression: OR 0.993 95%CI 0.942-1.046, p= 0.78. Conscientiousness: OR 1.037 95%CI 0.971-1.108, p=0.28. Agreeableness: OR 1.090 95%CI 1.014-1.172, p=0.019. Confrontational: OR 0.238 95%CI 0.067-0.852, p=0.027. Seeking social support: OR 2.34 95%CI 0.565-9.70, p=0.24. Employed: OR 1.41 95%CI 0.643-3.10, p=0.39. Living alone: OR 0.312 95%CI 0.145-0.673, p=0.003.
Snaterse 2015	Smoking cessation rate: 156/324 (48.1%) at 12 months.	Characteristics of successful quitters vs smokers in ACS patients during 1 year of follow up. <50 years age: 53/156 (34%) vs 61/168 (36%). 50-59 years age: 67/156 (43%) vs 71/168 (42%). ≥60 years age: 36/156 (23%) vs 36/168 (21%). Male: 127/156 (81%) vs 125/168 (74%), p=0.13. Fewer than 8 years education: 41/156 (28%) vs 63/168 (38%), p=0.02. College or University education: 49/156 (33%)vs 25/168 (15%), p<0.001. No history of CVD (87%): 136/156 vs 124/168 (74%), p<0.01. STEMI as index event: 89/156 (57%) vs 83/168 (53%). NSTEMI as index event: 50/156 (32%) vs 51/168 (30%). UA as index event: 17/156 (11%) vs 26/168 (16%). Nurse coordinated prevention program: 89/156 (57%) vs 83/168 (49%), p=0.17. Number of cigarettes per day <=10: 62/156 (40%) vs 59/168 (35%), p=0.36. Number of cigarettes per day >10: 93/156 (60%) vs 109/168 (65%). Quality of life at baseline assessed with MacNew questionnaire (mean): 5.13 SD 1.06 vs 5.02 SD 1.14, p=0.47. Quality of life at 1 year follow up: 5.66±1.01 vs 5.46±0.99, p=0.66. Systolic BP >140mmHg as risk factor at baseline: 36/156 (24%) vs 33/168 (20%), p=0.12.

		LDL cholesterol >2.5mmol/L as risk factor at baseline: 46/156 31%) vs 66/168 (39%), p=0.15. BMI >25Kg/m2 as risk factor at baseline: 116/156 (74%) vs 115/168 (68%), p=0.12. Inadequate physical activity as risk factor at baseline: 89/156(57%) vs 98/168 (58%), p=0.81. Systolic BP >140mmHg as risk factor at 1 year: 41/156 (28%) vs 43/168 (26%), p=0.79. LDL cholesterol >2.5mmol/L as risk factor at 1 year: 32/156 (22%) vs 62/168 (37%), p<0.01. BMI >25kg/m2 as risk factor at 1 year: 127/156 (81%) vs 112/168 (67%) , p<0.01. Inadequate physical activity as risk factor at 1 year: 54/156 (35%) vs 81/168 (48%), p=0.01. Sysematic Coronary Risk evaluation score (SCORE): 2.9% vs 5.7%, p<0.01.
Sochor 2015	Smoking cessation rates: at 12 months at timepoints studied. 1999 to 2001: 48% 2002 to 2006: 46% 2007 to 2010: 56%	Independent predictors of smoking cessation at 12 months: CR participation: OR 2.51, 95% CI 1.63-3.86, p<0.001. Older age (per decade): OR 1.44: 95% CI 1.17-1.77, p<0.001. PCI done in January through March vs October to December: OR 2.49 95% CI 1.37-4.52, p=0.003. Men more likely to quit at 12 months: OR 1.58, 95% CI 0.99-2.50, p=0.053.
Sverre 2017	Smoking cessation rate: 167/397 (43%) at mean of 16 months.	Odds ratio for persitant smoking after index event: Mean age at index event (per year): OR 0.97 95%CI 0.90-1.03, p=0.27. Time since the index event (per year): OR 1.01 95%CI 0.98-1.05, p=0.41. Female gender: OR 2.17 95%CI 0.85-5.52, p=0.10 . Living alone: OR 1.23 95%CI 0.48-3.11, p=0.67. Low education: OR 3.35 95%CI 1.43-7.81, p<0.01. Unemployed or on disability benefits: OR 4.12 95%CI 1.80-9.41, p=0.001. Not having ST-elevation infarction as index event: OR 2.30 95%CI 1.08-4.40, p<0.05. More than 1 coronary event: OR 1.53 95%CI 0.63-3.72, p=0.35. Participation in cardiac rehabilitation: OR 0.78 95%CI 0.38-1.60, p=0.50.

