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# **BMJ Open**

## Interactive Voice Response (IVR) for Tobacco Cessation: A Systematic Review

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Abstract
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**Objective:** To summarize the uses, outcomes, and implementation of interactive voice response (IVR) as a tobacco cessation intervention.

**Data sources:** A systematic review was conducted. Searches were performed on May 3, 2023. The strategies used key words such as "tobacco cessation", "smoking reduction" and "interactive voice recording". Ovid MEDLINE®ALL, Embase, APA PsycInfo, CINAHL, Cochrane Library, and Web of Science were searched. Grey literature searches were also conducted.

**Study selection:** Titles and abstracts were assessed by two independent reviewers. Studies were included if: IVR was an intervention for tobacco cessation for adults; any outcomes were reported; and study design was comparative. Any abstract included by either reviewer proceeded to full text review. Full texts were reviewed by two independent reviewers.

**Data extraction:** Data was independently extracted by two reviewers using a standardized form. The ROB-2 and the ROBINS-I tools were used to assess study quality.

**Data synthesis:** Of 308 identified abstracts, 20 moderate- to low-quality studies were included. IVR was used standalone or adjunctly as a treatment, follow-up or risk-assessment tool across populations including general smokers, hospitalized patients, quitline users, perinatal women, cancer patients and veteran smokers. Effective studies found that IVR was delivered more frequently with shorter follow-up times. Significant gaps in the literature include a lack of population diversity, limited implementation settings and delivery schedules, and limited patient and provider perspectives.

**Conclusions:** While the evidence is weak, IVR appears to be a promising intervention for tobacco cessation. However, pilot programs and research addressing literature gaps are necessary.

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data mining, Al training, and similar technologies

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• This systematic review followed a prior written protocol and searched multiple databases and grey literature sources to identify relevant studies.

- Details on study selection and data extraction were explicitly reported and conducted by at least two independent reviewers.
- Study quality was assessed using the Cochrane risk of bias tools for controlled and observational studies.
- Due to limited time and resources, only relevant studies published in English or French language were included.
- Where possible, outcomes were stratified by population, sex and/or gender, however significant heterogeneity across studies precluded a meta-analysis.

Introduction

As of 2020, 22.3% of the global population reported using tobacco products - around 1.3 billion individuals (1). The annual economic costs of tobacco use are significant, equaling an estimated US\$ 1.4 trillion and 1.8% of the world's annual gross domestic product (1). Over eight million deaths per year are attributed to direct and indirect tobacco use (1). While current global tobacco control efforts contribute to decreasing the prevalence of tobacco use and associated morbidity and mortality rates, it is crucial to continue finding ways to support patients who want to make a quit attempt or change their smoking behaviour.

Interactive voice response (IVR) is a phone-based platform that can be used to deliver health behaviour interventions (2). IVR can be used to deliver educational messages, reinforce behaviours, motivate and guide patients, record patient symptoms or outcomes, encourage medication adherence, and connect patients with further resources or professionals (3). With IVR, a human speaker is replaced with a high-quality, pre-recorded interactive script and responds to patients based on answers provided (2). Patients can either call the IVR or receive calls. The possible advantages of IVR include its ability to make multiple

calls during and outside regular business hours, it can connect with patients quickly, and it can identify those who are at higher risk and more likely to benefit from continued support (3, 4).

IVR has been used in interventions for alcohol consumption, asthma, heart failure, obesity, sleep apnea, hypertension, high cholesterol, dietary behaviour, to increase physical activity and to improve medication adherence (2). IVR has also been used as a tool to support tobacco cessation in patients, particularly post-hospital discharge (5). Post-discharge, patients receive tailored automated IVR calls at different time points (5). The calls typically assess patients' current smoking status, intention to quit or confidence in staying quit, current cessation medication use, and desire for additional support, and provides motivational messages, encourages patients to stay quit or continue attempting, promote the use of cessation medication, and offer to transfer patients to a counselor (5). IVR is also frequently used in conjunction with other interventions, such as nicotine replacement therapy (NRT), or after counselling with a physician in-hospital or in a primary care setting (5). However, the effectiveness of IVR as a tobacco cessation intervention for specific population groups, and the best uses and optimal delivery schedule of IVR interventions, are unknown.

This systematic review aims to synthesize and understand the current knowledge regarding IVR for tobacco cessation and to identify any gaps in the literature. Questions that guided this review included the ideal IVR delivery schedule, components of IVR, utilization of the intervention, outcomes reported in the literature, patient and provider perspectives, and costs of using IVR for tobacco cessation.

#### Methods

Search strategy

This systematic review followed a written, unregistered protocol and was conducted by following the Cochrane best practice guidelines and the PRISMA reporting standards (6, 7). An experienced medical information specialist developed and tested the search strategies through an iterative process in consultation with the review team. The MEDLINE strategy was peer reviewed by another senior information specialist using the PRESS Checklist (8). The strategies utilized a combination of controlled vocabulary (e.g., "Smoking Reduction", "Tobacco Use Cessation", "Reminder Systems") and keywords (e.g., "quit smoking", "interactive voice response"). Vocabulary and syntax were adjusted across

databases. Using the multifile option and deduplication tool available on the Ovid platform, we searched Ovid MEDLINE®ALL, Embase, APA PsycInfo, CINAHL (Ebsco), the Cochrane Library (Wiley), and Web of Science (Core Databases). Records were downloaded and deduplicated using EndNote version 9.3.3 (Clarivate Analytics). All searches were performed on May 3, 2023. Grey literature searches were conducted through the Canadian Agency for Drug and Technologies in Health Grey Matters database, targeted Google searches, and preprint databases including medRixV and Research Square.

122 Study selection

A calibration exercise was conducted by four reviewers on a sample of the retrieved abstracts. After 100% agreement was reached among reviewers, the remaining abstracts were screened in duplicate by two independent reviewers. Abstracts selected for inclusion by either reviewer proceeded to full-text review. This initial screen was intentionally broad to ensure that all relevant literature was captured. Abstracts proceeded to full-text review if: IVR was used as an intervention tool for tobacco cessation; IVR targeted adults; any outcomes were reported, including treatment completion, quit rates, smoking abstinence, and patient perspectives; and was a comparative study, comparing IVR to any comparator. Studies that reported other kinds of interventions but used IVR for data collection purposes were excluded.

Full texts were included if they met the above inclusion criteria. Conference abstracts, case series, reviews, letters, and editorials were excluded. Along with grey literature databases, the reference lists of relevant systematic reviews were also searched. Full-text review was conducted in duplicate by two independent reviewers. Discrepancies between reviewers were resolved through discussion and consensus.

Data extraction

Publication year, country, study design, target population, participant characteristics, intervention setting, purpose or use of IVR, IVR schedule and follow-up, and outcomes were extracted by a single reviewer using standardized data extraction forms. A second reviewer verified the extracted data. Discrepancies between reviewers during data extraction were resolved through consensus.

Quality assessment

The quality of controlled trials was assessed using the revised Cochrane Risk-Of-Bias Tool for Randomized Trials (ROB-2) (9), while the observational studies were assessed with the Risk of Bias in Non-Randomized Studies of Interventions (ROBINS-I) tool (10). Controlled trials were assessed using five criteria broadly covering the areas of randomization, deviation from intended intervention, missing outcome data, measurement of outcome, and selection of reported results (9). Observational studies were assessed based on the following parameters: bias due to confounding, selection bias, bias in classification, bias due to deviations from intended interventions, bias due to missing data, bias in measurement, and reporting bias (10). Quality assessment was completed by one reviewer and verified by a second reviewer.

Data analysis and synthesis

Significant heterogeneity of studies was expected. Therefore, a narrative approach to synthesis was adopted a-priori. A stratified analytic approach by population was adopted. Interventions used, outcomes, effectiveness, trends, and any gaps in the literature were assessed by population.

Patient and public involvement

Patients and the public were not involved this review. Stakeholders (and co-authors) from Alberta Health Services were involved in the conceptualization of this review and provided feedback on the final manuscript draft.

#### **Results**

Overall results

The search strategy yielded 308 unique citations, 271 of which were excluded after abstract review, Figure 1. Six studies were identified through hand and grey literature searches. Following abstract review, 43 studies proceeded to full-text review. At the full text-review phase, 23 studies were excluded for the following reasons: not IVR (n=4), IVR used as a data collection method (n=6), commentary or abstract (n=9), no outcomes (n=2), or duplicates (n=2), Figure 1.

The final dataset included 20 studies; 13 controlled trials and seven observational studies, Figure 2, panel A. Sixteen studies were conducted in the US (11-26), two were conducted in Canada (27, 28), and the remaining two were conducted in Norway (29, 30), Figure 2, panel B. Studies were published between 1995 – 2022, Figure 2, panel C. In eight studies, study sample sizes ranged between 100 to 500 participants while five studies each included between 500-1,000 participants, and >1,000 participants respectively. Only two studies included less than 100 participants, Figure 2, panel D. Appendix A includes additional details on the characteristics and outcomes of the 20 studies.

Quality of included studies

The risk of bias assessment of the 13 controlled trials ranged from some concerns (n=7) to high risk of bias (n=6), Figure 3, panel A. The most common critical weakness across the controlled trials was the deviation from intended intervention and the selection of reported results. However, most studies were assessed at a low risk of bias in the measurement of outcomes and the randomization process.

Overall, one observational study was assessed at a moderate risk of bias, two studies were at a high risk of bias, and the remaining four studies were assessed at critical risk of bias. The most common critical weakness across studies were confounding, deviation from interventions, measurement of outcomes, and the selection of reported results. Most of the observational studies were assessed at a low risk of bias in the classification of interventions and selection of participants to the study, Figure 3, panel B.

How was IVR used as an intervention?

Two uses of IVR were identified. Across the 20 studies, IVR was used as either a standalone (n=6) or an adjunct intervention (n=13) for tobacco cessation. The use of IVR was unclear in one study (17). When used as a standalone intervention, IVR was the primary intervention reported in the study (13, 14, 18, 20, 25, 31). When used as an adjunct intervention, IVR was used in combination with other interventions including counselling, referrals, quitlines, and web- or SMS-based cessation activities (11, 12, 15, 16, 19, 21-24, 26, 27, 29, 30).

- When in the care trajectory was IVR used?
- Studies examined IVR use along different points in the care treatment trajectory. Included studies used IVR as a treatment tool, a follow-up tool and a risk-assessment tool, Figure 4.

As a treatment tool, IVR asked questions regarding smoking habits, overall goals, and fears surrounding tobacco cessation. IVR provided tailored behaviour change therapeutic responses based on answers given by the patients, through personalized motivational messages and advice, coping mechanisms, and interactive activities. When IVR was used as a treatment tool, IVR delivery schedule varied widely for interventions with call schedules ranging from calls every day (20) to every 2-, 12-, 28-, 68-, and 88-days post-discharge (24) to every two weeks for 39 weeks (27). In two studies, IVR was available on an asneeded basis where patients were called regularly in response to their unique requirements (29, 30) and in two studies IVR was available 24/7 for participants to utilize when they wanted (18, 25).

As a follow-up tool, IVR was used post-discharge to monitor patients' progress, provided personalized motivational messages, provided access to requests for NRTs/pharmacotherapy, and directed calls to a quitline or counsellor. Five studies delivered IVR at 3-,14-, and 30-days post-discharge (12, 15, 16, 22, 28) and one delivered IVR at eight predetermined unspecified time periods over 12 weeks post-discharge (11). In all the studies that used IVR as a follow-up tool, IVR was also used as a risk-assessment tool (11, 28).

As a risk assessment tool, IVR assessed the risk of relapse based on responses to curated questions, flagging at-risk patients and connecting them to a counsellor, quitlines or nurse specialists to mitigate relapse and provide immediate support. Risk assessment was conducted differently across the different studies. In one study, specific questions were asked to assess risk of relapse and "at risk" patients were transferred to a quit coach for brief intervention (21). Frequency of IVR calls and follow-up times ranged widely.

For whom was IVR more likely to be effective?

IVR was used as a tobacco cessation intervention across multiple specific populations. Six studies targeted general adult smokers (20, 24, 25, 27, 29, 30), seven studies targeted hospitalized patients (11, 15, 16, 19, 22, 23, 28), three studies targeted quitline users (13, 14, 21), two studies targeted adult perinatal or pregnant women (12, 18), one study targeted cancer patients (17), and one study targeted veteran smokers (26), Figure 5.

General adult smokers

Four studies were controlled trials and the remaining two were observational studies (20, 24, 25, 27, 29, 30). Four controlled trials used IVR as an adjunct treatment tool. One reported biochemically confirmed abstinence rates and three reported self-reported point abstinence rates (24, 27, 29, 30). No statistically significant difference in past-7-days biochemically confirmed abstinence was found at 6-month follow-up (24). However, three controlled trials reported significantly higher self-reported point abstinence rates at 1-, 3-, 6, and 12-month follow-ups (24, 29, 30).

One observational study used IVR as a standalone treatment tool and reported abstinence rates. Of participants that reported abstinence at the 1-month follow-up, 47.1% were still abstinent at the 3-month follow-up and 37.3% were still abstinent at the 6-month follow-up (25). One observational study examined IVR as a treatment and risk assessment tool and focused on quit rates (20). Overall, 30% of individuals that opted into the IVR program were smoke-free at the last contact.

#### Hospitalized patients

Seven studies included patients admitted to hospital; four controlled trials and three observational studies (11, 15, 16, 19, 22, 23, 28). In the two controlled trials that used IVR as an adjunct treatment tool, one study found that 25.8% of intervention patients were biochemically confirmed abstinent in the past 7 days (p=0.009) and self-reported abstinence rates in the past-7-days at the 1-month and 6-month follow-ups were significantly higher in intervention patients (23). However, the other study found no statistically significant difference in self-reported abstinence rates between intervention and usual care participants (19). One controlled trial found that intervention patients were significantly more likely to be abstinent at 6-month follow-up (8.9%) compared to usual care control patients (3.5%, p=0.01) (11). Finally, one controlled trial that examined IVR as a standalone follow-up and risk assessment tool reported abstinence rates and found no difference in abstinence rates between intervention and control groups (28).

Two observational studies examined different outcomes of the same IVR follow-up program. One study reported that IVR was associated with significantly lower total healthcare costs at one-year post-discharge, with mean charges for the IVR group being over \$8,000 less than the usual care control group (15). The other study found no statistically significant reduction in odds of readmission between the IVR 9

group and the usual care control group and no significant difference in readmission rates at 30-, 90-, or 180-days post-discharge (16). IVR reach was also reported to be low as IVR only reached about 43% of eligible participants, and 36.4% of those reached reported abstinence since their last IVR call. The remaining observational study examined the reach of a hospital-based counselling and IVR tobacco cessation program (22). IVR reach was low as only 43% of eligible participants were reached. While no difference was found between IVR alone and bedside counselling with IVR, counselling with IVR was associated with an increase in response to IVR utilization (22).

277 Quitline users

Three controlled trials targeted tobacco cessation quitline users (13, 14, 21). Two controlled trials used IVR as a standalone treatment tool. IVR intervention participants were significantly more likely to reenroll into the quitline (28.2% intervention vs. 3.3% usual care; p<0.001), though the proportion of those that re-enrolled was small (14). Of those followed-up, 79.9% of those followed-up reported making a quit attempt lasting 24 hours or more in the last 90 days, with 24.0% reporting abstaining from tobacco in the last 7 days (13). One controlled trial used IVR as an adjunct risk assessment tool reported quit rates in quitline users at two different IVR delivery schedules: twice weekly for 2 weeks then weekly for 6 weeks (10 calls total) or daily for 2 weeks and weekly for 6 weeks (20 calls total) (21). The intervention found no difference in abstinence rates between the two IVR delivery schedules and the frequency of IVR calls did not impact tobacco cessation. Those that did not screen as at-risk for relapse during the scheduled IVR relapse risk assessments were 77% more likely to be abstinent at the 6-month follow-up (21).

Adult perinatal women

Two studies targeted adult perinatal women (12, 18). In the controlled trial, IVR was used as a standalone treatment tool and while 16.7% of IVR intervention participants were biochemically confirmed end-of-pregnancy quitters, there was no significant difference compared to usual care patients (18). The observational study used IVR as an adjunct follow-up and risk-assessment tool. There was no difference in reported abstinence between participants that only received IVR and those that received bedside counselling with IVR (12).

Cancer patients

One observational study examined IVR as a treatment tool at cancer centers (17). This study compared the effectiveness of multiple different tobacco cessation interventions, including IVR, implemented across 38 participating cancer centers. IVR was implemented at 4 out of the 38 cancer centers. Of all the cessation interventions, IVR had the greatest mean, median, minimum, and maximum ranges for reach, with responses from an average of 56% of those reached by IVR. No IVR-specific or patient-specific abstinence rates were reported; however, 22% of patients reported not smoking in the past 7 days and 19% not smoking in the past 30 days across all cancer centers and implemented interventions (17).

308 Veteran smokers

One controlled trial examined IVR as an adjunct treatment tool targeting veteran smokers (26). IVR was implemented in conjunction with a tobacco cessation manual, an expert system feedback report, and NRT use. At follow-up, 6-month prolonged abstinence rates at month 10 (6.6%), month 20 (9.3%) and month 30 (15%) showed a steady increase in abstinence, however, this increase was not statistically significant (26).

What were the patient-reported experiences with IVR?

Three controlled trials included elements of patient-reported experience with IVR for tobacco cessation (21, 29, 30). Most participants (96%) reported satisfaction with the overall quitline program and 98% stated that they would likely recommend the program to others (21). Furthermore, most participants reported that it was easy to answer questions using the IVR system (95%) regardless of IVR delivery schedule (21). Satisfaction with the IVR intervention was also highly positive, regardless of whether participants were given the option to utilize NRTs (29, 30).

What was the reach of IVR?

Eight studies reported reach of the IVR intervention (12, 14, 17, 18, 20, 22, 25, 26). The rate of participants interacting with IVR ranged from 20.8% to 42.8% (12, 14, 17, 18, 20, 22, 25, 26). In one study, IVR did have the highest average reach, compared to other smoking cessation interventions, with responses from 55.8% of those called by IVR; however, these results were at the institution-level, not the individual-level (17).

Sex and gender in this literature

Only one study stratified outcomes by sex or gender; it is unclear which (20). This observational study, of low quality, assessed IVR used as a standalone treatment and risk assessment tool for general adult smokers. It was found that females were significantly more likely to opt-in to the IVR intervention compared to males (OR = 0.78; 95% CI = 0.65-0.95). Of those that opted-in and received IVR calls, females were more likely to report being smoke free at last contact compared to males (OR = 0.87; 95% CI = 0.66-1.15), though this difference was not significant (20).

#### Discussion

Overall, this review included 20 heterogenous studies. While the evidence base is weak, results indicate that IVR is a promising intervention that can be implemented in multiple healthcare settings, across distinct populations. IVR was implemented as either a standalone or adjunct technology. When implemented as an adjunct technology, IVR was often paired with in- and out-patient counselling, nicotine replacement therapy, or self-help materials, though the type of adjunct intervention did not impact effectiveness of IVR. IVR was also implemented at several points along the patient trajectory and was effective at increasing self-reported abstinence and increasing the use of other tobacco cessation interventions across diverse populations, including general smokers, hospitalized patients, quitline users, adult perinatal or pregnant women, cancer patients, and veteran smokers. The frequency of IVR calls and follow-up times varied widely and studies comparing different IVR delivery schedules reported no differences between brief/short-term and sustained IVR delivery. However, increased IVR frequency and shorter time between follow-ups were generally associated with increased effectiveness of IVR. IVR also reduced healthcare costs. However, IVR did not significantly affect other outcomes, including hospitalization and biochemically confirmed abstinence. Additionally, the reach of IVR was consistently low. Despite variability of findings, no application or use of IVR was shown to be harmful to participants and studies that reported patient perspectives were positive.

