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Emergency department interventions for smoking cessation: a systematic review and meta-analysis

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Abstract

Background

Emergency Departments (EDs) offer a valuable opportunity to intervene to support people to quit smoking. We sought to determine the effectiveness of smoking cessation interventions delivered in the ED setting on rates of abstinence at the longest follow-up.

Methods

We undertook a systematic review according to the PRISMA guidelines considering only RCTs, based in the ED, where the goal of the intervention was smoking cessation and follow-up was at least 3 months. We systematically searched electronically published literature and trial registries from inception to May 2025. We pooled data using a Mantel-Haenszel random-effects model for behavioural interventions without pharmacotherapy, and using a fixed-effects model for interventions incorporating nicotine replacement therapy (NRT), with results reported as risk ratios (RR) and 95% confidence intervals. The primary outcome was smoking cessation using the strictest available measure, biochemically validated where possible. Risk of bias was assessed using the Cochrane risk of bias tool. Certainty of overall evidence was assessed using GRADE.

Results

Nineteen RCTs met inclusion criteria, of which 17 were deemed suitable for incorporating into meta-analyses. Participants randomized to receive a smoking cessation intervention involving NRT in the emergency department were significantly more likely to achieve abstinence (RR 1.55, 95% CI 1.27 to 1.89, p<0.0001, 6 RCTs, n=3528, I^2=46%). Trials involving behavioural support alone delivered in the ED had a RR of quitting compared with controls of 1.18 (95% CI 0.85 to 1.64, p=0.32, 11 RCTs, N=4711, I^2=37%). Of the 17 studies included in the meta-analyses 14 were at high risk of bias, 1 at low risk and 2 where the risk was unclear. One study incorporated e-cigarettes and was not incorporated in the meta-analysis but demonstrated evidence of effectiveness.

Conclusion

There is moderate certainty evidence that smoking cessation interventions incorporating pharmacotherapy delivered in the ED are effective in supporting smoking cessation.

What is already known on this topic

- Supporting people to quit smoking is one of the most powerful interventions to improve health and combat health inequalities.
- The Emergency Department has shown promise as a location for smoking cessation however there is uncertainty about the optimal intervention components.

What this study adds

- In this meta-analysis of randomised controlled trials, emergency department based smoking cessation interventions incorporating NRT had moderate certainty effectiveness for smoking cessation.
- Evidence was stronger for interventions incorporating pharmacotherapy, than for behavioural interventions without pharmacotherapy.

How this study might affect research, practice or policy

- Policy makers should consider the implementation of ED based smoking cessation interventions which incorporate pharmacotherapy in order to reduce smoking prevalence and health inequalities.
- Future trials could consider directly comparing nicotine replacement therapy (NRT) and e-cigarettes in the ED environment and the use of smoking cessation medication.

Introduction

Tobacco remains a leading cause of morbidity and mortality with more than 8 million deaths each year worldwide [1]. Supporting smoking cessation is a powerful tool to prevent premature death, combat health inequalities and reduce healthcare utilisation.[2]

Surveys conducted in EDs in the US, Canada, New Zealand and Australia have all demonstrated a smoking prevalence amongst ED attendees higher than the general population with prevalence ranging from 20% to 41%.[3–8]

Analysis of routinely collected data from Australia and the UK demonstrates that those who attend EDs are disproportionately likely to be from lower socio-economic groups.[9,10] In England in 2022/23 there were around twice as many attendances to EDs for the 10% of the population living in the most deprived areas (3.3 million), compared with the least deprived 10% (1.7 million).[11]

Those living in more deprived areas are less likely to quit if they access stop smoking service support [12] and less likely to quit in general [13], therefore Emergency Departments may offer a valuable opportunity to reach people who smoke who may face barriers to quitting.

EDs may offer a valuable opportunity to reach people because those waiting in EDs are a "captive audience", thinking about their health and likely to be there for some time.[14]

This systematic review of randomised controlled trials (RCTs) aimed to evaluate the impact of emergency department based smoking cessation interventions on smoking cessation.