		Duration of smoking (years): OR 2.34 95%CI 1.41-3.88, p=0.001. What do you feel is the likelihood of having a new heart attack over the next 12 months? (Perceived risk 1-10 Likert scale): OR 1.01 95%CI 0.86-1.18, p=0.93. How much do you feel you can help reduce your risk of having another heart attack? (Perceived risk 1-10 Likert scale): OR 0.88 95%CI 0.76-1.02, p=0.09. How much do you think you will have to restrict your activities in the long-term due to your heart condition? (Perceived risk 1-10 Likert scale) OR 1.00 95%CI 0.87-1.17, p=0.90. How much do you think your treatment can help you?(1-10 Likert scale): OR 0.88 95%CI 0.75-1.02, p=0.09.
Vilchinsky 2011	Smoking cessation rate: 24/37 (64.9%) at 6 months.	Patients' Perceptions of Partners' Active Engagement as Moderators of the Association Between Partners' Active Engagement and Patients' Smoking Cessation, 6 Months Post-ACS (cessation vs continue smoking): Angiogram score at baseline (1 normal- 5 extremely severe): OR 8.37 95%CI 1.32-52.95, p=0.024. Partners' Active Engagement (WAE): OR 11.46 95%CI 1.35-97.29, p=0.025. Patients' Active Engagement (PAE) : OR 0.912 95% CI 0.30-2.77, p=0.87. WAE x PAE: OR 42.47 95%CI 1.57-1148.87, p=0.026.
Vogiatzis 2010	Smoking cessation rate: 162/420 (38.6%) at 12 months.	Independent predictors of smoking resumption from multiple regression analysis: Non-participation in desensitisation programme: OR 4.32 95%CI 4.06-4.59, p<0.001. Antidepressants: OR 2.28 95%CI 1.56-3.24, p=0.01. Cerebrovascular disease as a comorbitity: OR 2.32 95%CI 1.37-3.86, p=0.03. COPD as a comorbitity: OR 1.32 95%CI 1.04-1.89, p=0.001. Fagerström test > 8: OR 1.42 95%CI 1.05-2.01, p=0.04.

BMI=body mass index; UA=unstable angina; STEMI=ST-elevation myocardial infarction; NSTEMI=non-ST-elevation myocardial infarction; OR=odds ratio; CPK=creatinine phosphokinases; CCU=coronary care unit; SEM=standard error of the mean; HADS=Hospital Anxiety and Depression Scale; CABG=coronary artery bypass graft; PTCA=percutaneous transluminal coronary angioplasty; PCI=percutaneous coronary intervention; PHQ=patient health questionnaire; MI=myocardial infarction; FTND=Fagerstrom Test for Nicotine Dependence; CRP=C-reactive

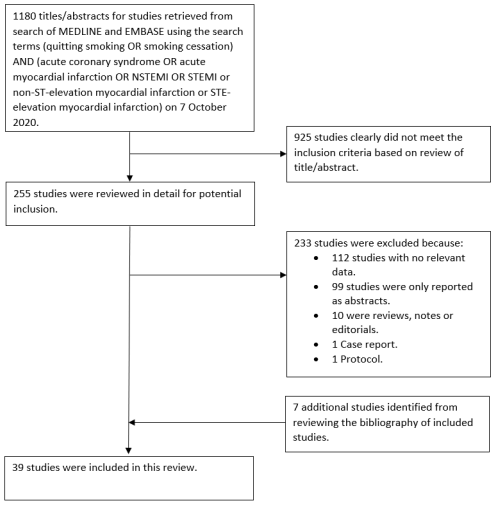
protein; AMI=acute myocardial infarction; BDI=Beck Depression Inventory; SD=standard deviation; UA=unstable angina; TIA/CVA=transient ischaemic attack/cerebrovascular accident; ETT=exercise tolerance test; PA=pulmonary artery; IABP=intraaortic balloon pump; LDL=low density lipoproteins; BP=blood pressure; CR=cardiac rehabilitation; COPD=chronic obstructive pulmonary disease

Table 4: Summary of the odds of smoking cessation according to individual variables