Our investigation of the applications, uses and outcomes associated with IVR as a tobacco cessation intervention highlights considerable implications of this health technology on patients, providers, and the healthcare system. For patients, IVR can be an accessible tobacco cessation tool, whether delivered independently or as a supplementary treatment. It can provide a private, judgement-free environment for patients to speak freely about their smoking habits, tobacco use, goals, fears, and motivations, and 12

can offer an opportunity for patients to engage in self-monitoring of their own care and progress as they persist towards becoming smoke-free. However, due to the automated nature of IVR, there is a loss of the emotional support patients may receive with in-person counselling and the risk of response bias. For providers, IVR can reduce workloads and may be valuable tool to provide optimal care for many patients. IVR can help providers gain regular insight on the progress of their patients, can help guide or revise treatment plans and provide additional support. IVR implementation considerations for providers may include technical training, privacy concerns, and costs. IVR may provide considerable benefits for healthcare systems by helping to address smoking and tobacco use which continues to pose a high public health burden through smoking-related diseases. IVR can also assist with data collection, appropriate resource allocation and may serve as a cost-saving healthcare tool.

To our knowledge, this review is the first to compile available evidence on the utilization, application, and effectiveness of IVR technology for tobacco cessation, limiting the possibility for comparison with previous reviews. A previous review by Shoesmith et al. examining different tobacco cessation interventions, including IVR, found that while both longer (> 6 months) and shorter (<6 months) follow-up durations produced an effect in favour of the smoking cessation interventions, abstinence rates showed a decreasing trend once follow-up length exceeded 6 months, supporting our findings that tobacco cessation intervention effectiveness may be associated with shorter follow-up times (32). However, Shoesmith et al. did not provide IVR-specific findings, opting to examine different behaviour change techniques for smoking cessation and relapse prevention (32). Conclusions made in this study may not appropriately correlate with the findings of this review due to the variability in purpose, mode of delivery, frequency and quality of behaviour change smoking cessation interventions and the impact of these factors have on intervention outcomes.

While this study provides a broad overview of the current literature surrounding IVR for tobacco cessation, several limitations exist. The majority of included studies were of low to moderate quality. Though most studies were controlled trials, variability in interventions, methods and outcome measures precluded a meta-analysis. This limited the extent to which the comparative effectiveness of IVR applications and uses across the different populations could be inferred. Further, due to the low number and quality of studies available for multiple populations, generalizations cannot be made, and results should be interpreted cautiously.

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There are significant gaps in the literature that should be noted. First, while this review identified some studies targeted at several populations, no studies were found for some populations that may benefit from IVR including racialized groups and Indigenous Peoples. Furthermore, only one study stratified outcomes by sex or gender. Second, no studies compared IVR initiated in different contexts or settings, such as inpatient versus outpatient settings. Third, only two studies compared different IVR delivery schedules and found no difference (21, 27). Different schedules and times to follow-ups may have different effectiveness. Finally, no qualitative studies examining patient or provider perspectives on IVR were identified.

#### Conclusion

Tobacco cessation interventions should be approached with effective mitigating and preventative strategies. Overall, IVR was effective at increasing abstinence rates and encouraging positive health outcomes for tobacco cessation. While this review summarized the current knowledge base of IVR for tobacco cessation, several significant gaps in the literature still exist. Organizations can pilot tobacco cessation intervention programs using IVR and contribute, using real-life contexts, to the growing knowledge base of this technology.

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- **Contributors:** MK: Analysis and interpretation of data, data quality assessment, draft of manuscript,
- review and editing of report. AM: Analysis and interpretation of data, data quality assessment, draft of
- manuscript, review and editing of report. NE: Conceptualization and design of work, analysis and
- interpretation of data, draft of manuscript, review and editing of report. BA: Analysis and interpretation
- of data, data quality assessment, draft of manuscript, review and editing of report. RD: Review and
- 507 editing of report. KA: Reviewing and editing. FC: Conceptualization and design of work, study
- registration, review and editing of report, guarantor.

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519	
520	Ethics approval
521	All data were from published studies so ethics approval was not required.
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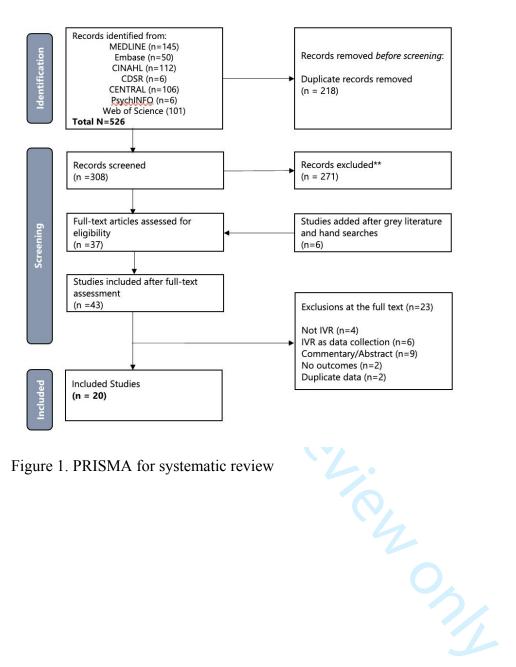
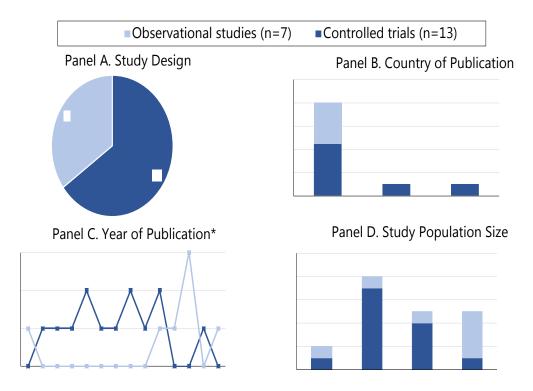
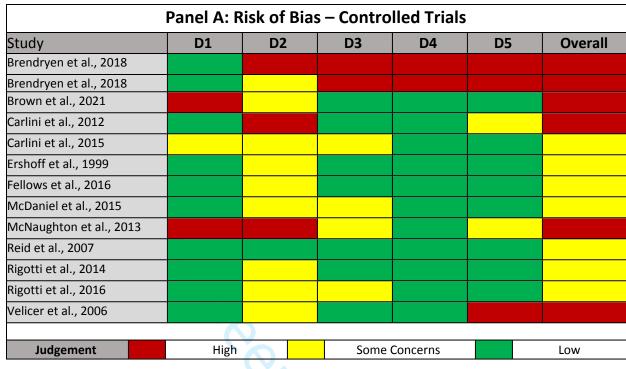


Figure 1. PRISMA for systematic review



\*Only the 14 years with at least one publication are shown

Figure 2. Summary characteristics of included studies



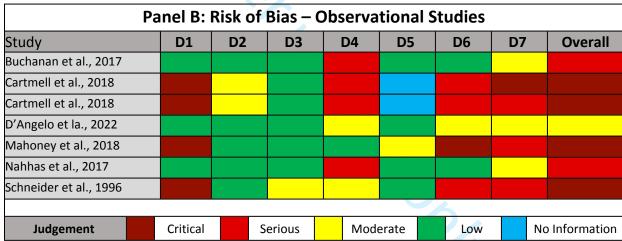


Figure 3. Quality assessment for included studies

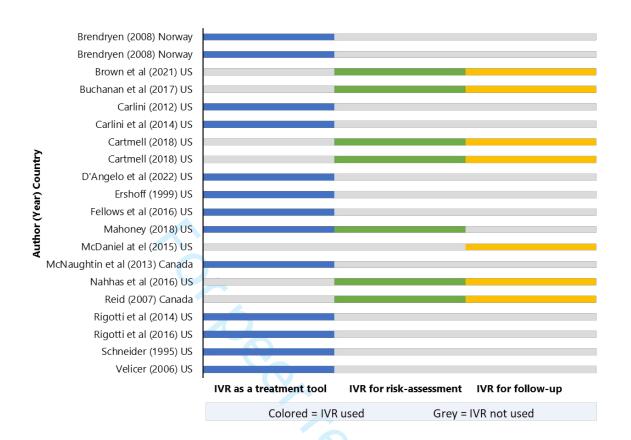


Figure 4. Timing of IVR use in the care trajectory

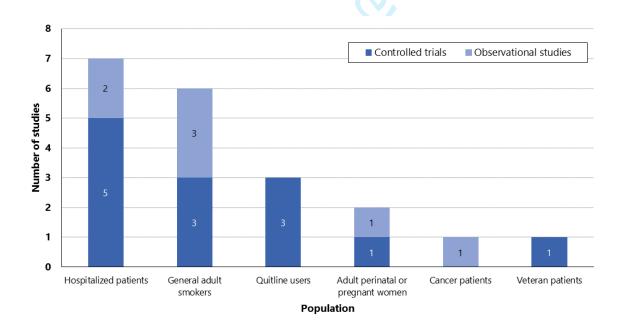


Figure 5. Populations assessed in systematic review

### Appendix A: Table of Study Characteristics

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	Study information	Intervention	Patient	Primary Outcomes	Other outcomes
Describer of all	CL d deste s	D ( IV/D	characteristics	u u u u	A. 4
Brendryen et al.	Study design:	Purpose of IVR:	Population:	Reach: 62% of 8 ns eight	At 1 month, 51% of
(2008) Norway	Controlled	Intervention	Adult Smokers	participants participants participants participants participants	participants found HE to be "helpful,"
Trial #: Not	Study setting:	Description of	Comparator:	calls. 87	and 32% reported
reported	Digital/Quitline	intervention: Happy	Usual care	calls. 87 ownloaded for intervention participants completed	HE to be "very
		Ending program is an		participants nc	helpful".
Funder:	Inclusion criteria:	internet-based	N: 144	completed a fro	ne.prai i
Norwegian	Wanting to attempt	multimedia	Control: 146	Trace   22 ≥ 3	
Research Council	quitting, 18 or older,	intervention that used		ES)	
	smoking 5+	CBT techniques to help	Age: 39.5	Abstinence at 🥳 · 💆	
Industry	cigarettes a day,	people quit smoking	0/ 5 1 500/	follow-up:	
sponsored: No	attempt quit without	without the use of	% female: 50%	Repeated poin	
	nicotine replacement	nicotine replacement		Abstinence at follow-up: Repeated pointing abstinence was an abstinence was a specific was was	
	therapy	therapies. IVR is an		20% 101	
		aspect of the		intervention grapupg	
		intervention, along		and 7% for congroup	
		with website-based activities and SMS		group (p=0.002) 0.3	
				2025 nologi	
		messages.		025 at	
		Standalone or adjunct:		Age	
		Adjunct		Agence Bibliograp	
		IVR/Follow-up		Siblio Siblio	
		Schedule: Regular IVR		grap	

			ВМЈ Оре	en	136/bmjopen cted by copy	
			calls depending on		-2023-081972 right, includir	
			participants' needs;		iclue	
			follow up at 1, 3, 6 and		72 c ding	
			12 months		n 9 for	
Brendry	en et al.	Study design:	Purpose of IVR:	Population:	Reach: 71% of ses religionment Superieur (AB participants completed treatment.	At 1 month, 48.2%
(2008) N	Norway	Controlled	Intervention	Adult Smokers	participants 20	found HE to be
					answered log-	'helpful' and 44.7%
Trial #: N	Not	Study setting:	Description of	Comparator:	calls. 152	reported HE to be
reported	d	Digital/Quitline	intervention: Happy	Usual Care	participants	'very helpful'.
			Ending program is an		completed a a a	
Funder:		Inclusion criteria:	internet-based	N: 197	treatment.	Most participants in
Norweg		Wanting to attempt	multimedia	Control: 199	om ata	both groups opted
Researc		to quit smoking,	intervention that used		Abstinence at 3.05	for NRT therapy
Council,	, Pfizer	aged 18+, smoking	CBT techniques to help	Age: 35.9	follow-up: ခြွှံုိ 🍃	(93% intervention
		10+ cigarettes a day	people quit smoking.	24.5	Repeated poin 🔁 💆	vs. 87% control - p =
Industry	="	and have access to	IVR is an aspect of the	% female:	abstinence wa <u>ន</u> ្នី 💆	0.07). At 1 month,
sponsor	red: Yes	the internet, email	intervention, along	50.8%	significantly highe	the mean number of
		and cellphone	with website-based	· M.	in treatment g 📆 u 👸	days of NRT use was
			activities and SMS		(22.3%) vs. con	significantly higher
			messages. Participants		(13.1%) (p = 0. 2. 2. 2. 2.	in treatment group
			were given and allowed		At the 12 month land	(M = 5.1 vs. 3.9; p =
			to use NRT products if		follow up, 74 🖺 💃	0.02).
			they wanted.		follow up, 74 ch 13, 2025 at participants	
					participants 👸 🔉	
			Standalone or adjunct:		reported " 🚡	
			Adjunct		abstinence vs. 48	
					control participant	
			IVR/Follow-up		(p = 0.005)	
1			Schedule: Regular IVR		(ρ = 0.005)   liographique de	

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		calls depending on		2023-081972 on 9 ght, including fo	
		participants' needs;		)819 nclu	
		follow up at 1, 3, 6 and		72 ding	
		12 months		,	
Brown et al.	Study design:	Purpose of IVR: Follow-	Population:	Abstinence at Second 2024.	Use of any smoking
(2021) US	Controlled	up monitoring	Hospitalized	follow-up: 8.9% of 2	cessation treatmen
			Patients	intervention late 24.	74.6% of
Trial #:	Study setting: Acute	Description of		reported company abstinence vs. 3.56	intervention vs.
NCT02204956	care private	intervention: Patients	Comparator:	abstinence vs. 8.58	40.5% of control at
	Psychiatric hospital	received in-patient	Usual Care	of control, p=0100 and of	months, p<0.001
Funder: National		tobacco cessation		verified at 6	
Institute of	Inclusion criteria:	counselling. Following	N: 174	months by sali	Use of counselling:
Mental Health	Inpatient psychiatric	discharge, IVR asked	Control: 179	cotinine analys	37.3% of
	patients aged 18 or	about participants'		://bi ing,	intervention vs.
Industry	older who smoked at	smoking, intentions to	Age: 36.1	njoj Al 1	11.0% of control at
sponsored: No	least 5 cigarettes per	quit, desire for an	0//	oen. trair	months, p<0.001
	day	additional 4 weeks of	% female:	bm, ning	
		transdermal nicotine	46.7%	, an	Use of
	Exclusion: a current	patches (ie, 8weeks		n√o dsi	pharmacotherapy:
	diagnosis of non-	total), and interest in		mila	71.0% vs. 37.0% at
	nicotine substance	connecting with free		une ar te	months, p<0.001
	use disorder,	telephone quitline		13, chn	
	dementia,	counseling.		202 olo	
	intellectual disability,			5 at gies	
	autistic spectrum or	Standalone or adjunct:		Ag	
	other cognitive	Adjunct		enco	
	impairment, an			е Ві	
	inability to provide	IVR/Follow-up		//bmjopen.bmj.com/ on June 13, 2025 at Agence Bibliographique de l ) . ng, Al training, and similar technologies.	
	consent, medical	Schedule: 8 times over		gra	

		ВМЈ Ора	en	cted by copyright, including	
	contraindication to the use of NRT or a current pregnancy.	12 weeks post- discharge			
Buchanan et al. (2017) US	Study design: Observational Study setting:	Purpose of IVR: Follow- up monitoring and transfer	Population: Adult perinatal women	Reach: 35.5% of The Enseignement Sulphy IVR  Abstinence at follow-up: 12.8x	15.4% of IVR + counselling participants used NRT vs. 4% of IVR
Funder: MUSC, NIDA	Academic medical center	Description of intervention: Patients counselled in-hospital	Comparator: Bedside Cessation	those who recឡ <del>ីច</del> ្ចិដ្ឋ	only 10.8% of IVR +
Industry sponsored: No	Inclusion criteria: Adult women admitted to the peripartum, delivery,	by a tobacco treatment specialist; Post- discharge, IVR collected	Counselling + IVR N: 421	both counselling of from and IVR reporting A Bass	counselling participants were transferred to the quitline vs. 14.0% of
	and postpartum units	info on smoking status, frequency, quit attempts, motivation to quit, use of nicotine	Age: 29	of those who ing, and si received IVR objectives of those who received IVR objectives of those who is ing, and si received IVR objectives of those who is ing, and si received IVR objectives of those who is ing, and si received IVR objectives of those who is ing, and si received IVR objectives of those who is ing, and si received IVR objectives of those who is ing, and si received IVR objectives of those who is ing, and si received IVR objectives of those who is ing, and si received IVR objectives of those who is ing, and si received IVR objectives of those who is ing, and si received IVR objectives of those who is ing, and si received IVR objectives of those who is ing, and si received IVR objectives of those who is ing, and si received IVR objectives of those who is in the ing, and si received IVR objectives of the ing, and si received its individual objectives of the ing, and the	IVR only
	Exclusion criteria: Women over 41 and admitted for something non- pregnancy-related	replacement therapy (NRT) and whether the patient wanted to be transferred to the quitline	% female: 100%	on June 13, milar techr	
		Standalone or adjunct: Adjunct		2025 at Agend	
		IVR/Follow-up Schedule: 3-, 14-, and 30-days post-discharge		at Agence Bibliogra ss.	