Methods

This systematic review is reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.[15] The methods were pre-registered on the open science framework.[16]

Search strategy

Database searches of the Cochrane Central Register of Controlled trials, MEDLINE, Embase, PsychINFO, CINAHL, US National Institutes of Health Ongoing Trials Register and World Health Organization International Clinical Trial Registry Platform were conducted for RCTs published before 15 May 2025, using a combined text and MeSH search strategy. The search terms used can be found in the published protocol. References from the relevant papers were also screened for relevant studies. No restrictions, including year of publication, language or publication type were applied.

Study selection

Inclusion criteria were any RCT which met the PICO criteria laid out in table 1. Two authors independently reviewed all of the abstracts of identified studies to determine eligibility and then reviewed all the full texts. Disagreements were resolved through discussion amongst the authors. The selection process is described in the PRISMA flow diagram (figure 1)

Participants	People who currently smoke tobacco attending an ED in order to seek medical assistance or, accompanying someone seeking medical assistance
Intervention	Any intervention intended to help people quit smoking
Control	Any less intensive intervention
Outcome	Smoking cessation measured at least three months after randomisation

Table 1: PICO for inclusion criteria

Data extraction
A data collection form was developed and piloted. Data extraction was performed by two authors independently onto an electronic database (Covidence) which allowed blinding of the other authors data extraction. Disagreements were resolved through discussion amongst the authors. All data extracted by all reviewers is available in the supplementary material.

Data synthesis
For our primary outcome of smoking cessation we combined eligible studies using a Mantel-Haenszel mixed-effects model for behavioural interventions without pharmacotherapy, and using a fixed-effects model for interventions incorporating NRT, as per standard practice of the Cochrane Tobacco Addiction Group. Results are reported as risk ratios (RRs) with a 95% confidence interval. We used the longest biochemically verified follow-up where available. Where not available, we used self-reported longest follow up.

Measures of treatment effect
We report results as RRs, calculated as ((number of events in intervention condition/intervention denominator)/(number of events in control condition/control denominator)), with a 95% confidence interval (CI). A RR greater than 1 indicates a higher rate of smoking abstinence in the intervention group compared with the control group. To investigate heterogeneity, we used the I^2 statistic.

Safety data was not extracted because this has been extensively investigated elsewhere and there was no reason to believe it would be different in this setting.[17]

Dealing with missing data
We conducted our analyses on an intention-to-treat basis, including everyone who smoked tobacco in the study arms to which they were randomised, regardless of whether they received the intervention. We counted participants lost to follow-up as continuing to smoke, which is standard in the field.[18]

Where study reports lacked information needed for the review we attempted to contact the study authors.

Subgroup analysis and investigation of heterogeneity
Due to insufficient data it was not possible to undertake the subgroup analyses planned in the protocol exploring the impact of participant motivation; professional delivering the intervention; year of publication; nature of person recruited (patient or accompanying person); or age.

Sensitivity analysis
Sensitivity analyses were conducted for (a) removing studies without a minimum of 6 months follow up recommended for smoking cessation studies as per the Russel standard and (b) removing studies without biochemical verification. It was not possible to conduct planned sensitivity analyses removing studies at high risk of bias, as once these studies were removed, there were only two studies remaining in the NRT analysis (Bernstein 2011 and Bock 2008) and one in the behavioural analysis (Li 2020).

Quality assessment
To assess for risk of bias, the Cochrane risk of bias tool for RCTs [19] was used alongside guidance from the Cochrane Tobacco Addiction Group.[20] As blinding of participants is not feasible due to the nature of the interventions, we do not assess performance bias, as is the standard methods of the Cochrane Tobacco Addiction Review Group.[20] Two review authors independently assessed each study on each domain.

We created a 'Summary of findings' table for smoking cessation at longest follow-up. Two reviewers independently assessed the certainty of the evidence using the five GRADE considerations (risk of bias, inconsistency, imprecision, indirectness, and publication bias).[41] We used methods and recommendations described in the *Cochrane Handbook (17)* using GRADEpro software.