Variable	No. of studies	Odds ratio	LL	UL	I^2
Cardiac rehabilitation	7	1.90	1.44	2.51	49%
Married/not alone	6	1.68	1.32	2.13	25%
Smoking intervention	5	1.67	0.70	3.98	95%
Obesity	3	1.43	0.93	2.19	53%
Intention/attempt to quit smoking	3	1.27	1.11	1.46	0%
Greater education	8	1.26	0.87	1.81	76%
Diabetes mellitus	6	1.24	1.03	1.51	24%
Higher income	7	1.18	0.79	1.76	84%
Hospitalized duration	3	1.09	1.02	1.15	47%
AMI/STEMI vs not	6	1.05	0.59	1.85	74%
Age	11	1.03	0.99	1.06	96%
Female	13	1.03	0.81	1.31	66%
Social support	2	1.01	0.98	1.05	0%
Current PCI	3	1.01	0.84	1.21	0%
Hypertension	4	0.91	0.68	1.21	40%
Anxiety	3	0.88	0.71	1.09	50%
Previous PCI	2	0.83	0.54	1.28	0%
Previous CABG	4	0.82	0.41	1.66	54%
Heart failure	2	0.81	0.31	2.11	48%
Current CABG	3	0.81	0.24	2.73	95%
Physical inactivity	2	0.79	0.44	1.44	79%
COPD/lung disease	3	0.73	0.57	0.93	0%
Hyperlipidemia	3	0.71	0.43	1.17	77%
Duration of smoking	2	0.63	0.33	1.21	85%
Previous AMI/cardiac admission	5	0.61	0.47	0.80	0%
Depression	11	0.57	0.43	0.75	85%
CVD/TIA	4	0.42	0.30	0.59	0%
Unemployment	3	0.37	0.17	0.80	51%

AMI=acute myocardial infarction, STEMI=ST-elevation myocardial infarction, PCI=percutaneous coronary intervention, CABG=coronary artery bypass graft,

COPD=chronic obstructive pulmonary disease, CVD=cerebrovascular disease, TIA=transient ischaemic attack



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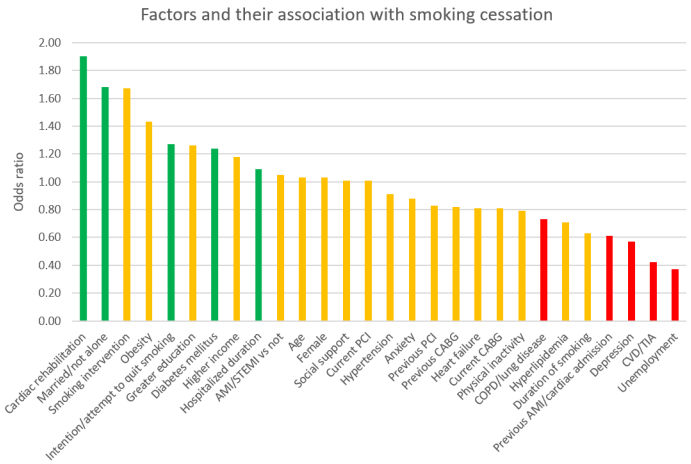

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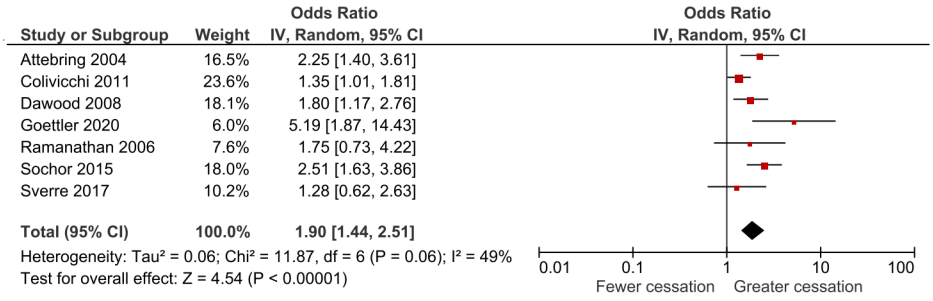

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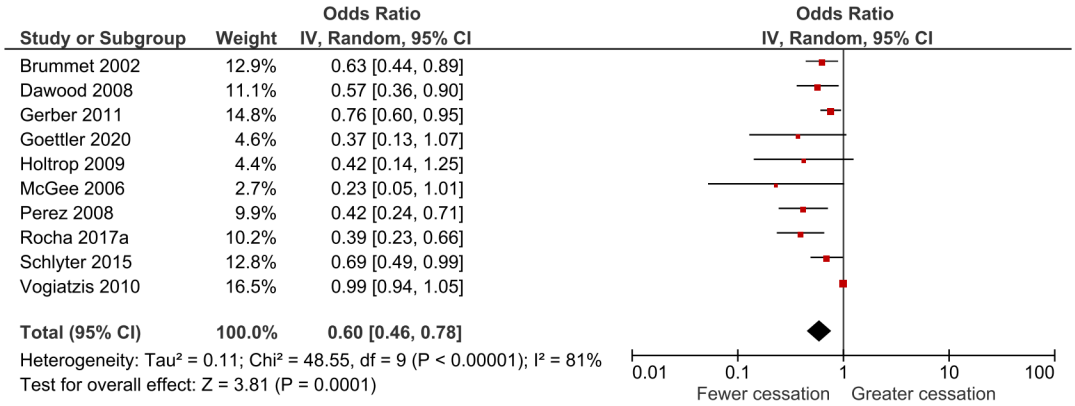

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