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Carlini et al.	Study design:	Purpose of IVR:	Population:	Reach: 23.6% of previous quitline users reached in	
(2012) USA	Controlled	Intervention	Quitline users	previous quitlinge 16	
(2012) 00/	Controlled		Quitime docto	users reached in 20	
Trial #:	Study setting:	Description of	Comparator:	on (	
NCT0126059	Quitline	intervention: Recruited	Usual Care	Re-enrollment 🖁 🚉	
		participants who were		was 28.2% for \$ \$ \$ \$ \$ \$	
Funder: National	Inclusion criteria:	previously enrolled in a	N: 245	intervention vsg 2.4	
Cancer Institute	Previously enrolled	quitline intervention;	Control: 276	3.3% for control 200	
	in quitline, Medicaid	IVR call assessed			
Industry	or uninsured, 18 or	smoking behaviours,	Age: 42.2	oad Supe	
sponsored: No	older, sought help	current smoking status;		IVR participant 👼 👸 🖺	
	for cigarette/tobacco	if participants were	% female:	were 11.2 time	
	use	interested in	66.5%	more likely to 臺紹畫	
		reattempting quit, they		enroll than con construction	
		were enrolled into		(OR - p < 0.001) ₹	
		connected with quitline	/ i°	(OR - p < 0.001) I training, and	
		specialist and	10.	ning	
		reenrolled into IVR	1/1.	பு <u>பூ</u>	
		intervention.		nd s	
				simil on L	
		Standalone or adjunct:		June nilar te	
		Standalone		9.13, 2025 echnologi	
		IVR/Follow-up		l <u>F</u> l	
		Schedule: One IVR call		at     ×s.   A	
		to assess and/or recruit		at Agence Bibliog	
		into intervention. Up to		Се <u>г</u>	
		20 call attempts made.		<u>                                   </u>	

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	In I I	La 60/2	I	. <del> </del>
Carlini et al.	Study design:	Purpose of IVR:	Population:	Abstinence at in 30
(2014) US	Controlled	Intervention	Quitline Users	follow-up: 24.0 8197
Fu: a.l. #.	Ctuducattiaa	Description of	Comananatan	reported abstatining
Гrial #:	Study setting:	Description of intervention: IVR	Comparator:	from tobacco in the
Funder: Quitline	Quitline		Usual Care	last 7 days us multiple last 7 days
Registries for	Inclusion criteria: 18	system delivered a set	N: 3,510	r seigh
Continuously	or older, having	of questions to identify motivational and	Control: 22,824	Quit rate: 79.9இத்தி those followed இத்த
Engaging	received services in	informational barriers	Control. 22,824	1 6551
Participants in	English, providing	to recycling into a new	Age: 65.2% over	with reported to state and making a quit to be add
Cessation from	verbal consent,	quit attempt and	40	attempted lastme
the Centers for	being a cigarette	provided tailored		24 hours or more a
Disease Control	smoker, not being	messages to specifically	% female:	in the last on day
and Prevention	incarcerated, and	address these barriers	53.8%	in the last 90 dayar
and revention	not having received	address these partiers		/bm
ndustry	quitline services for	Standalone or adjunct:		in the last 90 daing, Al training, and si
sponsored: No	at least 5 months	Standalone of dajunet:		ainii 🤚
	before the study	Standarone	.617	ng,
	launch	   IVR/Follow-up		and
	Tadirion.	Schedule: Two cycles of		sim / on
		6 IVR attempts each;		June nilar te
		follow-up at 90 days		://bmjopen.bmj.com/ on June 13 ) . ing, Al training, and similar tech
Cartmell et al.	Study design:	Purpose of IVR: Follow-	Population:	
(2018) USA	Observational	up monitoring and	Hospitalized	Cost/Cost-
-		transfer	patients	mean healthcare
	Study setting:			cost post-
Funder: Agency	Hospital	Description of	Comparator:	discharge: \$51,937 🚾
of Healthcare		intervention: IVR call at	Usual Care	IVR vs. \$59,132
Research and	Inclusion criteria:	discharge determined		IVR vs. \$59,132
Quality, Pfizer	18+ smokers		N: 764	aph

cted by copyrigh 136/bmjopen-20:

	1	1		<u>,≓ Ņ i</u>	$\overline{}$
	admitted to the	smoking status and	Control: 1439	t, inc	
Industry	hospital	referred to the tobacco		Comparing over	
sponsored: Yes		treatment specialist	Age: 49.4	health care charges	
	Exclusion criteria:	that assessed patients'		for the TDTS logy 👼	
	Those admitted for	behaviour and	% female:	exposed (IVR) use mindy	
	psychiatric care,	developed a treatment	47.5%	versus unexpose 2022 patient groups 222	
	same day surgery,	plan with the patient.		patient groups (Sp. 22)	
	<24-hour	IVR also conducts		mean charges 환호 및	
	observation or not	follow-up calls to		mean charges the IVR group well a	
	discharged	evaluate smoking		\$8006 lower th	
		status and transfer to		for the control ្តី គ្នា 🚉 📗	
		counsellor if needed.		group (P=0.08) (Sa) (Sa)	
				mi BE	
		Standalone or adjunct:		Intervention [3]	
		Adjunct		implementatio	
			· ·	costs were \$34521 g	
		IVR/Follow-up	10.	per participant	
		Schedule: At discharge,		12-month period 👸	
		3, 14, 30 days post-		(incl. start-up ﷺst 🎉	
		discharge		with total	
				intervention cos្នីt ធ្លី	
				being \$158,14 <b>్త్రీ</b> ప్రే	
Cartmell et al.	Study design:	Purpose of IVR: Follow-	Population:	Readmission races 25 30-day - 9.8% for R	
(2018) USA	Observational	up monitoring and	Hospitalized	30-day - 9.8% ( R )   30-day - 9.8%	
		transfer	patients	vs. 11.9% control 🚡	
Funder: Agency	Study setting:			(p=0.05), 90 day - 📆	
of Healthcare	Hospital	Description of	Comparator:	17.3% IVR vs. 👸	
Research and		intervention: IVR call at	Usual Care	18.6% control (p = =	
Quality, Pfizer		discharge determined		0.258), 180 day - 역	
	For near re	eview only - http://bmjopen.bn	oi com/sito/shout/swi	0.258), 180 day - gradings yet ml	

		ВМЈ Оре	en	22.4% IVR vs. 24.3% control (p=0.239).	
	In al rai an aritaria.		N. 764	oyright,	Γ
Industry	Inclusion criteria:	smoking status and	N: 764	22.4% IVR vs. in 30	
Industry	18+ smokers	referred to the tobacco	Control: 1439	24.3% control cudi 397	
sponsored: Yes	admitted to the	treatment specialist	Ago: 40 4	(p=0.239). lii N	
	hospital	that assessed patients'	Age: 49.4		
	Evolucion oritorio	behaviour and	% female:	uly Enses	
	Exclusion criteria:	developed a treatment	47.5%	seig rel	
	Those admitted for	plan with the patient.	47.370	4. D nen atec	
	psychiatric care,	IVR also conducts		owr lent to	
	same day surgery,	follow-up calls to		nloa Sul text	
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	discharged	counsellor if needed.		July 2024. Downloaded from http://bmjopen.bmj.com/ Enseignement Superieur (ABES) . uses related to text and data mining, Al training, and :	
		Standalone or adjunct:		s) . ning	
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		IVR/Follow-up	10.	inin 1.br	
		Schedule: At discharge,		9, a	
		3, 14, 30 days post-		nd s	
		discharge; Follow-up at		simil on .	
		30-, 90- and 180-day		June ilar te	
		post-discharge.		ech	
D'Angelo et al.	Study design:	Purpose of IVR:	Population:	Reach: IVR had the highest average of 55.8%	21.7% of patients
(2022) US	Observational	Intervention	Cancer Patients	highest average 25	had not smoked in
				reach with an " 🚡	the past 7 days and
Funder: National		Description of	Comparators:	average of 55.8%	18.6% had not
Cancer Institute	Study setting: Cancer	intervention: IVR used	Other smoking	of patients reache	smoked in the past
	Centers	to automatically	cessation	iblic	30 days, however,
		identify and contact	intervention	bliographiq	this result applies to

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Industry	Inclusion criteria:	patients who smoked	including	n-2023- yright, ii	all cancer centers,
sponsored: No	Adults 18 years and	to provide treatment.	telephone	0819 nclu	across all
	older	Implemented in 4/38	counselling, in-	972 	implemented
		cancer centers.	person	on 9	interventions and is
			counselling,	r us	not specific to IVR.
		Standalone or adjunct:	cessation	inse es r	'
		Unclear	medication and	igne elat	
			access to a	eme ed t	
		IVR/Follow-up	quitline.	o te	
		Schedule: Not reported		oade Supe ext a	
		100	N: 38 Cancer	ed fi	
			centers	rom Jur (A data	
		To	Age: N/A	July 2024. Downloaded from http://bmjoper Enseignement Superieur (ABES) . uses related to text and data mining, Al tra	
			% female: N/A		
Ershoff et al.	Study design:	Purpose of IVR:	Population:	Reach: 285 participants participants	Only 20.8% of IVR
(1999) USA	Controlled	Intervention	Adults Perinatal	Reach: 285 participants successfully	patients placed one
			women	Jacobs any (n	or more calls to the
Trial #: Not	Study setting:	Description of		reached for fol∰ow	system and it had no
reported	Hospital	intervention: For the	Comparators:	up at the 34th	impact on their quit
		IVR subgroup,	Cessation	week of pregnancy	status
Funder: Not	Exclusion criteria:	participants were given	booklet,	(IVR only groupenote)	
reported	Women under the	informational booklet	Motivational		
	age of 18, and those	along with access to	Interviewing	<b> </b>	
Industry	who began prenatal	computerized IVR		Quit rate: 16.7% of	
sponsored: No	care past the 26th	support system that	N: 120	IVR intervention	
	week of pregnancy,	they had access to 24/7	Control: 111	group were	
	smoked less than 7	toll-free. IVR would ask	A = = 20.6	group were bliog biochemically graph	
	cigarettes week pre-		Age: 29.6	<u> </u>	

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				pyrigh	
	pregnancy, had	about smoking		confirmed end	
	experienced a	behaviour and	% female: 100%	pregnancy quiteers	
	miscarriage/	readiness to change as		- not statistica	
	abortion, and had	well as stage-		significant ថ្មី ទី	
	not smoked prior to	appropriate,		Ens	
	the baseline	customized		y 20 nsei es r	
	interview	motivational messages,		2024. seigne s relat	
		interactive activities		Dov ed t	
		and reinforcement.		o te	
		Standalone or adjunct:		. Downloaded f ement Superiev led to text and	
		Adjunct		nd o	
				rom Jir (A data	
		IVR/Follow-up		mi BE	
		Schedule: Available		ning,	
		24/7 for participants to		, a,	
		utilize as needed;	· ·	http://bmjopen.bmj. ABES) . a mining, Al training,	
		Follow-up at 32 weeks	10.	inin 1.bn	
		pregnancy		g, a	
ellows et al.	Study design:	Purpose of IVR:	Population:	Reach: 50.6% of	Use of any quit
(2016) US	Controlled	Intervention	Hospitalized	patients competed	program: 8.4% in
			patients	call 1, 31.3%	intervention, 5.0%
Trial #:	Study setting:	Description of		completed call ဦး ္ကိ	control, p=0.096
NCT01236079	Hospitals	intervention: Patients	Comparator:	mean total calls 8	
Funder: National		were counselled in-	Usual Care	completed = 2 \$SD	Use of telephone
Heart, Lung, and	Inclusion criteria:	hospital and created a		1.7)	quitline: 6.9%
Blood Institute	Adult patients	tailored discharge	N: 597	genc	intervention vs.
	admitted to one of	treatment	Control: 301	completed = 2 SD at Agence Biblio  Abstinence at follow-up: 30-day biblio	2.5% control,
Industry	the hospitals who	recommendation;		follow-up: 30-day	p=0.014
sponsored: No	reported having	medications; IVR	Age: 53	abstinence = 18% 🖁	
	<u> </u>	<u> </u>		phique de l	<u> </u>

i C H I I	smoked a cigarette in the previous 30 days, spoke English, had a working phone, and were	contacted patients for smoking status,	% female:	for intervention 17% for control of 17% for control	Use of any
i C H I I	in the previous 30 days, spoke English, had a working	smoking status,		for intervention, 🖁,	Use of any
C   H   I   T	days, spoke English, had a working	=	<b>=</b> 6 60/		OSC OF arry
	had a working	coccation program	56.6%	17% for controding for p=0.569	medication: 47.9%
i r	_	cessation program		p=0.569 <b>ding</b> 72	intervention vs.
i	nhone and were	enrollment status, and		n 9   for	38.0% control,
r	prioric, and were	cessation medication		Ens Ens	p=0.013
	interested in	use, and received tips		y 20 nsei es ro	
	remaining abstinent	for quitting		v 2024. Do seignemu s related	
	post-discharge			Dov mer ed t	
		Standalone or adjunct:		wnk o te	
[	Exclusion criteria:	Adjunct		Downloaded ment Superi ed to text and	
ļ ī	Patients living more			ed fr	
1	than 50 miles away,	IVR/Follow-up		om data	
i	admitted to a critical	Schedule: 4, 14, 28, and		htt BE	
(	care, labor/delivery,	49 days; Follow-up at 6		o://br S) . ning,	
(	or psychiatric unit,	months		omjc j, Al	
,	were pregnant or		· ·	http://bmjopen.bmj.com/ on Ju ABES) . a mining, Al training, and similar	
1	breastfeeding, were		10.	ning	
	physically too ill or			bmj.co ìing, ar	
(	cognitively unable to			om/ nd s	
	provide informed			on simil	
(	consent			June ilar te	
Mahoney et al.	Study design:	Purpose of IVR:	Population:	Reach: 32% of ဋိ ္မိ	Females (OR = 0.78,
(2018) USA	Observational	Intervention, transfer	Adult Smokers	patients reached 25	CI 0.65-0.95) and
				following charter 3	those over 40 were
	Study setting:	Description of	Comparator:	review, 55% of 🝃	less likely to opt out
	Telephone	intervention: Looks at	Usual Care	these opted in to	while rural smokers
New York Cancer		AVR system (same as		AVR program.	(OR = 3.84, CI 3.01-
<i>'</i>	Inclusion criteria: 18	IVR). Following chart	N: 1049 (opt-in)	iblic	3.90) were more
Roswell Park	years or older,	review of smokers in		these opted in to AVR program.  Bibliographique de	likely to opt out.

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				cted by copyrigh	
Comprehensive	visited an	area, baseline AVR call	Control: 850	Abstinence at 🛱 🕇	
Cancer Center,	urban/rural primary	was made to all eligible	(opt-out)	follow-up: 30% of 3	
National Cancer	care office	patients. Opt-in		intervention gradup?	Smokers from rural
Institute	community health	participants received	Age: 59.1% over	that completed the	medical offices wer
	center, academic site	AVR calls every day.	50		more likely to repor
Industry	or private practice in	AVR customized		reported s s s s	being smoke free
sponsored: No	a medically	motivational messages,	% female:	AVR program uses related reported abstinence	(OR, 1.41, CI 1.01-
	underserved	activities and questions	51.9%	Dov ed t	1.97) - smoke free
	communities of	during call to specific		abstinee	status did not differ
	interest	stage of change. If		upe xt a	by sex, racial group
		participant relapsed,		rieu nd c	or age.
		they were transferred		ir (A	
		to primary care office		mi BE	
		or state quitline for		s) · /b	
		counselling.		, Al tr	
		Standalone or adjunct:	10.	aining	
		Standalone	1/1/	http://bmjopen.bmj.com/ on June 13, 20 BES) . mining, Al training, and similar techno	
		IVR/Follow-up		simil	
		Schedule: IVR calls		June iilar te	
		every day for study		echn	
		period (undefined)		Abstinence at \$\frac{1}{20}\$	
McDaniel et al.	Study design:	Purpose of IVR: Risk	Population:	Abstinence at 60 25	98% were satisfied,
(2015) US	Controlled	Assessment	Quitline users	follow-up: At 6 Apmonths: No smoking in last 7	98% would
				months: No	recommend the
Trial #:	Study setting: QFL	Description of	Comparators:		programme to
NCT0088899	program	intervention: All	Standard	days = 66.0% of	others; overall, 87%
		participants received		control, 69.6% of 🥞	said IVR was helpful
				ohique de	

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Funder: National	Inclusion criteria:	five counselling calls	quitline uses,	yyr on 2000 yyrigh 2000 TEQ-10 (p=0.305136
Institutes for	Tobacco users	from a Quit Coach; IVR	TEQ-10, TEQ-20	vs. control), 67န္ကြာ%မ္တို
Health	enrolled in the Quit	calls delivered risk		of TEQ-20 ding
	For Life (QFL)	assessments, and high-	N: 602 in TEQ-	(p=0.7121 vs. g
Industry	programme who	risk participants were	10, 591 in TEQ-	control); 🖟 m 🖺
sponsored: No	were quit for 24	transferred to a Quit	20	Did not smoke $\frac{1}{2}$
	hours or more,	Coach	Control: 592	the last 30 days = 1
	English-speaking, 18			60.6% of contrසී වූ
	or older, having	Standalone or adjunct:	Age: 43.4	65.2% of TEQ-150%
	access to a touch-	Adjunct		(p=0.1946), 61 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
	tone phone	$\mathcal{O}_{\triangle}$	% female:	of TEQ-20
	, i	IVR/Follow-up	54.2%	(p=0.8947); $\frac{d}{dt} = 0$
	Exclusion criteria:	Schedule: TEQ-10 =		mi BE
	Smokeless tobacco	twice weekly for 2		At 12 months: 🔊 🕌
	users, actively	weeks, then weekly for		smoking in last 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3
	participating in	6 weeks; TEQ-20 = daily	· ·	days = 65.3% o 🖺 💆
	another tobacco	for 2 weeks, then	10.	control, 67.0% ड्रेंग 🙀
	cessation	weekly for 6 weeks;		TEQ-10 (p=1694), 5
	programme, had	follow-up at 6 and 12		62.2% of TEQ-20 🔾
	previously enrolled	months		(p=0.4655); in <b>E</b> ist 3
	in QFL during the			30 days: 61.6% ਹੈ f ਡੂੱ
	past 6 months, had			control, 63.1% క్త్రి f ప్రే
	limited phone access			TEQ-10 (p=0.6 2 1)
				56.6% of TEQ-20 25
				(p=0.1871) φ
McNaughton et	Study design:	Purpose of IVR:	Population:	(p=0.1871)
al. (2013) Canada	Controlled	Intervention	Adult Smokers	follow-up: Of
, ,				patients who had
				quit smoking at 12 q

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ICT00832806 Funder: Pfizer Canada Industry ICT00832806 Funder: Pfizer Canada	Study setting: Outpatient Clinic  Inclusion criteria: Smoking ≥35 cigarettes per week or ≥5 cigarettes per day for at least 2 years with no period of abstinence longer than 3 months  Exclusion criteria: Use of any smoking cessation drugs or nicotine replacement in the last 3 months, use of medications to treat depression or any psychiatric illness, history of depression or an unstable medical condition	Description of intervention: All participants received a 12-week supply of varenicline; IVR asked about cigarette use, side effects, confidence in maintaining abstinence, and motivational messages; at 12 weeks, all participants who were still abstinent were randomized to receive either further IVR or no IVR  Standalone or adjunct: Adjunct  IVR/Follow-up Schedule: Days 1, 3, 8 and 11 post-quit then every 2 weeks for following 39 weeks; follow-up at 52 weeks and 2 years	Comparator: Participants who only received IVR for 12 weeks.  N: 101 initially and then 44 IVR only Control: 41  Age: 52.6 overall  % female: 33%	weeks, 59% were smoke-free at weeks, 52% of gintervention and 66.7% of control of contro

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Nahhas et al. (2016) US	Study design: Observational	Purpose of IVR: Follow- up monitoring and	Population: Hospitalized	Reach: 42.8% were 88 1972 once within 30ing for days	19.6% who were reached asked to be
(2010) 03	Observational	transfer	Patients	onco within 20=	transferred to the
	Study setting:	transier	Patients	days for	quitline
Funder: Medical	Medical University	Description of	Comparator:	1 22/2	9 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
University of	Wicalcal Offiversity	intervention: Patients	Bedside	Ahstinence at Ses Liv	Bedside counselling
South Carolina	Inclusion criteria:	counselled in-hospital	Counselling +	Abstinence at sess resigned.	was associated with
Health	Adult cigarette	by tobacco treatment	IVR	those who were	a 13% increase in
	smokers	specialist and		reached reported	response to IVR
Industry		developed an	N: Not reported	not smoking at	I .
sponsored: No	Exclusion criteria:	individualized tobacco-	·	time of their laste	increase in reported
	Patients who died	treatment plan; IVR	Age: Not	phone contact	abstinence (51% vs.
	during	collected info on	reported	based on inten	27%), and double
	hospitalization,	smoking status and		treat, 13.5% of	the rate of those
	receiving hospice	provide additional	% female: Not		using medications
	care, not discharged	support through the	reported	patients were ≥ 3 classified as no 2 classified as	(21% vs. 8%)
	back home, and	offer of a direct		smoking based	
	psychiatric inpatients	immediate referral		their most recent is	
		"warm transfer" to a		ı – – – – – – – – – – – – – – – – – – –	
		quitline		simi	
		•		i June	
		Standalone or adjunct:		e 13, echr	
		Adjunct		m/ on June 13, 2025 at d similar technologies.	
				25 a ogie	
		IVR/Follow-up		ss. at A	
		Schedule: 3-, 14-, and		Agence	
		30-days post-discharge			
				Bibliographique de	
				rapt	
				niqu	
				le d€	
	For peer re	eview only - http://bmjopen.bn	nj.com/site/about/gui		