Assessment of reporting biases
We assessed the risk of reporting bias using a funnel plot for comparisons with 10 or more studies.

Results
Study selection
Electronic searching revealed 6599 citations. Forty-five full-text articles were assessed for eligibility after removal of duplicates and abstract and title screening. Twenty-six were excluded, for reasons of exclusion see figure 1 which presents the corresponding PRISMA flow diagram resulting in 19 studies included in the systematic review and 17 incorporated into the meta-analyses (6 RCTs for the meta-analysis of NRT interventions, 11 RCTs for the meta-analysis of behavioural interventions without pharmacotherapy). A meta-analysis of trials incorporated e-cigarettes was not possible due to only one study being identified. One study (Bernstein 2023) lacked data so the author was contacted. No non-English studies were identified.

Study characteristics
The characteristics of all the studies are listed in tables 2 and 3.

The 19 trials included a total of 9,211 randomised participants (4707 intervention and 4504 control).

Of the 19 trials meeting the inclusion criteria 14 were conducted in the United States with one each from Hong Kong, Italy, Canada, Germany and the United Kingdom. Twelve of the thirteen trials recruited adults whilst one (Horn 2007) recruited those aged 14-19. Three trials only recruited those who were motivated to quit smoking with the remainder recruiting those who were motivated or unmotivated. The number of cigarettes smoked per day varied between the trial (means between 10 and 15). The only study involving an e-cigarette based intervention (Pope 2024) was conducted in the UK.

The intervention and control conditions varied between trials but were a variation of brief advice (ranging from 30 seconds to up to 60 minutes), written materials, referral or signposting to stop smoking services, follow-up phone calls and some form of nicotine replacement (patches, gum, lozenges or an e-cigarette). None of the included studied assessed the effectiveness of bupropion, varenicline or cytisinicline. In several trials the control group received a similar degree of intervention to the intervention group in other included trials for example in Anders 2011 the control participants received advice to quit smoking, written material and the contact details of the smoking cessation service and in Cheung 2018 participants in the intervention group received 30 seconds of brief advice and offer of referral to stop smoking services.

Effects of interventions
We have combined studies assessing the effectiveness of behavioural interventions without the use of NRT separately from studies of interventions involving NRT. Bernstein 2023 could not be included in a meta-analysis because it was a factorial trial and the necessary data was no longer available to the author of the trial. Pope et al. was the only study to assess the effectiveness of an e-cigarette intervention and so was not included in either meta-analysis.

Behavioural interventions

A meta-analysis of eleven studies was conducted comparing the effectiveness of behavioural interventions alone for smoking cessation compared with control (Figure 2). The primary result at longest follow-up, using biochemically verified data where available (Castello 2002 & Li 2020), gave a RR for quitting with a behavioural smoking cessation intervention delivered in ED compared with controls of 1.18 (95% CI 0.85 to 1.64, p=0.32, 11 RCTs, N=4711, I^2=37%).

Nicotine replacement interventions

A meta-analysis of six studies was conducted comparing the effectiveness of interventions incorporating NRT compared with control (Figure 3). The primary result at longest follow-up, using biochemically verified data where available (Bernstein 2011, Bernstein 2015, Bock 2008, Mahabee-Gittens 2020) gave a RR for quitting with a smoking cessation intervention involving NRT delivered in ED compared with controls of RR 1.55 (95% CI 1.27 to 1.89, p<0.0001, 6 RCTs, n=3528, I^2=46%). The heterogeneity was moderate (I^2=46%) which was deemed acceptable given the variety in intervention components and populations recruited.

Bernstein 2023 [21] which could not be included in the meta-analysis due to lack of available data was a full-factorial trial of four smoking cessation interventions: a brief negotiation interview; 6 weeks of nicotine replacement therapy with the first dose delivered in the ED; active referral to a telephone quitline and enrolment in SmokefreeTXT, a free text message program compared with control (a brochure of the hazards of smoking and signposting to the state quitline). They found brief negotiation interview and nicotine replacement therapy were both significantly associated with a greater likelihood of biochemically verified abstinence at 3 months compared to control (brief negotiation interview OR= 1.8, 95% CI 1.1-2.8, nicotine replacement therapy OR= 2.1, 95% CI 1.3-3.2). Neither referral to a telephone quitline service nor enrolment in a text support program was significantly associated with increased abstinence (quitline OR= 1.4, 95% CI 0.9-2.2, text support OR= 1.1 95% CI 0.7-1.7).

Pope et al. 2024 [22] was the only identified study to examine an e-cigarette intervention. It was a multi-centre RCT which recruited from 6 emergency departments. The intervention incorporated brief advice (15 minutes), an e-cigarette and advice on how to use it to quit smoking (15 minutes) and referral to local stop smoking services. It demonstrated a 6-month biochemically-verified abstinence rate of 7.2% in the intervention group and 4.1% in the control group (relative risk 1.76; 95% CI 1.03 to 3.01; p=0.038).

Sensitivity analysis

Sensitivity analysis removing studies with less than six months follow up had minimal impact on the results for NRT (RR 1.61, 95% CI 1.29 to 2.01, p<0.0001, 4 RCTs, N=3130, I^2=59%, Bernstein 2011 and Bernstein 2016 removed) and behavioural interventions (RR 1.15, 95% CI 0.72 to 1.85, p=0.56, 5 RCTs, N=3463, I^2=57%, Anders 2011, Boudreaux 2008, Boudreaux 2015, Mahabee-Gittens 2008, Richman 2000 and Scheibel 2007 removed), suggesting that interventions remain effective beyond this time period (figure 1 in the supplementary material).

Sensitivity analysis removing studies where smoking cessation was not biochemically verified showed a continued effect in favour of the intervention for studies incorporating NRT (RR 1.75, 95% CI 1.35 to 2.27, N=2424, p<0.0001, I^2=52%, Bernstein 2016 and Neuner 2009 removed, figure 2 in supplementary material). Sensitivity analysis was not conducted for behavioural interventions as only two (Li 2020 and Mahabee-Gittens 2008) of the 11 studies used biochemical verification.

Quality evaluation

A summary of risk of bias assessment is shown in figure 4. One study was at low risk of bias (Bernstein 2011), two were at unclear risk of bias (Li 2020 and Bock 2008) with the remainder being

at high risk of bias. The most common sources of potential bias were those collecting outcome data not being blinded to study group and the outcome data being incompleted.

Funnel Plot
We constructed an exploratory funnel plot for the only meta-analysis including over 10 studies, with no clear evidence of publication bias (Figure 5).

Summary of findings
The summary of findings table is shown in Table 4 with low certainty evidence of the estimate of the effectiveness of behaviour interventions alone, and moderate certainty evidence for NRT.

Outcome	Intervention	Anticipated absolute effects (95% CI)		Relative effect (95% CI)	No of participants (studies)	Certainty
		Risk with control	Risk with intervention			
Smoking cessation at longest follow-up	Behavioural interventions only	70 per 1,000	83 per 1,000 (60 to 115)	RR 1.18 (0.85 to 1.64)	4711 (11 RCTs)	⊕⊕◯◯ Low[a,b]
Smoking cessation at longest follow-up	NRT	81 per 1,000	126 per 1,000 (103 to 154)	RR 1.55 (1.27 to 1.89)	3528 (6 RCTs)	⊕⊕⊕◯ Moderate[a]

[a] Majority of included studies were judged to be at high risk of bias.
[b] Large overall sample size (>4000) but confidence intervals include the potential for harm as well as benefit.

Table 4- summary of findings

Discussion

Our systematic review on the effectiveness of emergency department based smoking cessation interventions included 19 studies of which 17 were included in one of two meta-analyses. We found moderate-certainty evidence that interventions incorporating nicotine replacement therapy were more likely to result in smoking cessation compared to control. There was some evidence of effect, but with low certainty evidence and confidence intervals incorporating the potential for harm as well as benefit, for the effectiveness of behavioural interventions alone for smoking cessation in ED. This adds to the existing evidence about the effectiveness of smoking cessation interventions delivered in primary care[23,24], in-patient settings [25,26] and peri-operatively.[27,28] This body of evidence as a whole provides a strong argument for opportunistic behaviour change interventions in health care settings.