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Poid at al. (2007) Study design:	Durnoso of IVP: Follow	Donulation	Reach: At 3-day.
Reid et al. (2007) Study design:	Purpose of IVR: Follow-	Population:	Reach: At 3-day
Canada Controlled	up monitoring and risk	Hospitalized	follow-up, 70 and go
Trial H. Nat. Church and tings	assessment	patients	participants 6
Trial #: Not Study setting:	Description	6	answered IVR द्वी।ऽ
reported Hospital	Description of	Comparator:	I Seg
e i di i	intervention: IVR	Usual Care	Abstinence at 👸 👸
Funder: Inclusion criteria:	system called	N 50	follow-up: At the
Canadian Current smokers (5	participants post-	N: 50	52-week follow
Tobacco Control or more cigarettes	discharge and asked	Control: 50	46% of the IVR وَ مِيْ
Research per day), 18+,	about smoking status,		group and 34.7
Initiative hospitalized for	confidence in staying	Age: 54	the control gro
acute coronary	smoke free until next	0/ famala, 200/	were abstinenਵ੍ਹੀ ਨੂੰ
Industry syndrome	call, and use of self-	% female: 39%	0.07). 異. 器
sponsored: No	help materials and		Nining, Al training, and (0.07).
	pharmacotherapies.		ng, Al training, and similar technologies.
	Patients were flagged	<b>/</b>	trai
	and connected with	10.	ning
	nurse specialists if they		y, ar
	reported relapse but		nd s
	interest in quit		si mil
	reattempt or if they		nilar te
	were not confident in		ech 3
	their ability to stay		chnolog
	smoke free. Further		gie g
	telephone counselling		s, S
	was given.		
	Standalone or adjunct:		\$5. Section 1. Section
	Standalone		9

				<u> </u>	
Rigotti et al. (2014) US	Study design: Controlled	IVR/Follow-up Schedule: 3-, 14- and 30-days post-discharge; 12- and 52-weeks post- discharge (by telephone, not IVR) Purpose of IVR: Intervention	Population: Hospitalized	2023-081972 on 9 July 2024. Downlo Enseignement S ght, including for uses related to te at at Abstinence follow-up:	Any smoking cessation use: at 1
Trial #: NCT01177176  Funder: National Institutes of Health/National Heart, Lung, and Blood Institute  Industry sponsored: No	Study setting: Hospital  Inclusion criteria: 18 or older, smoked ≥1 cigarette/day during the month before admission, received smoking cessation counseling in the hospital, stated that they planned to try to quit smoking after discharge  Exclusion criteria: Expected hospital stay of <24 hours, substance use in the	Description of intervention: Participants give a 30-day supply of tobacco cessation medication, refillable for up to 90 days of treatment; 5 IVR calls provided advice and support messages that prompted smokers to stay quit, encouraged proper use and adherence to cessation medication, offered medication refills, and triaged smokers to a return telephone call from a live counselor	patients  Comparator: Usual Care  N: 198 Control: 199  Age: 53.9  % female: 48.5%	Abstinence at follow-up: Biochemically confirmed abstinence for a moning of control, p=0.25 at moning at 6 months = 52.0% of intervention, 28.1% of control, p=0.00% of control, p=0.00% of intervention, 28.1% of control, p=0.00% of control, p=0.00% of intervention, 28.1% of control, p=0.00% of control, p=0.00% of control, p=0.00% of control, p=0.00% of control, p=0.00	month = 82.8% of intervention, 62.8% of control, p<0.001; at 6 months = 89.9% of intervention, 80.4% of control, p=0.01

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	past 12 months other than tobacco, alcohol, or marijuana, admitted for an alcohol or drug overdose, could not consent or participate in counselling, admitted to obstetric or psychiatric units, life expectancy <12 months, medical instability	Standalone or adjunct: Adjunct  IVR/Follow-up Schedule: 2, 14, 30, 60, and 90 days; follow-up at 6 months		at 1 month = 4fc.0% of intervention of intervention of intervention of intervention, p<0.01; at 6 of control, p=0.01; at 6 months = 27.3% of control, p=0.01; at 6 mon	
Rigotti et al.	Study design:	Purpose of IVR:	Population:	Reach: Interve	59% requested
(2016) US	Controlled	Intervention	Adult smokers	participants , ,	transfer to a Quit
				answered (62%) o	Coach
Trial #:	Study setting:	Description of	Comparator:	IVR calls; median 🕌	
NCT0171432	Hospitals	intervention:	Usual Care	3 of 5 planned call	Any use of smoking-
		Intervention patients		per person	cessation treatment

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Funder:	Inclusion criteria:	receive a 30-day supply	N: 680	Abstinence at follow-up:	at 6 months: 85.3%
NIH/NHLBI	Adults 18 or older	of free FDA-approved	Control: 677	Abstinence at 은 역	of intervention,
	who smoke one or	tobacco cessation		follow-up:	
Industry	more cigarettes	medication, refillable	Age: 49.6	Abstinent for past	p<0.001
sponsored: No	daily, had >5 minutes	for up to 90 days of		7 days, at 1 mos 計算	
	of smoking cessation	treatment; IVR calls	% female:	= 43.4%	
	counselling in the	prompted smokers to	48.8%	intervention, 3 🖁 🕱	
	hospital, stated they	quit or stay quit,		control, p<0.0∰∄;5	'
	planned to try to	offered support		at 6 months: 36.7%	
	quit smoking post-	messages, encouraged		intervention, 25 5	
	discharge	adherence to cessation		control, p<0.10 = 1	
		medication, and		abstinent since	
	Exclusion criteria:	offered smokers the		hospital discha	
	Had no telephone,	option of a direct two-		at 1 month: 31 គ្នី) 🖔	;
	could not give	step transfer to a		intervention, 2 <u>6</u> .48	
	informed consent or	telephone quitline	<b>/</b>	control, p<0.10 <u>ឆ</u> ្នី atថ្ន	
	participate in		10.	6 months: 17.8 3	•
	counselling, were	Standalone or adjunct:		intervention, 14.9%	
	admitted to obstetric	Adjunct		control, not	
	or psychiatric units,			control, not significant significant	
	were admitted for IV	IVR/Follow-up		ar to	
	drug overdose, had	Schedule: 2, 12-, 28-,		Quit rate: technology Signature 23, 23	.
	medical instability,	58-, and 88-days post-		Biochemically of S	
	had <1 year of	discharge; follow-up at		confirmed tob	
	estimated life	6 months		abstinence " abstinence	
	expectancy.			immediately post-	
				discharge = 16.6% a	
				of intervention,	

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Schneider et al. (1995) USA  Funder: National Institute of Health  Industry sponsored: No	Study design: Observational Study setting: Telephone Inclusion criteria: 18 or older, smoke daily	Purpose of IVR: Intervention  Description of intervention: Early IVR system monitored participants progress, provided motivation, helpful techniques and coping mechanisms and interactive activities (smoking diary).  Standalone or adjunct: Standalone  IVR/Follow-up Schedule: Participants called as needed following the initiation call; follow-up at 1, 3 and 6 months after	Population: Adult Smokers  Comparator: Self- Comparison  N: 571  Age: Not reported  % female: Not reported	15.5% of controlling to not significant diagram at least once, 571 were sering memoritising analysis. Ceed to more calls included in these 473 participants make 5 or more calls.  Abstinence at 1 month follow-up: Of training, anothing abstinent at 3-temporary at 3-te	Similar results found
		initiation call (letter and post-card for data collection)		6-month follow- Agence Biblio	

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Velicer et al. (2006) USA Controlled Controlled Intervention Veteran Smokers IVR multiple ti 30% used it or and 40% did n use it at all. Vessation booklet, cless a day Inclusion criteria: Regularly smoke 10+ cligs a day Inclustry sponsored: No  Veteran Smokers  Veteran Smokers  Comparators: Cessation booklet, Not cessation	123-081972.on 9 July 2024. Downloaded from http://www.jopen.dom.n. of use Enseignement Suppenblur (ABES). Of use to do the state of use to do the state of the st



### PRISMA 2020 Checklist

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Section and Topic	Item #	Checklist item	Location where item is reported
TITLE		72 9	
Title	1	Identify the report as a systematic review.	Ln. 2
ABSTRACT		<u> </u>	
Abstract	2	See the PRISMA 2020 for Abstracts checklist.  Describe the rationale for the review in the context of existing knowledge.	Pg. 2
INTRODUCTION		9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	Pg. 3 - 4
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	Pg. 4
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	Pg. 5
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted date when each source was last searched or consulted.	Pg. 4
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used	Pg. 4
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how mage iewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	Pg. 4 - 5
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each epocit, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, deta to obtain the process.	Pg. 5
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with action action actions and if not, the methods used to decide which study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which study were sought (e.g. for all measures).	Pg. 4 - 5
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, and be sources). Describe any assumptions made about any missing or unclear information.	Table. A
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	Pg. 5, 7
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	Pg. 6
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the studies wertion characteristics and comparing against the planned groups for each synthesis (item #5)).	Pg. 6
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	Pg. 6
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	Pg. 6
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	Pg. 6
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	N/A
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	N/A
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting bias s).	Pg. 5
Certainty	15	Describe any methods used to assess certainty (or contidence) in the body of evidence for tank outcome.	Pg. 5



#### PRISMA 2020 Checklist

Pag	ge 47 of 47		BMJ Open BMJ Open					
1 2	PRISM	ИА 20	BMJ Open  Cted by Copbin jopen 2020 Checklist  A 2020 Checklist					
3 4 5	Section and Topic	Item #	Checklist item	Location where item is reported				
6	assessment		ing 2 o					
7	RESULTS	1	o o					
8 9 10	Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to t	Fig. 1				
11		16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they water cluded.	Fig. 1				
12 13	Study characteristics	17	Cite each included study and present its characteristics.	Table. A				
14 15	Risk of bias in studies	18	Present assessments of risk of bias for each included study.	Fig. 3				
16 17	Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) and (c.g. confidence/credible interval), ideally using structured tables or plots.	Table. A				
18	Results of	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.					
19 20	syntheses	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary of the gradient and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	N/A				
21 22		20c	Present results of all investigations of possible causes of heterogeneity among study results.	N/A				
23		20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	N/A				
24	Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	Pg. 7				
25 26	Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	Pg. 7				
27	DISCUSSION	I	<u>\$</u> . 0					
28 29	Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	Pg. 13				
30		23b	Discuss any limitations of the evidence included in the review.	Pg. 14				
31		23c	Discuss any limitations of the review processes used.	Pg. 14				
32		23d	Discuss implications of the results for practice, policy, and future research.	Pg. 14				
33	OTHER INFORMA	1	ପ୍ର :5					
34 35	Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	Pg. 4				
36	protocol	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	N/A				
37		24c	Describe and explain any amendments to information provided at registration or in the protocol.	N/A				
38	Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the	Pg. 15				
39 40	Competing interests	26	Declare any competing interests of review authors.	Pg. 15				
41 42 43	Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	Pg. 15				

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# **BMJ Open**

## Interactive Voice Response (IVR) for Tobacco Cessation: A Systematic Review

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**Title:** Interactive Voice Response (IVR) for Tobacco Cessation: A Systematic Review

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27 **Abstract Objective:** To summarize the uses, outcomes, and implementation of interactive voice response 28 29 (IVR) as a tobacco cessation intervention. 30 **Data sources:** A systematic review was conducted. Searches were performed on May 3, 2023. 31 The strategies used key words such as "tobacco cessation", "smoking reduction" and "interactive 32 voice recording". Ovid MEDLINE®ALL, Embase, APA PsycInfo, CINAHL, Cochrane Library, 33 and Web of Science were searched. Grey literature searches were also conducted. 34 35 **Study selection:** Titles and abstracts were assessed by two independent reviewers. Studies were 36 included if: IVR was an intervention for tobacco cessation for adults; any outcomes were 37 38 reported; and study design was comparative. Any abstract included by either reviewer proceeded to full text review. Full texts were reviewed by two independent reviewers. 39 40 **Data extraction:** Data was independently extracted by two reviewers using a standardized form. 41 The ROB-2 and the ROBINS-I tools were used to assess study quality. 42 43 44 Data synthesis: Of 308 identified abstracts, 20 moderate- to low-quality studies were included. IVR was used standalone or adjunctly as a treatment, follow-up or risk-assessment tool across 45 46 populations including general smokers, hospitalized patients, quitline users, perinatal women, cancer patients and veteran smokers. Effective studies found that IVR was delivered more 47 48 frequently with shorter follow-up times. Significant gaps in the literature include a lack of 49 population diversity, limited implementation settings and delivery schedules, and limited patient 50 and provider perspectives. 51 **Conclusions:** While the evidence is weak, IVR appears to be a promising intervention for 52 53 tobacco cessation. However, pilot programs and research addressing literature gaps are 54 necessary.

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- This was a thorough and comprehensive search of the literature created by an experienced medical information specialist and peer reviewed by another specialist. Six peer-reviewed databases were searched, along with grey literature searches and hand searches of the included studies.
- There was significant heterogeneity in the interventions utilized, reported methods, and outcome measures reported, meaning meta-analysis was not possible.
- Limited populations and settings were assessed by the included studies, meaning generalizability is limited and significant gaps still remain.

#### Introduction

As of 2020, 22.3% of the global population reported using tobacco products - around 1.3 billion individuals (1). The annual economic costs of tobacco use are significant, equaling an estimated US\$ 1.4 trillion and 1.8% of the world's annual gross domestic product (1). Over eight million deaths per year are attributed to direct and indirect tobacco use (1). While current global tobacco control efforts contribute to decreasing the prevalence of tobacco use and associated morbidity and mortality rates, it is crucial to continue finding ways to support patients who want to make a quit attempt or change their smoking behaviour.

Interactive voice response (IVR) is a phone-based platform that can be used to deliver health behaviour interventions (2). IVR can be used to deliver educational messages, reinforce behaviours, motivate and guide patients, record patient symptoms or outcomes, encourage medication adherence, and connect patients with further resources or professionals (3). With IVR, a human speaker is replaced with a high-quality, pre-recorded interactive script and responds to patients based on answers provided (2). Patients can either call the IVR or receive calls. The possible advantages of IVR include its ability to make multiple calls during and outside regular business hours, it can connect with patients quickly, and it can identify those who are at higher risk and more likely to benefit from continued support (3, 4).

IVR has been used in interventions for alcohol consumption, asthma, heart failure, obesity, sleep apnea, hypertension, high cholesterol, dietary behaviour, to increase physical activity and to improve medication adherence (2). Effectiveness has been mixed, with IVR having small but significant effects on medication adherence and physical activity, but limited effectiveness for alcohol consumption or dietary behaviour (2). IVR has also been used as a tool to support tobacco cessation in patients, particularly post-hospital discharge (5). Post-discharge, patients receive tailored automated IVR calls at different time points (5). The calls typically assess patients' current smoking status, intention to quit or confidence in staying quit, current cessation medication use, and desire for additional support, and provides motivational messages, encourages patients to stay quit or continue attempting, promote the use of cessation medication, and offer to transfer patients to a counselor (5). IVR is also often used in conjunction with other

interventions, such as alongside nicotine replacement therapy (NRT), or after counselling with a physician in-hospital or in a primary care setting (5). However, the effectiveness of IVR as a tobacco cessation intervention for specific population groups, and the best uses and optimal delivery schedule of IVR interventions, are unknown.

This systematic review aims to synthesize and understand the current knowledge regarding IVR for tobacco cessation and to identify any gaps in the literature. Questions that guided this review included the ideal IVR delivery schedule, components of IVR, utilization of the intervention, outcomes reported in the literature, patient and provider perspectives, and costs of using IVR for tobacco cessation.

#### Methods

Search strategy

This systematic review followed a written, unregistered protocol and was conducted by following the Cochrane best practice guidelines and the PRISMA reporting standards (6, 7). An experienced medical information specialist developed and tested the search strategies through an iterative process in consultation with the review team. The MEDLINE strategy was peer reviewed by another senior information specialist using the PRESS Checklist (8). The strategies utilized a combination of controlled vocabulary (e.g., "Smoking Reduction", "Tobacco Use Cessation", "Reminder Systems") and keywords (e.g., "quit smoking", "curtail tobacco", "interactive voice response"). Vocabulary and syntax were adjusted across the databases. Using the multifile option and deduplication tool available on the Ovid platform, we searched Ovid MEDLINE®ALL, Embase, APA PsycInfo, CINAHL (Ebsco), the Cochrane Library (Wiley), and Web of Science (Core Databases). No language restrictions were placed on the search. Records were downloaded and deduplicated using EndNote version 9.3.3 (Clarivate Analytics). All databases were searched from inception to May 3, 2023. The final search strategy is available in the supplementary material, Appendix A.

Grey literature searches were conducted through the Canadian Agency for Drug and Technologies in Health Grey Matters database, a database of government reports and non-

commercially published reports, and preprint databases including medRixV and Research Square. Targeted Google searches were also conducted to identify any relevant reports that may have been missed by these databases.

Study selection

A calibration exercise was conducted by four reviewers on a sample of the retrieved abstracts.

After 100% agreement was reached among reviewers, the remaining abstracts were screened in

duplicate by two independent reviewers. Abstracts selected for inclusion by either reviewer

proceeded to full-text review. This initial screen was intentionally broad to ensure that all

relevant literature was captured. Abstracts proceeded to full-text review if: IVR was used as an

intervention tool for tobacco cessation; IVR targeted adults; any outcomes were reported,

including treatment completion, quit rates, smoking abstinence, and patient perspectives; and

was a comparative study, comparing IVR to any comparator. Any comparative study design was

eligible for inclusion. Studies that reported other kinds of interventions but used IVR for data

144 collection purposes were excluded.

Full texts were included if they met the above inclusion criteria and were in English. Conference abstracts, case series, reviews, letters, and editorials were excluded. Along with grey literature databases, the reference lists of relevant systematic reviews were also searched. Full-text review was conducted in duplicate by two independent reviewers. Any discrepancies between reviewers were resolved through discussion and consensus.

Data extraction

For all included studies, year of publication, country, study design, target population, participant characteristics, intervention setting, purpose or use of IVR, details about IVR schedule and follow-up, and outcomes were extracted by a single reviewer using standardized data extraction forms. A second reviewer verified the extracted data. Discrepancies between reviewers during data extraction were resolved through consensus.

Quality assessment

The quality of controlled trials was assessed using the revised Cochrane Risk-Of-Bias Tool for Randomized Trials (ROB-2) (9), while the observational studies were assessed with the Risk of Bias in Non-Randomized Studies of Interventions (ROBINS-I) tool (10). Each controlled trial was assessed using five criteria broadly covering the areas of randomization, deviation from intended intervention, missing outcome data, measurement of outcome, and selection of reported results (9). The observational studies were assessed based on the following parameters: bias due to confounding, selection bias, bias in classification, bias due to deviations from intended interventions, bias due to missing data, bias in measurement, and reporting bias (10).

Quality assessment was completed by one reviewer and verified by a second reviewer.

- Data analysis and synthesis
- 172 Significant heterogeneity of studies was expected. Therefore, a narrative approach to synthesis
- was adopted a-priori. A stratified analytic approach by population was adopted. The types of
- interventions used, the outcomes reported, the effectiveness, overall trends, and any gaps in the
- literature were assessed by population.

- 177 Ethics approval
- All data were from published studies so ethics approval was not required.

- 180 Patient and public involvement
- There was no patient or public involvement in this review.

183 Results

- 185 Overall results
- The search strategy yielded 308 unique citations, 271 of which were excluded after abstract
- review, Figure 1. Six studies were identified through hand and grey literature searches.
- Following abstract review, 43 studies proceeded to full-text review. At the full text-review phase,
- 23 studies were excluded for the following reasons: not IVR (n=4), IVR used as a data collection
- method (n=6), commentary or abstract (n=9), no outcomes (n=2), or duplicates (n=2), Figure 1.

The final dataset included 20 studies, including 13 controlled trials and seven observational studies, Figure 2, panel A. Sixteen of the included studies were conducted in the US (11-26), two were conducted in Canada (27, 28), and the remaining two were conducted in Norway (29, 30), Figure 2, panel B. The included studies were published between 1995 – 2022, Figure 2, panel C. In most of the studies (n=8), study sample sizes ranged between 100 to 500 participants while five studies each included between 500-1,000 participants, and >1,000 participants respectively. Only two studies included less than 100 participants, Figure 2, panel D. Appendix B includes additional details on the characteristics and outcomes of the 20 studies. Quality of included studies

Full risk of bias assessments can be found in the supplementary material, Appendix C. The risk of bias assessment of the 13 controlled trials ranged from some concerns (n=7) to high risk of bias (n=6), Figure 3, panel A. The most common critical weakness across the controlled trials was the deviation from intended intervention and the selection of reported results. However, most studies were assessed at a low risk of bias in the measurement of outcomes and the randomization process.

Overall, one observational study was assessed at a moderate risk of bias, two studies were at a high risk of bias, and the remaining four studies were assessed at critical risk of bias. The most common critical weakness across studies were confounding, deviation from interventions, measurement of outcomes, and the selection of reported results. Most of the observational studies were assessed at a low risk of bias in the classification of interventions and selection of participants to the study, Figure 3, panel B.

How was IVR used as an intervention?

Two uses of IVR were identified. Across the 20 studies, IVR was used as either a standalone (n=6) or an adjunct intervention (n=13) for tobacco cessation. The use of IVR was unclear in one study (17). When used as a standalone intervention, IVR was the primary intervention reported in the study (13, 14, 18, 20, 25, 31). When used as an adjunct intervention, IVR was used in combination with other interventions including counselling, referrals, quitlines, and web- or

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222	SMS-based cessation activities (11, 12, 15, 16, 19, 21-24, 26, 27, 29, 30). In one study,
223	participants were able to contact the IVR services (18); in all other interventions, the IVR system
224	contacted participants.

When in the care trajectory was IVR used?

Studies examined IVR use along different points in the care treatment trajectory. Included studies used IVR as a treatment tool, a follow-up tool and a risk-assessment tool, Figure 4.

As a treatment tool, IVR asked questions regarding smoking habits, overall goals, and fears surrounding tobacco cessation. IVR provided tailored behaviour change therapeutic responses based on answers given by the patients, through personalized motivational messages and advice, coping mechanisms, and interactive activities. When IVR was used as a treatment tool, IVR delivery schedule varied widely for interventions with call schedules ranging from calls every day (20) to every 2-, 12-, 28-, 68-, and 88-days post-discharge (24) to every two weeks for 39 weeks (27). In two studies, IVR was available on an as-needed basis where patients were called regularly in response to their unique requirements (29, 30) and in two studies IVR was available 24/7 for participants to utilize when they wanted (18, 25).

As a follow-up tool, IVR was used post-discharge to monitor patients' progress and track tobacco behaviour, as well as provide personalized motivational messages and give patients direct access to resources such as requesting additional NRTs/pharmacotherapy and directing calls to a quitline or counsellor. Five studies delivered IVR at 3-,14-, and 30-days post-discharge (12, 15, 16, 22, 28) and one delivered IVR at eight predetermined, yet unspecified, time periods over the course of 12 weeks post-discharge (11). In all the studies that used IVR as a follow-up tool, IVR was also used as a risk-assessment tool (11, 28).

As a risk assessment tool, IVR assessed the risk of relapse based on responses to curated questions, flagging at-risk patients and connecting them to a counsellor, quitlines or nurse specialists to mitigate relapse and provide immediate support. Risk assessment was conducted differently across the different studies. As an example, one study specifically asked questions as part of a risk assessment for relapse and flagged "at risk" patients and directly transferred the call

to a quit coach for brief intervention (21). Frequency of IVR calls and follow-up times ranged widely. For whom was IVR more likely to be effective? IVR was used as a tobacco cessation intervention across multiple specific populations. Six studies targeted general adult smokers (20, 24, 25, 27, 29, 30), seven studies targeted hospitalized patients (11, 15, 16, 19, 22, 23, 28), three studies targeted quitline users (13, 14, 21), two studies targeted adult perinatal or pregnant women (12, 18), one study targeted cancer patients (17), and one study targeted veteran smokers (26), Figure 5. General adult smokers In the six studies that looked at general adult smokers, four were controlled trials and two were observational studies (20, 24, 25, 27, 29, 30). Four controlled trials used IVR as an adjunct treatment tool. One reported biochemically confirmed abstinence rates and three reported self-reported point abstinence rates (24, 27, 29, 30). No statistically significant difference in past-7-days biochemically confirmed abstinence was found at the 6-month follow-up (24). However, three controlled trials reported significantly higher self-reported point abstinence rates at 1-, 3-, 6, and 12-month follow-ups (24, 29, 30). One observational study used IVR as a standalone treatment tool and reported abstinence rates. Of participants that reported abstinence at the 1-month follow-up, 47.1% were still abstinent at the 3-month follow-up and 37.3% were still abstinent at the 6-month follow-up (25). One observational study examined IVR as a treatment and risk assessment tool and focused on quit rates (20). Overall, 30% of individuals that opted into the IVR program were smoke-free at the last contact. Hospitalized patients Of the seven studies that included patients admitted to hospital, four were controlled trials and three were observational studies (11, 15, 16, 19, 22, 23, 28). In the two controlled trials that used IVR as an adjunct treatment tool, one study found that 25.8% of intervention patients were biochemically confirmed abstinent in the past 7 days (p=0.009) and self-reported abstinence rates 

in the past-7-days at the 1-month and 6-month follow-ups were significantly higher in intervention patients (23). However, the other study found no statistically significant difference in self-reported abstinence rates between intervention and usual care participants (19). One controlled trial found that intervention patients were significantly more likely to be abstinent at 6-month follow-up (8.9%) compared to usual care control patients (3.5%, p=0.01) (11). Finally, one controlled trial that examined IVR as a standalone follow-up and risk assessment tool reported abstinence rates and found no difference in abstinence rates between intervention and control groups (28).

Two observational studies examined different outcomes of the same IVR follow-up program. One study reported that IVR was associated with significantly lower total healthcare costs at one-year post-discharge, with mean charges for the IVR group being over \$8,000 less than the usual care control group (15). The other study found no statistically significant reduction in odds of readmission between the IVR group and the usual care control group and no significant difference in readmission rates at 30-, 90-, or 180-days post-discharge (16). IVR reach was also reported to be low as IVR only reached about 43% of eligible participants, and 36.4% of those reached reported abstinence since their last IVR call. The remaining observational study examined the reach of a hospital-based counselling and IVR tobacco cessation program (22). IVR reach was low as only 43% of eligible participants were reached. While no difference was found between IVR alone and bedside counselling with IVR, counselling with IVR was associated with an increase in response to IVR utilization (22).

#### Quitline users

Three controlled trials targeted tobacco cessation Quitline users (13, 14, 21). Two controlled trials used IVR as a standalone treatment tool. IVR intervention participants were significantly more likely to re-enroll into the quitline (28.2% intervention vs. 3.3% usual care; p<0.001), though the proportion of those that re-enrolled was small (14). Of those followed-up with, 79.9% of those followed-up reported making a quit attempt lasting 24 hours or more in the last 90 days, with 24.0% reporting abstaining from tobacco in the last 7 days (13). One controlled trial used IVR as an adjunct risk assessment tool reported quit rates in quitline users at two different IVR delivery schedules: twice weekly for 2 weeks then weekly for 6 weeks (10 calls total) or daily for

2 weeks and weekly for 6 weeks (20 calls total) (21). The intervention found no difference in abstinence rates between the two IVR delivery schedules and the frequency of IVR calls did not impact tobacco cessation. Those that did not screen as at-risk for relapse during the scheduled IVR relapse risk assessments were 77% more likely to be abstinent at the 6-month follow-up (21).

Adult perinatal women

> Two studies targeted adult perinatal women (12, 18). In the controlled trial, IVR was used as a standalone treatment tool and while 16.7% of IVR intervention participants were biochemically confirmed end-of-pregnancy quitters, there was no significant difference compared to usual care patients (18). The observational study used IVR as an adjunct follow-up and risk-assessment tool. There was no difference in reported abstinence between participants that only received IVR and those that received bedside counselling with IVR (12).

Cancer patients

One observational study examined IVR as a treatment tool at cancer centers (17). This study compared the effectiveness of multiple different tobacco cessation interventions, including IVR, implemented across 38 participating cancer centers. IVR was implemented at 4 out of the 38 cancer centers. Of all the cessation interventions, IVR had the greatest mean, median, minimum, and maximum ranges for reach, with responses from an average of 56% of those reached by IVR. No IVR-specific or patient-specific abstinence rates were reported; however, 22% of patients reported not smoking in the past 7 days and 19% not smoking in the past 30 days across all cancer centers and implemented interventions (17).

#### Veteran smokers

One controlled trial examined IVR as an adjunct treatment tool targeting veteran smokers (26). IVR was implemented in conjunction with a tobacco cessation manual, an expert system feedback report, and NRT use. At follow-up, 6-month prolonged abstinence rates at month 10

(6.6%), month 20 (9.3%) and month 30 (15%) showed a steady increase in abstinence, however, 

this increase was not statistically significant (26). 

What were the patient-reported experiences with IVR?
Only three studies, all controlled trials, included elements of patient-reported experience with
IVR for tobacco cessation (21, 29, 30). Most participants (96%) reported satisfaction with the
overall quitline program and almost all participants (98%) stated that they would likely
recommend the program to others (21). Furthermore, most participants reported that it was easy
to answer questions using the IVR system (95%) regardless of IVR delivery schedule (21).
Satisfaction with the IVR intervention was also highly positive, regardless of whether
participants were given the option to utilize NRTs (29, 30).

355 What was the reach of IVR?

Eight studies reported reach of the IVR intervention (12, 14, 17, 18, 20, 22, 25, 26). The rate of participants interacting with IVR ranged from 20.8% to 42.8% (12, 14, 17, 18, 20, 22, 25, 26). In one study, IVR did have the highest average reach, compared to other smoking cessation interventions, with responses from 55.8% of those called by IVR; however, these results were at the institution-level, not the individual-level (17).

Sex and gender in this literature

Only one study stratified outcomes by sex or gender; it is unclear which (20). This observational study, of low quality, assessed IVR used as a standalone treatment and risk assessment tool for general adult smokers. It was found that females were significantly more likely to opt-in to the IVR intervention compared to males (OR = 0.78; 95% CI = 0.65-0.95). Of those that opted-in and received IVR calls, females were more likely to report being smoke free at last contact compared to males (OR = 0.87; 95% CI = 0.66-1.15), though this difference was not significant (20).

#### **Discussion**

Overall, 20 studies were included. There was a heterogenous body of literature identified in the present review. IVR was implemented as either a standalone or adjunct technology. When implemented as an adjunct technology, IVR was often paired with in- and out-patient counselling, nicotine replacement therapy, or self-help materials, though the type of adjunct

intervention did not impact effectiveness of IVR. IVR was also implemented at several points along the patient trajectory and was effective at increasing self-reported abstinence and increasing the use of other tobacco cessation interventions across multiple different populations, including general smokers, hospitalized patients, quitline users, adult perinatal or pregnant women, cancer patients, and veteran smokers. While the frequency of IVR calls and follow-up times varied widely in the literature and studies specifically comparing different IVR delivery schedules reported no differences between brief/short-term and sustained IVR delivery, increased IVR frequency and shorter time between follow-ups were generally associated with increased effectiveness of IVR. The studies that reported on costs reported that IVR reduced healthcare costs. However, IVR did not significantly affect other outcomes, including hospitalization and biochemically confirmed abstinence. Additionally, the reach of IVR was consistently low. Despite variability of findings, no application or use of IVR was shown to be harmful to participants and studies that reported patient perspectives were highly positive.

The results of our search are mixed on the effectiveness of IVR, and the use of IVR in other contexts is similarly mixed. Some studies report significantly improved patient outcomes with the use of IVR, particularly those for disease management and medication adherence (32-34); others, however, report minimal effectiveness of IVR, particularly for alcohol dependence (35-37). The studies on alcohol dependence found that while clinical outcomes were not different, IVR was useful for self-monitoring and provided regular feedback on alcohol use to patients (36, 37). Additionally, most studies noted that IVR is relatively inexpensive and can have a high reach, particularly for otherwise hard-to-reach patients, meaning it may be useful in keeping patients engaged in treatment even if clinical effectiveness is low (34-37). These findings, along with the results of our search, may suggest that IVR for tobacco cessation may be most effective when used as a way of engaging patients in treatment rather than as a treatment itself.

Our review, along with the wider literature on IVR, suggests that while IVR may have limited clinical effectiveness, there are other factors that should be considered for IVR use in tobacco cessation. For patients, IVR can be an accessible tobacco cessation tool. Barriers to entry are relatively low, it can provide a private, judgement-free environment for patients to speak freely about their smoking habits, tobacco use, goals, fears, and motivations, and it can offer an

opportunity for patients to engage in self-monitoring of their own care and progress. However, due to the automated nature of IVR, there may be a loss of the emotional support patients can receive with in-person counselling (38). For providers, IVR can immensely reduce their workload and optimize their time and scalability, while still allowing them to thoroughly care for many patients simultaneously. IVR can help providers gain regular insight on the progress of their patients and can help guide or revise treatment plans and provide additional support when needed most. However, there is required technical training, privacy concerns, and implementation costs that providers should consider when thinking about using IVR for tobacco cessation. Implications on the healthcare system include important public health and population health considerations. IVR directly addresses smoking and tobacco use which continues to highly burden the healthcare system through smoking-related diseases. IVR can also assist with appropriate resource allocation and may serve as a cost-saving healthcare tool. Ultimately, though the clinical effectiveness of IVR may be low for some patients, it may still be a useful tool for patients, providers, and the healthcare system for increasing smoking cessation and reducing healthcare use and costs.

While this study provides a broad overview of the current literature surrounding IVR for tobacco cessation, several limitations exist. First, the majority of included studies were of low to moderate quality. Though most studies were controlled trials, variability in interventions, methods and outcome measures prevented the possibility for a metanalysis. This limited the extent to which the comparative effectiveness of IVR applications and uses across the different populations could be inferred. Further, due to the low number and quality of studies available for multiple populations, generalizations cannot be made, and results should be interpreted with caution.

There are also significant gaps present in the literature that should be noted. Though the literature review identified several unique populations, there were several populations that were not identified that may uniquely benefit from IVR, such as racialized groups and Indigenous Peoples, and only one study stratified by sex or gender. Therefore, little is known about how the effectiveness of IVR is affected by race, marginalization, or sex or gender. Similarly, there were no studies that compared IVR initiated in different contexts or settings, such as inpatient versus

outpatient, and very few compared rural and urban settings. The effectiveness of IVR could be impacted by the context or setting in which it is initiated as this may affect how open patients are to quitting, and different considerations or barriers associated with different settings may be required. Further, only two studies compared different IVR delivery schedules and found no difference (21, 27). Different schedules and times to follow-ups may have different effectiveness, and effectiveness may be dependent on patient needs. Finally, the literature search did not identify any qualitative studies examining patient perspectives on IVR, the usefulness of IVR, and patient's responsiveness to IVR for tobacco cessation and no studies examined providers' opinions on IVR.

#### **Conclusion**

It is imperative that tobacco cessation interventions be approached with effective mitigating and preventative strategies. While the evidence base is weak, results of this review indicate that IVR appears to be a promising intervention that can be implemented in multiple healthcare settings, across multiple distinct populations. Overall, IVR was effective at increasing abstinence rates and encouraging positive health outcomes for tobacco cessation. However, several significant gaps in the literature still exist. Organizations can pilot tobacco cessation intervention programs using IVR and contribute, using real-life contexts, to the growing knowledge base of this technology.

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- Supplemental material Appendix A. Final Search Strategies; Appendix B. Table of Study
- Characteristics; Appendix C. Full Risk of Bias Assessment
- Data sharing: Not applicable.

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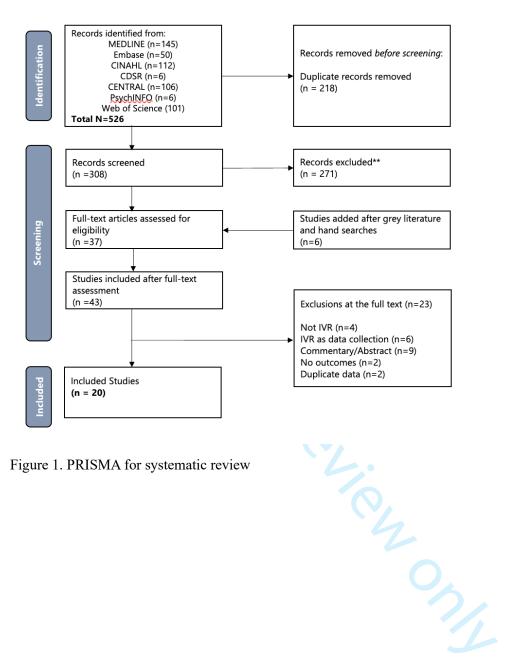


Figure 1. PRISMA for systematic review

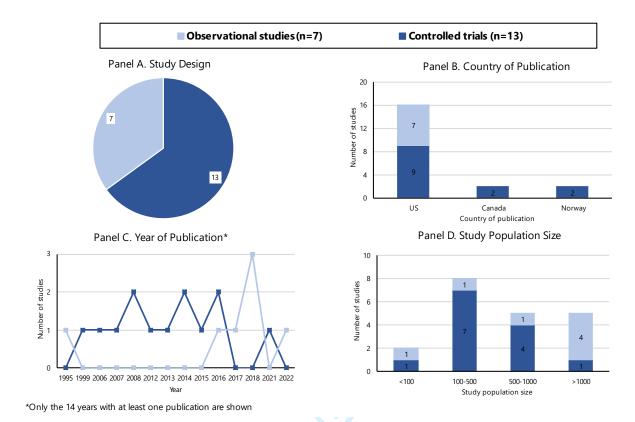


Figure 2. Summary characteristics of included studies

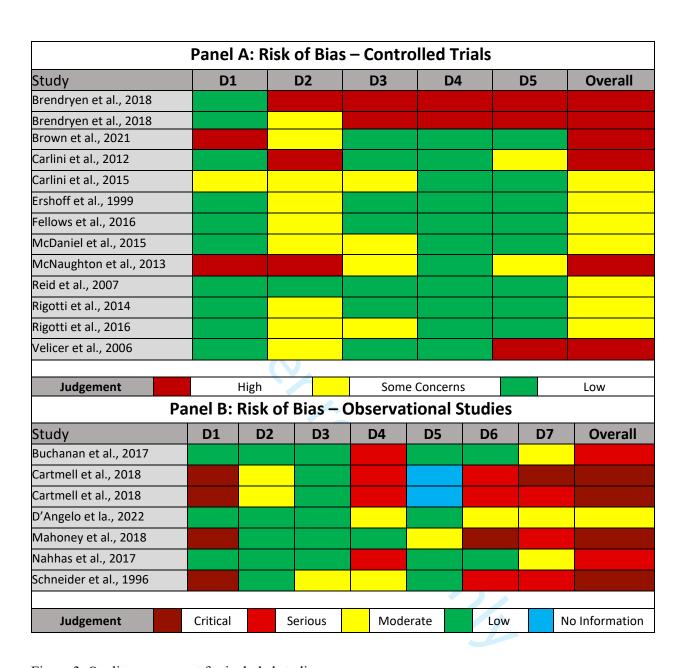


Figure 3. Quality assessment for included studies

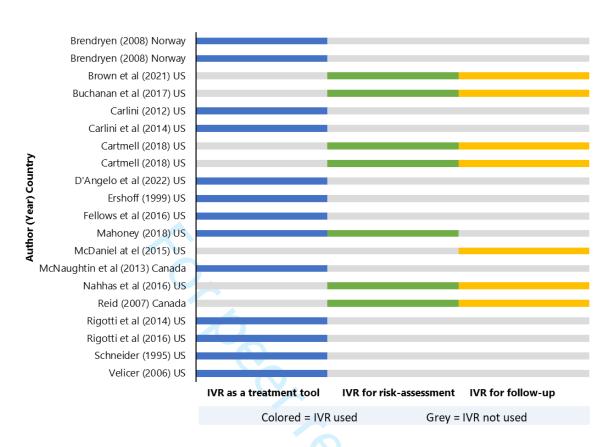


Figure 4. Timing of IVR use in the care trajectory

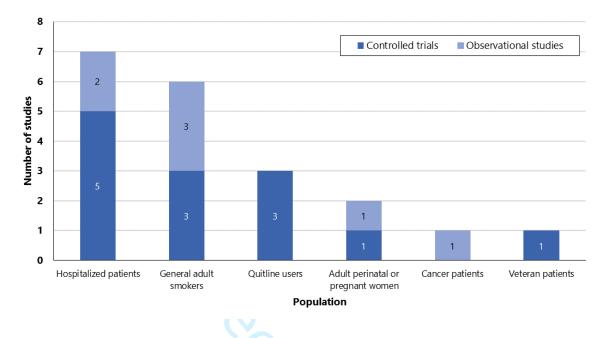


Figure 5. Populations assessed in systematic review

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Appendix A. Final search strategies