A potential barrier to implementation is the willingness of staff to deliver smoking cessation interventions in the ED given the high clinical burden and the frenetic nature of the setting. Surveys of ED staff in Australasia, Canada, Tanzania and South Africa indicates that ED staff are broadly supportive of public health interventions being delivered in the ED. [29–34] A systematic review has investigated the barriers to alcohol interventions in the ED and found lack of knowledge, lack of time and resources and for some lack of motivation are all barriers to staff. [35] All of the studies included in this review used input from dedicated staff to deliver some element of the interventions reflecting the challenge of asking clinical staff to deliver these sort of interventions alongside their clinical

work. Therefore for these interventions to be successful it is likely their will need to be some dedicated staff in order to not add to the burden on already busy ED staff.

A further potential barrier is whether patients are willing to participate in such interventions whilst in the ED given their focus will likely be on their presenting problem. However multiple qualitative and quantitative studies have demonstrated that patients felt the ED was an acceptable place to receive a smoking cessation intervention and in fact welcomed the distraction during what can be long waits to be seen and treated.[36–40]

Strengths

To our knowledge this is the largest systematic review of emergency department based smoking cessation interventions. The methods used are robust with blinded double data extraction and risk of bias assessment.

Limitations

There are several limitations of the systematic review. One study could not be included in the meta-analysis due to data not being available. Disagreements regarding extracted data was agreed between the two reviewers rather than an independent reviewer. There was notable heterogeneity in the components included in both the intervention and control arms (both in terms of pharmacotherapy and behavioural interventions) this may have diluted the effect of any single specific type of intervention. The duration of NRT provided varied between 4, 6 and 8 weeks this has the potential to introduce heterogeneity. Only one study included e-cigarettes. There is the risk of contamination between the intervention and control group which may have reduced the magnitude of the effect size. Varying definitions of abstinence were used and not all studies included biochemical verification of abstinence. We could not carry out many of the pre-planned subgroup analyses due to insufficient data.

Future research

Future trials should ensure the risk of biases are minimised, and have a clear difference in the interventions delivered to the intervention and control groups. Trials comparing e-cigarettes and NRT in the ED setting would be particularly helpful to guide policy makers. No trials incorporated smoking cessation medication (cytisinicline, bupropion or varenicline) so these are needed. The ED could also be considered as a setting for other behaviour change interventions such as diet, exercise, weight management and alcohol reduction.

Conclusion

This is moderate certainty evidence that smoking cessation interventions incorporating NRT delivered in the emergency department results in smoking cessation. For behavioural interventions alone there is low certainty evidence that they may be of benefit. Future policy should support the use of nicotine containing interventions, in supporting people accessing Emergency Departments to quit smoking

Competing interests: IP, CN, JLB and SG were involved in one of the included studies (Pope 2024) therefore were not involved in data extraction or risk of bias assessment. No other competing interests to declare.

Contributors: IP, CN and JLB conceived the study. JLB designed the search strategy and undertook the searches. IP, HI, SR and CC undertook data extraction. SG and IP undertook the analysis. IP wrote a first draft of the manuscript. All authors were involved in drafting the manuscript. IP is the guarantor.

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Data availability statement: All data relevant to the study are included in this article or uploaded as supplementary material.

Patient and public involvement: None

Table 2: Summary of studies included in the meta-analysis

Author & year	Country	Number of EDs	Population	Number randomized and number followed-up	Outcome
Li 2020[41]	Hong Kong	4	Adults triaged as semiurgent or urgent who were occasional or daily smokers.	N= 1571 f/u= 1101	-1, 3, 6 and 12 months -7 day abstinence -Biochemically validated at 12 months by carbon monoxide level in expired air of less than 4 ppm and by a saliva cotinine level of less than 115 ng/mL
Antonacci 2000[42]	United States	1	Medically stable adult smokers who reported being interested in quitting	n= 42 f/u- unknown	-6 month -self reported abstinence
Castello 2022[43]	Italy	1	Adults smokers	N= 480 f/u= 240	-6 and 12 months self reported smoking status -hair analysis and expiratory Carbon moxodine tests only in the intervention group
Mahabee-Gittens 2020[44]	United States	2	Adults who smoked daily and were the parent/legal guardian of a ≤17 year old patient who presented to the paediatric emergency department with a tobacco smoke exposure related complaint (e.g., wheezing)	N= 765 f/u= 393	-6 weeks and 6 months -Biochemically verified abstinence at 6 weeks and 6 months- CO less than 8ppm or salivary cotinine <10 ng/mL
Cheung 2018[45]	Canada	1	Medically stable adults who had smoked in the last 30 days	N= 1295 f/u= 905	-1, 3, 6, 12 months - self reported 30 day abstinence
Bernstein 2016[46]	United States	1	Adults with access to a cell phone who self-reported daily- or some-day tobacco use and had life-time use of at least 100 cigarettes	N= 60 f/u= 51	-1 and 3 months -Self-reported 7-day abstinence
Boudreaux 2015[47]	United States	4	Tobacco dependence- not further defined	N= 427 f/u= 295	-4 and 12 weeks -Self-reported abstinence
Bernstein 2015[48]	United States	1	Adults who spoke English, had Medicaid or no insurance, had smoked at least 100 cigarettes in their lifetime, and were currently daily or sometime smokers, averaging at least 5 cigarettes per day.	N= 778 f/u= 629	-1, 3 and 12 months -7 day abstinence -biochemically verified at 3 months with CO <7ppm
Anders 2011[49]	United States	1	Adults who smoked at least one cigarette per day for non-urgent care	N= 221 f/u= 87	-3 months -7-day abstinence
Bernstein 2011[50]	United States	1	Adults who spoke English or Spanish who had smoked at least 100 cigarettes lifetime, were currently every- or some-day smokers, smoke at least 10 cigarettes daily on the days they smoke, did not require admission to the hospital, and were in the contemplation or preparation stage of change	N= 338 f/u= 280	-3 months -7 day abstinence -Biochemically verified at 3 months by CO or salivary cotinine
Boudreaux 2008[51]	United States	1	Adult daily smokers	N= 53 f/u= 33	-1 and 3 months -Prolonged abstinence was defined as continuous abstinence, without even a puff
Neuner 2009[52]	Germany	1	Adults who had smoked at least one cigarette per day during the last 7 days	N= 1044 f/u= 685	-1, 3, 6 and 12 months -7 day abstinence

					-Biochemical validation in sub-sample of 100 participants reporting abstinence using CO <6.5ppm
Mahabee-Gittens 2008[53]	United States	1	All parents/legal guardians of children 18 years of age and younger triaged to the non-urgent category who reported current tobacco use	N= 356 f/u= 185	-6 weeks and 3 months -Self- reported abstinence
Bock 2008[54]	United States	1	Adults who spoke English or Spanish who were admitted to an observation unit with chest pain who smoked >5 cigarettes/day for the past 3 months)	N= 543 f/u= 292	-1, 3, and 6 months - 7 day point prevalence -Biochemical verification for those not using NRT by Salivary cotinine <15ng/ml
Schiebel 2007[55]	United States	1	Adults who spoke English and were current daily cigarette smoking for at least one year and who indicated an interest in attempting to quit smoking.	N= 39 f/u= 18	-3 and 6 months -7 day smoking abstinence
Horn 2007[56]	United States	1	14–19 year olds reported smoking on 1 or more days in the past 30 days accompanied by a parent or guardian	N= 75 f/u= 28	-6 months -Self reported quitting
Richman 2000[57]	United States	1	Adults who were medically stable	N= 152 f/u= 103	-3 months -Self reported smoking status
Pope 2024[22]	United Kingdom	6	adults who reported smoking tobacco daily, attending the ED for medical treatment or accompanying someone attending for medical treatment	N= 972 f/u= 668	-1, 3 and 6 months -Self reported 7 day abstinence -6 months biochemically validated continuous abstinence CO <8ppm
Bernstein 2023[21]	United States	1	Adults who had smoked at least 100 cigarettes and currently smoked 5 cigarettes a day and owned a cell phone.	N= 1056 f/u= 966	-1 and 3 months -Biochemically verified 7-day abstinence at 3 months with exhaled CO <10ppm