2023 May 3

Ovid Multifile

Database: Embase <1974 to 2023 May 02>, APA PsycInfo <1806 to April Week 4 2023>, Ovid MEDLINE(R) ALL <1946 to May 02, 2023>

Search Strategy:

1 Constitut (1115020)

- 1 Smoking Cessation/ (115928)
- 2 Smoking Reduction/ (519)
- 3 "Tobacco Use Cessation"/ (70076)
- 4 Smoking Cessation Agents/ (314)
- 5 "Tobacco Use Cessation Devices"/ (5573)
- 6 Smoking/th [therapy] (2353)
- 7 exp Tobacco Smoking/th [therapy] (561)
- 8 "Tobacco Use Disorder"/th [therapy] (3548)
- 9 Vaping/th [therapy] (17)
- 10 ((smoking or smoker\* or tobacco\* or nicotine or cigar? or cigarette\* or cigarillo? or vape\$1 or vaping or ecig\* or e-cig\* or e-vape\$1 or e-vaping or evape\$1 or evaping or snuff or snus or gutka or gutkas or naswar) adj5 (abstain\* or abstinen\* or cease or ceased or ceases or cessation\* or dehabituat\* or desist\* or discontinu\* or end or ended or ending or ends or "give up" or "giving up" or "gives up" or "gave up" or halt\* or quit\* or stop\*)).tw,kw,kf. (135877)
- ((smoking or smoker\* or tobacco\* or nicotine or cigar? or cigarette\* or cigarillo? or vape\$1 or vaping or ecig\* or e-cig\* or e-vape\$1 or e-vaping or evape\$1 or evaping or snuff or snus or gutka or gutkas or naswar) adj5 (curb\* or curtail\* or decreas\* or diminish\* or lessen\* or limit\* or lower\* or reduc\* or taper\* or cut back or cuts back or cutting back)).tw,kw,kf. (111997)
- 12 or/1-11 [TOBACCO CESSATION] (243977)
- 13 ((interactive or inter-active) adj voice record\*).tw,kw,kf. (60)
- 14 ((interactive or inter-active) adj voice respon\*).tw,kw,kf. (2573)
- 15 voice response unit?.tw,kw,kf. (5)
- 16 (IVR adj5 (call\* or cellphon\* or cell-phon\* or dialogue\* or mobile? or phon\* or record\* or smartphon\* or smart-phon\* or system? or technolog\* or telephon\*)).tw,kw,kf. (1220)
- 17 ((IVR or IVRS) and (interactive or inter-active or voice or record\* or respons\*)).tw,kw,kf. (2376)
- 18 AI-IVR.tw,kw,kf. (2)
- 19 ((automated or digital\* or intelligent or interactive or inter-active or smart or virtual) adj3 (assistant? or PDA or PDAs)).tw,kw,kf. (4153)
- 20 (Alexa or Bixby or Cortana or Siri or Google Assistant).tw,kw,kf. (8019)
- 21 Reminder Systems / (6619)
- 22 Speech Recognition Software/ (2074)
- 23 or/13-22 [IVR] (24377)
- 24 12 and 23 [TOBACCO CESSATION IVR] (334)
- 25 24 use medall [MEDLINE RECORDS] (146)
- 26 smoking cessation/ (115928)
- 27 smoking cessation program/ (3867)
- 28 smoking reduction/ (519)
- 29 smoking cessation agent/ (314)

30 nicotine gum/ (3087)

- 31 smoking/th [therapy] (2353)
- 32 tobacco dependence/th [therapy] (4751)
- 33 ((smoking or smoker\* or tobacco\* or nicotine or cigar? or cigarette\* or cigarillo? or vape\$1 or vaping or ecig\* or e-cig\* or e-vape\$1 or e-vaping or evape\$1 or evaping or snuff or snus or gutka or gutkas or naswar) adj5 (abstain\* or abstinen\* or cease or ceased or ceases or cessation\* or dehabituat\* or desist\* or discontinu\* or end or ended or ending or ends or "give up" or "giving up" or "gives up" or "gave up" or halt\* or quit\* or stop\*)).tw,kw,kf. (135877)
- 34 ((smoking or smoker\* or tobacco\* or nicotine or cigar? or cigarette\* or cigarillo? or vape\$1 or vaping or ecig\* or e-cig\* or e-vape\$1 or e-vaping or evape\$1 or evaping or snuff or snus or gutka or gutkas or naswar) adj5 (curb\* or curtail\* or decreas\* or diminish\* or lessen\* or limit\* or lower\* or reduc\* or taper\* or cut back or cuts back or cutting back)).tw,kw,kf. (111997)
- 35 or/26-34 [TOBACCO CESSATION] (244250)
- 36 ((interactive or inter-active) adj voice record\*).tw,kw,kf. (60)
- 37 ((interactive or inter-active) adj voice respon\*).tw,kw,kf. (2573)
- 38 voice response unit?.tw,kw,kf. (5)
- 39 (IVR adj5 (call\* or cellphon\* or cell-phon\* or dialogue\* or mobile? or phon\* or record\* or smartphon\* or smart-phon\* or system? or technolog\* or telephon\*)).tw,kw,kf. (1220)
- 40 ((IVR or IVRS) and (interactive or inter-active or voice or record\* or respons\*)).tw,kw,kf. (2376)
- 41 AI-IVR.tw,kw,kf. (2)
- 42 ((automated or digital\* or intelligent or interactive or inter-active or smart or virtual) adj3 (assistant? or PDA or PDAs)).tw,kw,kf. (4153)
- 43 (Alexa or Bixby or Cortana or Siri or Google Assistant).tw,kw,kf. (8019)
- 44 reminder system/ (6830)
- 45 automatic speech recognition/ (1338)
- 46 or/36-45 [IVR] (23924)
- 47 35 and 46 [TOBACCO CESSATION IVR] (340)
- 48 47 use oemezd [EMBASE RECORDS] (156)
- 49 Smoking Cessation/ (115928)
- 50 "Tobacco Use Disorder"/ (26295)
- ((smoking or smoker\* or tobacco\* or nicotine or cigar? or cigarette\* or cigarillo? or vape\$1 or vaping or ecig\* or e-cig\* or e-vape\$1 or e-vaping or evape\$1 or evaping or snuff or snus or gutka or gutkas or naswar) adj5 (abstain\* or abstinen\* or cease or ceased or ceases or cessation\* or dehabituat\* or desist\* or discontinu\* or end or ended or ending or ends or "give up" or "giving up" or "gives up" or "gave up" or halt\* or quit\* or stop\*)).tw,id. (134325)
- 52 ((smoking or smoker\* or tobacco\* or nicotine or cigar? or cigarette\* or cigarillo? or vape\$1 or vaping or ecig\* or e-cig\* or e-vape\$1 or e-vaping or evape\$1 or evaping or snuff or snus or gutka or gutkas or naswar) adj5 (curb\* or curtail\* or decreas\* or diminish\* or lessen\* or limit\* or lower\* or reduc\* or taper\* or cut back or cuts back or cutting back)).tw,id. (111682)
- 53 or/49-52 [TOBACCO CESSATION] (252880)
- 54 ((interactive or inter-active) adj voice record\*).tw,id. (58)
- 55 ((interactive or inter-active) adj voice respon\*).tw,id. (2522)
- 56 voice response unit?.tw,id. (5)
- 57 (IVR adj5 (call\* or cellphon\* or cell-phon\* or dialogue\* or mobile? or phon\* or record\* or smartphon\* or smart-phon\* or system? or technolog\* or telephon\*)).tw,id. (1210)
- 58 ((IVR or IVRS) and (interactive or inter-active or voice or record\* or respons\*)).tw,id. (2327)
- 59 AI-IVR.tw,id. (2)

- 60 ((automated or digital\* or intelligent or interactive or inter-active or smart or virtual) adj3 (assistant? or PDA or PDAs)).tw,id. (4035)
- 61 (Alexa or Bixby or Cortana or Siri or Google Assistant).tw,id. (7941)
- 62 Automated Speech Recognition/ (2494)
- 63 or/54-62 [IVR] (18078)
- 64 53 and 63 [TOBACCO CESSATION IVR] (228)
- 65 64 use psyh [PSYCINFO RECORDS] (38)
- 66 25 or 48 or 65 [ALL DATABASES] (340)
- 67 remove duplicates from 66 (201) [TOTAL UNIQUE RECORDS]
- 68 67 use medall [MEDLINE UNIQUE RECORDS] (145)
- 69 67 use oemezd [EMBASE UNIQUE RECORDS] (50)
- 70 67 use psyh [PSYCINFO UNIQUE RECORDS] (6)

## \*\*\*\*\*\*\*\*\*\*

## CINAHL

#	Query	Limiters/Expanders	Last Run Via	Results
S24	S19 OR S23	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Plus with Full Text	112
S23	S7 AND S22	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Plus with Full Text	66
S22	S20 OR S21	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search	1,199

			Database - CINAHL Plus with Full Text	
S21	TX "interactive voice" W0 record*	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Plus with Full Text	23
S20	TX "interactive voice response"	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Plus with Full Text	1,181
S19	S7 AND S18	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Plus with Full Text	82
S18	S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Plus with Full Text	6,342

S17	(MH "Voice Recognition Systems")	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database -	1,311
			CINAHL Plus with Full Text	
S16	(MH "Reminder Systems")	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Plus with Full Text	3,117
S15	TI ( Alexa or Bixby or Cortana or Siri or "Google Assistant" ) OR AB ( Alexa or Bixby or Cortana or Siri or "Google Assistant" )	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Plus with Full Text	426
S14	TI ( (automated or digital* or intelligent or interactive or inter-active or smart or virtual) N3 (assistant# or PDA or PDAs) ) OR AB ( (automated or digital* or intelligent or interactive or interactive or smart or virtual) N3 (assistant# or PDA or PDAs) )	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Plus with Full Text	950
S13	TI "AI-IVR" OR AB "AI-IVR"	Search modes - Find all my search terms	Interface - EBSCOhost Research	0

			Databases Search Screen - Advanced Search Database - CINAHL Plus with Full Text	
S12	TI ( (IVR or IVRS) and (interactive or inter-active or voice or record* or respons*) ) OR AB ( (IVR or IVRS) and (interactive or inter-active or voice or record* or respons*) )	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Plus with Full Text	290
S11	TI (IVR N5 (call* or cellphon* or cell-phon* or dialogue* or mobile# or phon* or record* or smartphon* or smart-phon* or system# or technolog* or telephon*) ) OR AB (IVR N5 (call* or cellphon* or cell-phon* or dialogue* or mobile# or phon* or record* or smartphon* or smart-phon* or system# or technolog* or telephon*))	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Plus with Full Text	217
S10	TI "voice response" W0 unit# OR AB "voice response" W0 unit#	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Plus with Full Text	1
\$9	TI ( ((interactive or inter-active) W0 voice respon*) ) OR AB ( ((interactive or inter-active) W0 voice respon*))	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced	629

			c 1	
			Search Database - CINAHL Plus with Full Text	
<b>S</b> 8	TI ( ((interactive or inter-active) W0 voice record*) ) OR AB ( ((interactive or inter-active) W0 voice record*) )	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Plus with Full Text	91
<b>S</b> 7	S1 OR S2 OR S3 OR S4 OR S5 OR S6	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Plus with Full Text	45,557
S6	TI ( (smoking or smoker* or tobacco* or nicotine or cigar# or cigarette* or cigarillo# or vape or vaped or vapes or vaping or ecig* or e-cig* or e-vape* or e-vaping or evape* or evaping or snuff or snus or gutka or gutkas or naswar) N5 (curb* or curtail* or decreas* or diminish* or lessen* or limit* or lower* or reduc* or taper* or "cut back" or "cuts back" or "cutting back") ) OR AB ( (smoking or smoker* or tobacco* or nicotine or cigar# or cigarette* or cigarillo# or vape or vaped or vapes or vaping or ecig* or e-cig* or e-vape* or e-vaping or evape* or evaping or snuff or snus or gutka or gutkas or naswar) N5 (curb* or curtail* or decreas* or diminish* or lessen* or limit* or lower* or reduc* or taper* or "cut back" or "cuts back" or "cutting back") )	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Plus with Full Text	16,852
S5	TI ( (smoking or smoker* or tobacco* or nicotine or cigar# or cigarette* or cigarillo# or vape or vaped or vapes or vaping or ecig* or e-cig* or e-vape* or	Search modes - Find all my search terms	Interface - EBSCOhost Research	25,644

	e-vaping or evape* or evaping or snuff or snus or gutka or gutkas or naswar) N5 (abstain* or abstinen* or cease or ceased or ceases or cessation* or dehabituat* or desist* or discontinu* or end or ended or ending or ends or "give up" or "giving up" or "gives up" or "gave up" or halt* or quit* or stop*) ) OR AB ( (smoking or smoker* or tobacco* or nicotine or cigar# or cigarette* or cigarillo# or vape or vaped or vapes or vaping or ecig* or e-cig* or e-vape* or e-vaping or evape* or evaping or snuff or snus or gutka or gutkas or naswar) N5 (abstain* or abstinen* or cease or ceased or ceases or cessation* or dehabituat* or desist* or discontinu* or end or ended or ending or ends or "give up" or "giving up" or "gives up" or "gave up" or halt* or quit* or stop*) )		Databases Search Screen - Advanced Search Database - CINAHL Plus with Full Text	
S4	(MH "Smoking/TH") OR (MH "Vaping/TH")	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Plus with Full Text	981
<b>S3</b>	(MH "Tobacco Use Cessation Products+")	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Plus with Full Text	3,979
S2	(MH "Smoking Cessation Programs")	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search	2,617

			Database - CINAHL Plus with Full Text	
S1	(MH "Smoking Cessation")	Search modes - Find all my search terms	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Plus with Full Text	22,734

## Web of Science

Set

# Search Query Results (smoking or smoker\* or tobacco\* or nicotine or cigar or cigars or cigarette\* or cigarillo\* or vape or vaped or vapes or vaping or ecig\* or e-cig\* or e-vape\* or e-vaping or evape\* or evaping or snuff or snus or gutka or gutkas or naswar) NEAR/5 (abstain\* or abstinen\* or cease or ceased or ceases or cessation\* or dehabituat\* or desist\* or discontinu\* or end or ended or ending or ends or "give up" or "giving up" or "gives up" or "gave up" or 1 halt\* or quit\* or stop\*) (Topic) (smoking or smoker\* or tobacco\* or nicotine or cigar or cigars or cigarette\* or cigarillo\* or vape or vaped or vapes or vaping or

ecig\* or e-cig\* or e-vape\* or e-vaping or evape\* or evaping or snuff or snus or gutka or gutkas or naswar) NEAR/5 (curb\* or curtail\* or decreas\* or diminish\* or lessen\* or limit\* or lower\* or reduc\* or taper\* or "cut back" or "cuts back" or "cutting 2 back") (Topic)

3 #2 OR #1 

(interactive or inter-active) NEAR/O ("voice record" or "voice recorded" or "voice recording" OR "voice recordings" or "voice

4 records") (Topic) (interactive or inter-active) NEAR/O ("voice response" or "voice responses" or "voice respond" or "voice responded" OR "voice

responding" or "voice responds") (Topic) 

"voice response unit" or "voice response units" (Topic) IVR NEAR/5 (call\* or cellphon\* or cell-phon\* or dialogue\* or

7 mobile or mobiles or phon\* or record\* or smartphon\* or smart-

7 (Topic)

	phon* or system or systems or technolog* or telephon*) (Topic)	
8	(IVR or IVRS) and (interactive or inter-active or voice or record* or respons*) (Topic)	1165
9	"AI-IVR" (Topic)	1
	(automated or digital* or intelligent or interactive or inter-	
	active or smart or virtual) NEAR/3 (assistant or assistants or PDA	
10	or PDAs) (Topic)	6484
11	Alexa or Bixby or Cortana or Siri or "Google Assistant" (Topic)	4778
12	#11 OR #10 OR #9 OR #8 OR #7 OR #6 OR #5 OR #4	12886
13	#12 AND #3	101
Web o	f Science	
Set		
#	Search Query	Results
	(smoking or smoker* or tobacco* or nicotine or cigar or cigars	
	or cigarette* or cigarillo* or vape or vaped or vapes or vaping or	
	ecig* or e-cig* or e-vape* or e-vaping or evape* or evaping or snuff or snus or gutka or gutkas or naswar) NEAR/5 (abstain* or	
	abstinen* or cease or ceased or ceases or cessation* or	
	dehabituat* or desist* or discontinu* or end or ended or ending	
	or ends or "give up" or "giving up" or "gives up" or "gave up" or	
1	halt* or quit* or stop*) (Topic)	53731
	(smoking or smoker* or tobacco* or nicotine or cigar or cigars	
	or cigarette* or cigarillo* or vape or vaped or vapes or vaping or	
	ecig* or e-cig* or e-vape* or e-vaping or evape* or evaping or	
	snuff or snus or gutka or gutkas or naswar) NEAR/5 (curb* or	
	curtail* or decreas* or diminish* or lessen* or limit* or lower* or reduc* or taper* or "cut back" or "cuts back" or "cutting	
2	back") (Topic)	49489
3	#2 OR #1	89674
	(interactive or inter-active) NEAR/0 ("voice record" or "voice	
	recorded" or "voice recording" OR "voice recordings" or "voice	
4	records") (Topic)	20
	(interactive or inter-active) NEAR/0 ("voice response" or "voice	
	responses" or "voice respond" or "voice responded" OR "voice	
5	responding" or "voice responds") (Topic)	1288
6	"voice response unit" or "voice response units" (Topic)	8
	IVR NEAR/5 (call* or cellphon* or cell-phon* or dialogue* or mobile or mobiles or phon* or record* or smartphon* or smart-	
	phon* or system or systems or technolog* or telephon*)	
_	/+ · \	746

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```
(IVR or IVRS) and (interactive or inter-active or voice or record*
   or respons*) (Topic)
 8
                                                                      1165
 9 "AI-IVR" (Topic)
                                                                      1
    (automated or digital* or intelligent or interactive or inter-
    active or smart or virtual) NEAR/3 (assistant or assistants or PDA
10 or PDAs) (Topic)
                                                                      6484
11 Alexa or Bixby or Cortana or Siri or "Google Assistant" (Topic)
                                                                      4778
12 #11 OR #10 OR #9 OR #8 OR #7 OR #6 OR #5 OR #4
                                                                      12886
13
    #12 AND #3
                                                                      101
```

5599

42

## Cochrane Library

Search Name:

04/05/2023 05:20:45 Date Run:

[mh "Smoking Cessation"]

[mh "Smoking Reduction"]

Search Hits

Comment:

ID

#1

#2

#3