Table 3: Summary of intervention and control conditions of included studies

Author & year	Intervention	Control
Li 2020[41]	-Brief advice -Referral to a smoking cessation hotline services -Four booster calls.	-Smoking cessation leaflet -Advice around physical activity and fruit and vegetable intake.
Antonacci 2000[42]	-Brief counselling from the ED physician	-Referral to smoking cessation program
Castello 2022[43]	-Brief counselling based on a 5As model. -Those who were motivated were referred to the local smoking cessation centre.	-Advice to quit smoking
Mahabee-Gittens 2020[44]	-Brief advise bases on SBIRT including information about how quitting could help their child's health. -Demonstration of the smokefree.gov website -Offer to sign-up for smokefreeTXT on their phone. - 6 weeks of NRT (patch or lozenge)	-Obesity prevention advice and written materials.
Cheung 2018[45]	-30 seconds of brief advice -Offer of referral to community smoking cessation services.	-No specific smoking cessation advice
Bernstein 2016[46]	-Brochure describing the health benefits of quitting -Referral to a quitline -Enrolment in a text support service. -4 weeks of NRT (patch and gum).	-Brochure describing the health benefits of quitting -Information about stop smoking services
Boudreaux 2015[47]	-Treating clinician informed of smoking status -Patient feedback report including tailored feedback regarding smoking and worksheets based on motivational interviewing -Offer of a referral to stop smoking services.	-No specific smoking cessation advice
Bernstein 2015[48]	-10 to 15-minute motivational interview -Written material -Information about stop smoking services -6 weeks of NRT (patches and gum)	-Written material -Information about stop smoking services
Anders 2011[49]	-Advice to quit smoking -written materials -referral to stop smoking services.	-Advice to quit smoking -Written materials -Contact information for the smoking cessation service.
Bernstein 2011[50]	-10-15 minute motivational interview -written materials. -6 weeks of NRT patches	-Written material
Boudreaux 2008[51]	Bedside + booster group: -Up to 60 minutes motivational interview delivered in the ED -Written materials -Referral to stop smoking services -3 follow-up telephone support sessions Faxed referral group: -Written material -Referral to stop smoking services	-Written material -Referral to the smoking cessation service

	-3 follow-up telephone support sessions	
Neuner 2009[52]	-1-3 minutes of motivational interviewing -4 telephone booster sessions. -NRT (gum, patch, sublingual tablets)- amount not specified.	-Usual care
Mahabee-Gittens 2008[53]	-10-15 minutes of counselling -Offer of referral to smoking cessation services -Written materials.	Usual care
Bock 2008[54]	-30 minutes motivational interview and written material. -2 follow-up phone calls -8 weeks of NRT patches	Information about stop smoking services
Schiebel 2007[55]	-Advice to quit smoking -Referral to a smoking cessation service	-Advice to quit smoking -Written material
Horn 2007[56]	-15- to 30-minute motivational interview -written materials.	-2 minutes smoking cessation advice -Information about stop smoking services
Richman 2000[57]	-Scripted counselling -written material	-Written material
Pope 2024[22]	-15 minutes brief advice on smoking cessation -15 minutes on the use of e-cigarettes to quit -referral to the smoking cessation service. -Nicotine e-cigarette plus 2 weeks supplies.	-Information about stop smoking services
Bernstein 2023[21]	-Brief negotiated interview -6 weeks of NRT patches and gum -Text messaging- 2-4 texts per day - Referral to state quitline	-Written materials

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