```
[mh "Tobacco Use Cessation"]
#4
        [mh "Smoking Cessation Agents"]
                                                66
#5
        [mh "Tobacco Use Cessation Devices"]
#6
        [mh ^Smoking/TH]
                                598
#7
        [mh "Tobacco Smoking"/TH]
#8
        [mh "Tobacco Use Disorder"/TH]
                                                472
#9
        [mh Vaping/TH]3
#10
        ((smoking or smoker* or tobacco* or nicotine or cigar or cigars or cigarette* or cigarillo* or vape
or vaped or vapes or vaping or ecig* or e-cig* or e-vape* or e-vaping or evape* or evaping or snuff or
snus or gutka or gutkas or naswar) NEAR/5 (abstain* or abstinen* or cease or ceased or ceases or
cessation* or dehabituat* or desist* or discontinu* or end or ended or ending or ends or "give up" or
"giving up" or "gives up" or "gave up" or halt* or quit* or stop*)):ti,ab,kw
                                                                                 14748
        ((smoking or smoker* or tobacco* or nicotine or cigar or cigars or cigarette* or cigarillo* or vape
#11
or vaped or vapes or vaping or ecig* or e-cig* or e-vape* or e-vaping or evape* or evaping or snuff or
snus or gutka or gutkas or naswar) NEAR/5 (curb* or curtail* or decreas* or diminish* or lessen* or
limit* or lower* or reduc* or taper* or "cut back" or "cuts back" or "cutting back")):ti,ab,kw
                                                                                                 6686
#12
        {or #1-#11}
                        17438
#13
        ((interactive or inter-active) NEXT voice record*):ti,ab,kw
                                                                        210
#14
        ((interactive or inter-active) NEXT voice respon*):ti,ab,kw
                                                                        1052
#15
        ("voice response" NEXT (unit# or units)):ti,ab,kw0
        (IVR NEAR/5 (call* or cellphon* or cell-phon* or dialogue* or mobile* or phon* or record* or
#16
smartphon* or smart-phon* or system or systems or technolog* or telephon*)):ti,ab,kw 276
#17
        ((IVR or IVRS) and (interactive or inter-active or voice or record* or respons*)):ti,ab,kw
                                                                                                554
#18
        "AI-IVR":ti,ab,kw
#19
        ((automated or digital* or intelligent or interactive or inter-active or smart or virtual) NEAR/3
(assistant# or PDA or PDAs)):ti,ab,kw
#20
        (Alexa or Bixby or Cortana or Siri or "Google Assistant"):ti,ab,kw 166
#21
        [mh "Reminder Systems"]
                                        1108
```

BMJ Open: first published as 10.1136/bmjopen-2023-081972 on 9 July 2024. Downloaded from http://bmjopen.bmj.com/ on June 13, 2025 at Agence Bibliographique de l Enseignement Superieur (ABES)

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#22 [mh "Speech Recognition Software"] 

#23 {or #13-#22} #24 #12 AND #23 

CDSR - 6 reviews CENTRAL - 106 trials



Appendix B: Table of Study Characteristics

Appendix B: Table	of Study Characteristics	ВМЈ Ор	en	136/bmjopen-2023-08197	
	Study information	Intervention	Patient characteristics	Primary Outcomes	Other outcomes
Brendryen et al.	Study design:	Purpose of IVR:	Population:	Reach: 62% of es r	At 1 month, 51% of
(2008) Norway	Controlled	Intervention	Adult Smokers	participants answered log-get to text and data reatment.	participants found HE to be "helpful,"
Trial #: Not	Study setting:	Description of	Comparator:	calls. 87	and 32% reported
reported	Digital/Quitline	intervention: Happy	Usual care	intervention Explosion	HE to be "very
		Ending program is an		participants and beginned	helpful".
Funder:	Inclusion criteria:	internet-based	N: 144	completed a for	
Norwegian	Wanting to attempt	multimedia	Control: 146	treatment.	
Research Council	quitting, 18 or older,	intervention that used	Age: 39.5	mining	
Industry	smoking 5+ cigarettes a day,	CBT techniques to help	Age. 39.3	Abstinence at 9 hmjopen.bmj.co	
sponsored: No	attempt quit without	people quit smoking without the use of	% female: 50%	follow-up:	
Sponsoreal no	nicotine replacement	nicotine replacement	10.	abstinence was	
	therapy	therapies. IVR is an	1/1/	20% for	
		aspect of the		intervention graup	
		intervention, along		and 7% for control	
		with website-based		group (p=0.002)	
		activities and SMS		13, 2 chno	
		messages.		3, 2025 at hnologies.	
		Standalone or adjunct:		s.	
		Adjunct		at Agence B	
		IVR/Follow-up		Bibliograp	
		Schedule: Regular IVR		grap	

			ı	<del> </del>	T
		calls depending on		)023-081972 jht, includir	
		participants' needs;		3197 clud	
		follow up at 1, 3, 6 and		023-081972 on 9 ht, including for	
		12 months		n 9 for	
Brendryen et al.	Study design:	Purpose of IVR:	Population:	Reach: 71% of 🖁 📆 💆	At 1 month, 48.2%
(2008) Norway	Controlled	Intervention	Adult Smokers	participants 8 20.20	found HE to be
				answered log-	'helpful' and 44.7%
Trial #: Not	Study setting:	Description of	Comparator:	calls. 152	reported HE to be
reported	Digital/Quitline	intervention: Happy	Usual Care	Reach: 71% of ses related to text and data management.  Reach: 71% of ses related to text and data management.  Abstingage at Abstingage at Abstingage at text and data management.	'very helpful'.
		Ending program is an		completed and a	
Funder:	Inclusion criteria:	internet-based	N: 197	treatment.	Most participants in
Norwegian	Wanting to attempt	multimedia	Control: 199	om ata	both groups opted
Research	to quit smoking,	intervention that used		Abstinence at 3.85	Tor With therapy
Council, Pfizer	aged 18+, smoking	CBT techniques to help	Age: 35.9	Abstinence at mining, ABES).  Abstinence at mining, Extraoring Repeated points train abstinence was abstinence at abstinenc	(93% intervention
	10+ cigarettes a day	people quit smoking.	0/05-0-1-	Repeated poin ≥ 5	vs. 87% control - p =
Industry	and have access to	IVR is an aspect of the	% female:		0.07). At 1 month,
sponsored: Yes	the internet, email	intervention, along	50.8%	significantly hiễ្ឌheែ្ន	the mean number o
	and cellphone	with website-based	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	in treatment g gug	days of NRT use was
		activities and SMS		(22.3%) vs. con	significantly higher
		messages. Participants		(13.1%) (p = 0.82. At the 12 month	in treatment group
		were given and allowed		At the 12 mont੍ਹੀ ਹੈ	(M = 5.1 vs. 3.9; p =
		to use NRT products if		follow up, 74 🔓 🗯	0.02).
		they wanted.		follow up, 74 is 13, 2025	
				At the 12 months follow up, 74 treatment participants	
		Standalone or adjunct:		reported 💆	
		Adjunct		reported Agence control participants	
				control participant	
		IVR/Follow-up		(p = 0.005)	
		Schedule: Regular IVR		gra	
				(p = 0.005) Bliographique de I	
				ue d	
	For peer re	view only - http://bmjopen.bm	ni com/site/about/quid	delines.xhtml	

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Brown et al. (2021) US  Trial #: NCT02204956  Funder: National Institute of Mental Health Industry sponsored: No	Study design: Controlled  Study setting: Acute care private Psychiatric hospital  Inclusion criteria: Inpatient psychiatric patients aged 18 or older who smoked at least 5 cigarettes per day  Exclusion: a current diagnosis of nonnicotine substance use disorder, dementia, intellectual disability, autistic spectrum or other cognitive impairment, an	calls depending on participants' needs; follow up at 1, 3, 6 and 12 months  Purpose of IVR: Follow-up monitoring  Description of intervention: Patients received in-patient tobacco cessation counselling. Following discharge, IVR asked about participants' smoking, intentions to quit, desire for an additional 4 weeks of transdermal nicotine patches (ie, 8weeks total), and interest in connecting with free telephone quitline counseling.  Standalone or adjunct: Adjunct	Population: Hospitalized Patients  Comparator: Usual Care  N: 174 Control: 179  Age: 36.1  % female: 46.7%	136/bmjopen-2023-081972 on 9 July 2024. Down baded from http://bmjopen.bmj.com/ on June 13, 2025 at Agence Bibliogra Ensaginement Superieur (ABES).  cted by copyright, including for uses related to dext and data mining, and similar technologies.  at 9.9  cted by copyright, including for uses related to dext and data mining, and similar technologies.  Ab similar technologies.  Ab follow reported a by a line of control at by an another control of the con	Use of any smoking cessation treatment: 74.6% of intervention vs. 40.5% of control at 6 months, p<0.001  Use of counselling: 37.3% of intervention vs. 11.0% of control at 6 months, p<0.001  Use of pharmacotherapy: 71.0% vs. 37.0% at 6 months, p<0.001
	inability to provide consent, medical	IVR/Follow-up Schedule: 8 times over		ibliograp	

		ВМЈ Ор	en	136/bmjopen cted by copy	
Buchanan et al. (2017) US Funder: MUSC, NIDA Industry sponsored: No	contraindication to the use of NRT or a current pregnancy.  Study design: Observational  Study setting: Academic medical center  Inclusion criteria: Adult women admitted to the peripartum, delivery, and postpartum units  Exclusion criteria: Women over 41 and admitted for something non-pregnancy-related	12 weeks post-discharge  Purpose of IVR: Follow-up monitoring and transfer  Description of intervention: Patients counselled in-hospital by a tobacco treatment specialist; Post-discharge, IVR collected info on smoking status, frequency, quit attempts, motivation to quit, use of nicotine replacement therapy (NRT) and whether the patient wanted to be transferred to the quitline	Population: Adult perinatal women  Comparator: Bedside Cessation Counselling + IVR  N: 421  Age: 29  % female: 100%	136/bmjopen-2023-081972 dn 9 July 2024. Downtoaded from http://bmjopen.bmj.com/ on June 13, 2025 at Enseignement Superieur (ABES). y Enseignement Enseignem	15.4% of IVR + counselling participants used NRT vs. 4% of IVR only  10.8% of IVR + counselling participants were transferred to the quitline vs. 14.0% of IVR only
		Standalone or adjunct: Adjunct  IVR/Follow-up Schedule: 3-, 14-, and 30-days post-discharge		5 at Agence Bibliographique de l	

		ВМЈ Оре	en	Reach: 23.6% dince previous quitlime users reached in
Carlini et al.	Study design:	Purpose of IVR:	Population:	<u>호</u> 항 Reach: 23.6% 한 경
(2012) USA	Controlled	Intervention	Quitline users	previous quitlinge 3
(===, ==,			<b></b>	users reached in 22
Trial #:	Study setting:	Description of	Comparator:	on 9
NCT0126059	Quitline	intervention: Recruited	Usual Care	Re-enrollment हिन्मह्
		participants who were		was 28.2% for $\frac{69}{8}$ $\frac{1}{8}$
Funder: National	Inclusion criteria:	previously enrolled in a	N: 245	intervention vs
Cancer Institute	Previously enrolled	quitline intervention;	Control: 276	3.3% for control $ \  \  \  \  \  \  \  \  \  \  \  \  \$
	in quitline, Medicaid	IVR call assessed		
Industry	or uninsured, 18 or	smoking behaviours,	Age: 42.2	o supe
sponsored: No	older, sought help	current smoking status;		IVR participants = = = = = = = = = = = = = = = = = = =
	for cigarette/tobacco	if participants were	% female:	were 11.2 time $\stackrel{\square}{\stackrel{\square}{\stackrel{\square}{\stackrel{\square}{\stackrel{\square}{\stackrel{\square}{\stackrel{\square}{\stackrel{\square}$
	use	interested in	66.5%	more likely to 聲照畫
		reattempting quit, they		enroll than congress
		were enrolled into		(OR - p < 0.001 ₹ 3.
		connected with quitline	/ i°	(OR - p < 0.001) training, and
		specialist and	10.	ning
		reenrolled into IVR		g, ar
		intervention.		nd s
				on June
		Standalone or adjunct:		une ar te
		Standalone		ichn 13,
		IVR/Follow-up		pen.bmj.com/ on June 13, 2025 at training, and similar technologies.
		Schedule: One IVR call		ies.
		to assess and/or recruit		at Agence
		into intervention. Up to		nce
		20 call attempts made.		Biblio 9r
	l	can accempte made.		l

		ВМЈ Оре	en	136/bmjopen-20
Carlini et al. (2014) US  Trial #:  Funder: Quitline Registries for Continuously Engaging Participants in Cessation from the Centers for Disease Control and Prevention  Industry sponsored: No	Study design: Controlled  Study setting: Quitline  Inclusion criteria: 18 or older, having received services in English, providing verbal consent, being a cigarette smoker, not being incarcerated, and not having received quitline services for at least 5 months before the study launch	Purpose of IVR: Intervention  Description of intervention: IVR system delivered a set of questions to identify motivational and informational barriers to recycling into a new quit attempt and provided tailored messages to specifically address these barriers  Standalone or adjunct: Standalone  IVR/Follow-up Schedule: Two cycles of	Population: Quitline Users  Comparator: Usual Care  N: 3,510 Control: 22,824  Age: 65.2% over 40  % female: 53.8%	Abstinence at follow-up: 24.0% reported abstagg from tobacco in uses regregated from http://bmjopen.bmj.com/ on June 1: Enseigher from tobacco in uses regregated from http://bmjopen.bmj.com/ on June 1: those followed with reported making a quit attempted last and adming, Al training, and similar tecling in the last 90 dining, Al training, and similar tecling in the last 90 dining.
Cartmell et al. (2018) USA  Funder: Agency of Healthcare Research and Quality, Pfizer	Study design: Observational Study setting: Hospital Inclusion criteria: 18+ smokers	6 IVR attempts each; follow-up at 90 days Purpose of IVR: Follow-up monitoring and transfer  Description of intervention: IVR call at discharge determined	Population: Hospitalized patients  Comparator: Usual Care  N: 764	Cost/Cost- ologo effectiveness: Eotata mean healthcare cost post- discharge: \$51,937 billiographique.

		ВМЈ Оре	en	136/bmjopen-20:
		·		yn-202 yright
	admitted to the	smoking status and	Control: 1439	; 3-0g
Industry	hospital	referred to the tobacco		Comparing over
sponsored: Yes		treatment specialist	Age: 49.4	health care charges
	Exclusion criteria:	that assessed patients'		for the TDTS logv
	Those admitted for	behaviour and	% female:	exposed (IVR) 🖟 📺 💆
	psychiatric care,	developed a treatment	47.5%	versus unexpoឡឹមផ្លី ខ្ល
	same day surgery,	plan with the patient.		patient groups $\frac{6}{2}$ $\frac{6}{2}$ $\frac{1}{2}$
	<24-hour	IVR also conducts		mean charges 🗗 💆
	observation or not	follow-up calls to		the IVR group 🎇 🚉
	discharged	evaluate smoking		\$8006 lower th ្នង់គ្លី ន្ទី
		status and transfer to		for the control a a a a
		counsellor if needed.		group (P=0.08) (S )
		, (C/2		htt NBE
		Standalone or adjunct:		Intervention
		Adjunct		implementation 3
			· ·	costs were \$345215
		IVR/Follow-up		per participant gr
		Schedule: At discharge,		12-month periပွဲပြ
		3, 14, 30 days post-		(incl. start-up 🏚 st 🖺
		discharge		with total
				intervention cost
				being \$158,14@
Cartmell et al.	Study design:	Purpose of IVR: Follow-	Population:	Readmission rages
(2018) USA	Observational	up monitoring and	Hospitalized	30-day - 9.8% <b>8</b> R 5
(====)		transfer	patients	vs. 11.9% control
Funder: Agency	Study setting:			(p=0.05), 90 day - 9
of Healthcare	Hospital	Description of	Comparator:	17.3% IVR vs.
Research and	'	intervention: IVR call at	Usual Care	18.6% control (p = 5
		discharge determined		0.258), 180 day - graphique de

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	1	T.	T	<del>,                                    </del>	T
	Inclusion criteria:	smoking status and	N: 764	22.4% IVR vs. 🚡 👸	
Industry	18+ smokers	referred to the tobacco	Control: 1439	23-081972 on 9 July 2024. Downloaded from http://bmjopen.bmj.com/ on June 13 Enseignement Superieur (ABES). t, including for uses related to text and data mining, Al training, and similar tech vs. rol vs. rol vs. 24.3% control v	
sponsored: Yes	admitted to the	treatment specialist		(p=0.239). ding 72	
	hospital	that assessed patients'	Age: 49.4	j for	
		behaviour and		Jul E	
	Exclusion criteria:	developed a treatment	% female:	y 20 nsei es r	
	Those admitted for	plan with the patient.	47.5%	924. gne elat	
	psychiatric care,	IVR also conducts		Dov ed t	
	same day surgery,	follow-up calls to		vnlc o te	
	<24-hour	evaluate smoking		upe xt a	
	observation or not	status and transfer to		nd c	
	discharged	counsellor if needed.		om lata	
		(C)		mir BEC	
		Standalone or adjunct:		ning	
		Adjunct		, ≥ 3	
			<b>/</b>	pen trai	
		IVR/Follow-up	10.	ning	
		Schedule: At discharge,		j.co ar	
		3, 14, 30 days post-		nd s	
		discharge; Follow-up at		imil	
		30-, 90- and 180-day		une ar te	
		post-discharge.		echi	
D'Angelo et al.	Study design:	Purpose of IVR:	Population:	Reach: IVR had the highest average at the hight average at the highest average at the highe	21.7% of patients
(2022) US	Observational	Intervention	Cancer Patients	highest average	had not smoked in
				reach with an average of 55.8%	the past 7 days and
Funder: National		Description of	Comparators:	average of 55.8%	18.6% had not
Cancer Institute	Study setting: Cancer	intervention: IVR used	Other smoking	of patients reache	smoked in the past
	Centers	to automatically	cessation	blio	30 days, however,
		identify and contact	intervention	gra	this result applies to
				- phi	
				of patients reached bliographique de delines.xhtml	
				<u>de</u>	
	For peer re	eview only - http://bmjopen.bn	nj.com/site/about/gui	delines.xhtml	

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Industry	Inclusion criteria:	patients who smoked	including	yright,	all cancer centers,
sponsored: No	Adults 18 years and	to provide treatment.	telephone	-081 incl	across all
sponsored. No	older	Implemented in 4/38	counselling, in-	972 udir	implemented
	Oldel	cancer centers.	person	ng fo	interventions and is
		cancer centers.	counselling,	9 Ju	not specific to IVR.
		Standalone or adjunct:	cessation	enso ses	not specific to tvik.
		Unclear	medication and	seigne s relat	
		- Chiclesi	access to a		
		IVR/Follow-up	quitline.	to to	
		Schedule: Not reported	quitime.	Downloaded ment Superi ed to text and	
			N: 38 Cancer	led f erie and	
	4		centers	rom ur (/ data	
		10/	Age: N/A	http://bmjope ABES) . a mining, Al tra	
			% female: N/A		
Ershoff et al.	Study design:	Purpose of IVR:	Population:		Only 20.8% of IVR
(1999) USA	Controlled	Intervention	Adults Perinatal	Reach: 285 ning participants successfully	patients placed one
			women	baccessiany o	or more calls to the
Trial #: Not	Study setting:	Description of		reached for fole	system and it had no
reported	Hospital	intervention: For the	Comparators:	up at the 34th	impact on their quit
		IVR subgroup,	Cessation	week of pregnancy	status
Funder: Not	Exclusion criteria:	participants were given	booklet,	(IVR only group not)	
reported	Women under the	informational booklet	Motivational	specified) g. 25 at	
Industry.	age of 18, and those	along with access to	Interviewing	▶	
Industry	who began prenatal	computerized IVR	N. 420	Quit rate: 16.7% of	
sponsored: No	care past the 26th	support system that	N: 120	IVR intervention	
	week of pregnancy,	they had access to 24/7	Control: 111	group were	
	smoked less than 7	toll-free. IVR would ask	Ago: 20 6	group were bliograph	
	cigarettes week pre-		Age: 29.6	<u> </u>	

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	pregnancy, had	about smoking		confirmed end	
	experienced a	behaviour and	% female: 100%	pregnancy quiteers	
	miscarriage/	readiness to change as		- not statistica	
	abortion, and had	well as stage-		significant of o	
	not smoked prior to	appropriate,			
	the baseline	customized		y 20 nsei es r	
	interview	motivational messages,		)24. igne elat	
		interactive activities		Dov ed t	
		and reinforcement.		vnlc o te	
		Standalone or adjunct:		yade upe xt a	
		Adjunct		July 2024. Downloaded from http://bmjopen. Enseignement Superieur (ABES) . uses related to text and data mining, Al trair	
				data	
		IVR/Follow-up		m. B.	
		Schedule: Available		http://bi BES) . mining,	
		24/7 for participants to		j, Al	
		utilize as needed;	<b></b>	trai	
		Follow-up at 32 weeks	10.	njopen.bmj. Al training,	
		pregnancy		j, co g, ar	
Fellows et al.	Study design:	Purpose of IVR:	Population:	Reach: 50.6% of	Use of any quit
(2016) US	Controlled	Intervention	Hospitalized	patients comp <b>Ē</b> te <b>₹</b>	program: 8.4% in
			patients	call 1, 31.3%	intervention, 5.0% i
Trial #:	Study setting:	Description of		completed call နှို; ជំ	control, p=0.096
NCT01236079	Hospitals	intervention: Patients	Comparator:	mean total calle 2	
Funder: National		were counselled in-	Usual Care	completed = 2 5 SD 5	Use of telephone
Heart, Lung, and	Inclusion criteria:	hospital and created a		1.7)	quitline: 6.9%
Blood Institute	Adult patients	tailored discharge	N: 597	yenc	intervention vs.
	admitted to one of	treatment	Control: 301	Abstinence at $\overline{\mathbf{w}}$	2.5% control,
Industry	the hospitals who	recommendation;		completed = 2 SD at 1.7)  Abstinence at follow-up: 30-day billow	p=0.014
sponsored: No	reported having	medications; IVR	Age: 53	abstinence = 18% ម្នី	
		ı		abstinence = 18% graph	1

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	smoked a cigarette in the previous 30 days, spoke English, had a working phone, and were interested in remaining abstinent post-discharge  Exclusion criteria: Patients living more than 50 miles away, admitted to a critical care, labor/delivery, or psychiatric unit, were pregnant or breastfeeding, were physically too ill or cognitively unable to	contacted patients for smoking status, cessation program enrollment status, and cessation medication use, and received tips for quitting  Standalone or adjunct: Adjunct  IVR/Follow-up Schedule: 4, 14, 28, and 49 days; Follow-up at 6 months	% female: 56.6%	copyright, molyading for uses related to text and data mining, Al training, and similar for 17% for p	Use of any medication: 47.9% intervention vs. 38.0% control, p=0.013
Mahoney et al.	provide informed consent Study design:	Purpose of IVR:	Population:	Reach: 32% of ch	
(2018) USA	Observational	Intervention, transfer	Adult Smokers	patients reached	CI 0.65-0.95) and
Funder: Western New York Cancer	Study setting: Telephone	Description of intervention: Looks at AVR system (same as	Comparator: Usual Care	review, 55% of these opted in to	less likely to opt out, while rural smokers
Coalition Center, Roswell Park	Inclusion criteria: 18 years or older,	IVR). Following chart review of smokers in	N: 1049 (opt-in)	AVR program.	(OR = 3.84, CI 3.01- 3.90) were more likely to opt out.

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				open-203 opyrigh	
Comprehensive	visited an	area, baseline AVR call	Control: 850	Abstinence at 🚡 🖁	
Cancer Center,	urban/rural primary	was made to all eligible	(opt-out)	follow-up: 30% of 8	
National Cancer	care office	patients. Opt-in		intervention grain	Smokers from rural
Institute	community health	participants received	Age: 59.1% over	that complete&th&	medical offices were
	center, academic site	AVR calls every day.	50	AVR program 🚡 📆 💆	more likely to report
Industry	or private practice in	AVR customized		reported 3 2 2	being smoke free
sponsored: No	a medically	motivational messages,	% female:	abstinence abstinence	(OR, 1.41, CI 1.01-
	underserved	activities and questions	51.9%	Dov	1.97) - smoke free
	communities of	during call to specific		vnlo nt Si o tej	status did not differ
	interest	stage of change. If		upe kt ai	by sex, racial group
	4	participant relapsed,		rieu nd d	or age.
		they were transferred		om r (A lata	
		to primary care office		min BES	
		or state quitline for		ing.	
		counselling.		mjope , Al tr	
		Standalone or adjunct:	10.	en.brr aining	
		Standalone	1/	that complete data mining, Al training, and similar technologies, at AVR reported abstinence abstin	
		IVR/Follow-up		l simi	
		Schedule: IVR calls		June ilar te	
		every day for study		echr	
		period (undefined)		Abstinence at 5	
McDaniel et al.	Study design:	Purpose of IVR: Risk	Population:	Abstinence at $\frac{G}{G}$	98% were satisfied,
(2015) US	Controlled	Assessment	Quitline users	Tollow-up: At 6	98% would
				months: No	recommend the
Trial #:	Study setting: QFL	Description of	Comparators:		programme to
NCT0088899	program	intervention: All	Standard	days = 66.0% of	others; overall, 87%
		participants received		control, 69.6% of	said IVR was helpful
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Funder: National	Inclusion criteria:	five counselling calls	quitline uses,	TEQ-10 (p=0.30 1 2	
Institutes for	Tobacco users	from a Quit Coach; IVR	TEQ-10, TEQ-20	vs. control), 67 8 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	
Health	enrolled in the Quit	calls delivered risk		of TEQ-20	
	For Life (QFL)	assessments, and high-	N: 602 in TEQ-	(p=0.7121 vs. 👌 💆	
Industry	programme who	risk participants were	10, 591 in TEQ-	control); ធ្ល ក្មុ	
sponsored: No	were quit for 24	transferred to a Quit	20	Did not smoke 🖫 🙎	
	hours or more,	Coach	Control: 592	the last 30 day	
	English-speaking, 18			60.6% of contrăți ಕ್ಷ ರ	
	or older, having	Standalone or adjunct:	Age: 43.4	65.2% of TEQ-1မွဲ့တို့ ခြ	
	access to a touch-	Adjunct		(p=0.1946), 61 👸 👸 🙀	
	tone phone	$\mathcal{O}_{\mathcal{O}}$	% female:	of TEQ-20	
		IVR/Follow-up	54.2%	(p=0.8947);	
	Exclusion criteria:	Schedule: TEQ-10 =		http BES	
	Smokeless tobacco	twice weekly for 2		At 12 months: 👸 🖔 📙	
	users, actively	weeks, then weekly for		smoking in last	
	participating in	6 weeks; TEQ-20 = daily	//	days = 65.3% o 🚡 💆	
	another tobacco	for 2 weeks, then	10,	control, 67.0% of 🙀	
	cessation	weekly for 6 weeks;	1/1.	TEQ-10 (p=1694), 👸	
	programme, had	follow-up at 6 and 12		62.2% of TEQ-200	
	previously enrolled	months		(p=0.4655); in Bist 길	
	in QFL during the			30 days: 61.6% ្និof	
	past 6 months, had			control, 63.1% 💆 👼	
	limited phone access			TEQ-10 (p=0.6 221)	
				(p=0.1871)	
McNaughton et	Study design:	Purpose of IVR:	Population:	(p=0.1871) at Abstinence at Company of the company	
al. (2013) Canada	Controlled	Intervention	Adult Smokers	follow-up: Of 👸	
				patients who had	
				quit smoking at 12 g	

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Trial #:	Study setting:	Description of	Comparator:	weeks, 59% were 30 81972 weeks, 52% of in 22
NCT00832806	Outpatient Clinic	intervention: All	Participants	smoke-free at $\frac{\overline{\rho}}{2}$ 2 $\frac{\overline{\omega}}{6}$
Funder: Pfizer		participants received a	who only	weeks, 52% of
Canada	Inclusion criteria:	12-week supply of	received IVR for	intervention and
	Smoking ≥35	varenicline; IVR asked	12 weeks.	66.7% of control
Industry	cigarettes per week	about cigarette use,		(p=0.33) % 5 2 2
sponsored: Yes	or ≥5 cigarettes per	side effects, confidence	N: 101 initially	)24. gne
	day for at least 2	in maintaining	and then 44 IVR	At two years, 19 bow of overall to supply population, 30 bow population, 30 bow population.
	years with no period	abstinence, and	only	of overall of structure of stru
	of abstinence longer	motivational messages;	Control: 41	population, 30 វីវី ទ្វា ម្តី
	than 3 months	at 12 weeks, all		those abstinen के किया
	·	participants who were	Age: 52.6	12 weeks, and $\frac{1}{2}$
	Exclusion criteria:	still abstinent were	overall	of those abstin型偏量
	Use of any smoking	randomized to receive		at 52 weeks (n = 40 =
	cessation drugs or	either further IVR or no	% female: 33%	were confirme to
	nicotine replacement	IVR	· ·	be non-smokeស៊ី; oំ្នី
	in the last 3 months,		10.	these, 21% hads
	use of medications	Standalone or adjunct:		received extended
	to treat depression	Adjunct		IVR (so 21.7% 👸 💆
	or any psychiatric			intervention ve
	illness, history of	IVR/Follow-up		42.9% of control   42.9%
	depression or an	Schedule: Days 1, 3, 8		p=0.13, were $\frac{6}{2}$ $\frac{3}{3}$
	unstable medical	and 11 post-quit then		smoke-free at ම්හර්ව
	condition	every 2 weeks for		years) Ogies 25 at
		following 39 weeks;		ς <del>‡</del>
		follow-up at 52 weeks		at Agence
		and 2 years		Се В

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Nahhas et al.	Study design:	Purpose of IVR: Follow-	Population:	Reach: 42.8% were	19.6% who were
(2016) US	Observational	up monitoring and	Hospitalized	reached at lease 3	reached asked to be
, ,		transfer	Patients	reached at least 81972 on days	transferred to the
	Study setting:			I uavs o 🙃	quitline
Funder: Medical	Medical University	Description of	Comparator:	r us	'
University of	,	intervention: Patients	Bedside	Abstinence at Abstinence	Bedside counselling
South Carolina	Inclusion criteria:	counselled in-hospital	Counselling +	Abstinence at resigned follow-up: 36.4	was associated with
Health	Adult cigarette	by tobacco treatment	IVR	those who wer	a 13% increase in
	smokers	specialist and		reached reported in	response to IVR
Industry		developed an	N: Not reported	not smoking at	(55% vs. 49%), a 90%
sponsored: No	Exclusion criteria:	individualized tobacco-	·	time of their laste	increase in reported
	Patients who died	treatment plan; IVR	Age: Not	phone contact	abstinence (51% vs.
	during	collected info on	reported	I baaaal an :n+an⊋ Wa∹	27%), and double
	hospitalization,	smoking status and		treat, 13.5% of	the rate of those
	receiving hospice	provide additional	% female: Not	patients were $\geq$	using medications
	care, not discharged	support through the	reported	patients were be classified as noting	(21% vs. 8%)
	back home, and	offer of a direct		smoking based	(22/0 131 3/0)
	psychiatric inpatients	immediate referral	(4)	their most recent 6	
		"warm transfer" to a			
		quitline		on sim	
		quitille		ı June nilar te	
		Standalone or adjunct:		ne 13, techr	
		Adjunct		n/ on June 13, 2025 at d similar technologies.	
				2025 nologi	
		IVR/Follow-up		es.	
		Schedule: 3-, 14-, and		\ger	
		30-days post-discharge		псе	
		30 days post discharge		at Agence Bibliographique de l	
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Reid et al. (2007)	Study design:	Purpose of IVR: Follow-	Population:	Reach: At 3-day	80-8
Canada	Controlled	up monitoring and risk	Hospitalized	follow-up, 70 din	197
		assessment	patients		0
Trial #: Not	Study setting:			answered IVR <b>ट्व</b> ा।	اکم
reported	Hospital	Description of	Comparator:	use	ĘŢ
		intervention: IVR	Usual Care	Abstinence at 👸 💆	20
Funder:	Inclusion criteria:	system called		follow-up: At t	24.
Canadian	Current smokers (5	participants post-	N: 50	52-week follow ਸ਼੍ਰੇ	- 2
Tobacco Control	or more cigarettes	discharge and asked	Control: 50	46% of the IVR ಕ್ಷ್ಮೆಕ್ಕೆ ಕ್ಷ	수 기타
Research	per day), 18+,	about smoking status,		group and 34.7	Oğ.
Initiative	hospitalized for	confidence in staying	Age: 54	the control group	id E ±
	acute coronary	smoke free until next		were abstinent	m &
Industry	syndrome	call, and use of self-	% female: 39%		
sponsored: No		help materials and		ning	http://bmjopen.bmj.com/
		pharmacotherapies.		g.	<u>ğ</u> ,
		Patients were flagged	•	l tra	ope
		and connected with		i i	a. br
		nurse specialists if they		g, a	J.C
		reported relapse but		) . ing, Al training, and similar technologies.	ě
		interest in quit		sim	9 n
		reattempt or if they		ilar	Jun
		were not confident in		tech	on June 13, 2025
		their ability to stay		nol	3, 20
		smoke free. Further		ogi	)25
		telephone counselling		es.	at A
		was given.			ger
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Rigotti et al.	Study design:	IVR/Follow-up Schedule: 3-, 14- and 30-days post-discharge; 12- and 52-weeks post- discharge (by telephone, not IVR) Purpose of IVR:	Population:	136/bmjopen-2023-081972 on 9 July 2024. Dov Enseigneme cted by copyright, including for uses related t at ence Abstinen	Any smoking
(2014) US  Trial #:  NCT01177176	Controlled  Study setting: Hospital	Intervention  Description of intervention:  Participants give a 30-	Hospitalized patients  Comparator: Usual Care	Abstinence at to text and follow-up: Biochemically and data moderate abstinence for abstinence f	cessation use: at 1 month = 82.8% of intervention, 62.8% of control, p<0.001; at 6 months = 89.9%
Funder: National Institutes of Health/National Heart, Lung, and Blood Institute Industry sponsored: No	Inclusion criteria: 18 or older, smoked ≥1 cigarette/day during the month before admission, received smoking cessation counseling in the hospital, stated that they planned to try to quit smoking after discharge  Exclusion criteria: Expected hospital stay of <24 hours,	day supply of tobacco cessation medication, refillable for up to 90 days of treatment; 5 IVR calls provided advice and support messages that prompted smokers to stay quit, encouraged proper use and adherence to cessation medication, offered medication refills, and triaged smokers to a return telephone call	N: 198 Control: 199 Age: 53.9 % female: 48.5%	7 days = 25.8% not intervention, 15.2 not control, p=0.200 of training astinence in pastinence in pa	of intervention, 80.4% of control, p=0.01

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past 12 months other than tobacco, alcohol, or marijuana, admitted for an alcohol or drug overdose, could not consent or participate in counselling, admitted to obstetric or psychiatric units, life expectancy <12 months, medical instability	Standalone or adjunct: Adjunct  IVR/Follow-up Schedule: 2, 14, 30, 60, and 90 days; follow-up at 6 months		at 1 month = 4th 0.000 of intervention of intervention of intervention of intervention of control, p<0.01; at 6 months = 27.3 session ment Superiour (ABLS).  Reducing costs to texture (ABLS).  Incremental post to texture (ABLS).	
Rigotti et al. Study design: (2016) US Controlled	Purpose of IVR: Intervention	Population: Adult smokers	Reach: Interves tion participants answered (62%) of second control of the second control	59% requested transfer to a Quit Coach
Trial #: Study setting: NCT0171432 Hospitals	Description of intervention: Intervention patients	Comparator: Usual Care	IVR calls; median = 3 of 5 planned calls; per person	Any use of smoking- cessation treatment

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Funder:	Inclusion criteria:	receive a 30-day supply	N: 680	Abstinence at follow-up:	
NIH/NHLBI Industry	Adults 18 or older who smoke one or more cigarettes	of free FDA-approved tobacco cessation medication, refillable	Control: 677 Age: 49.6	Abstinent for past	p<0.001
sponsored: No	daily, had >5 minutes of smoking cessation counselling in the hospital, stated they	for up to 90 days of treatment; IVR calls prompted smokers to quit or stay quit,	% female: 48.8%	7 days, at 1 month is 1 at 1 a	
	planned to try to quit smoking post- discharge	offered support messages, encouraged adherence to cessation medication, and		at 6 months: 36 75 25 25 25 25 25 25 25 25 25 25 25 25 25	;
	Exclusion criteria: Had no telephone, could not give	offered smokers the option of a direct two-step transfer to a		hospital dischare at 1 month: 3130% intervention, 26.4%	
	informed consent or participate in counselling, were admitted to obstetric	telephone quitline  Standalone or adjunct:  Adjunct	10h	control, p<0.10 at a to	
	or psychiatric units, were admitted for IV drug overdose, had	IVR/Follow-up Schedule: 2, 12-, 28-,		significant similar to the Chi	
	medical instability, had <1 year of estimated life	58-, and 88-days post- discharge; follow-up at 6 months		confirmed tob	
	expectancy.			immediately post-	) 

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Schneider et al. (1995) USA Funder: National Institute of Health Industry sponsored: No	Study design: Observational Study setting: Telephone Inclusion criteria: 18 or older, smoke daily	Purpose of IVR: Intervention  Description of intervention: Early IVR system monitored participants progress, provided motivation, helpful techniques and coping mechanisms and interactive activities (smoking diary).  Standalone or adjunct: Standalone  IVR/Follow-up Schedule: Participants	Population: Adult Smokers  Comparator: Self- Comparison  N: 571  Age: Not reported  % female: Not reported	15.5% of control not significant under significant und significant und significant und significant under significant und signi	Those who used IVR more often were more likely to remain abstinent at 6 month follow up (m = 17.67 calls vs. 7.65 calls; p < .001). Similar results found at 1- and 3-month follow-ups.
		called as needed following the initiation call; follow-up at 1, 3 and 6 months after initiation call (letter and post-card for data collection)		month follow-go 3, 2025, and 37.3% were abstinent at 3-go 6 Agence Bibliog	

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Velicer et al. (2006) USA  Trial #: Not reported  Funder: Not reported  Inclusion criteria: Regularly smoke 10 cigs a day  Industry sponsored: No	Purpose of IVR: Intervention  Description of intervention: IVR was used in conjunction with a manual, expert system feedback report and NRT. With the addition of IVR, calls were made on a schedule depending on NRT acceptance. IVR system asked questions and provided support according to participant responses.  Standalone or adjunct: Adjunct	Population: Veteran Smokers  Comparators: Cessation booklet, Cessation booklet + NRT, Cessation booklet + NRT + expert system feedback report  N: 500 Control: 523  Age: 49.9  % female:	Reach: 30% of inparticipants used IVR multiple times 30% used it ones related to fee and 40% did not related to fee related to
	IVR/Follow-up Schedule: 2 contact schedules depending on NRT acceptance: if not accepted, IVR calls made monthly for 6 months; if accepted, IVR calls made weekly	24.2%	similar technologies.

 Page 60 of 69

of 69				ВМЈ Ор	en				136/bmjoper cted by copy		
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Brown et al (2021), US	N	PN	N	High	Υ	PY	PN		2 on ing f	Υ	
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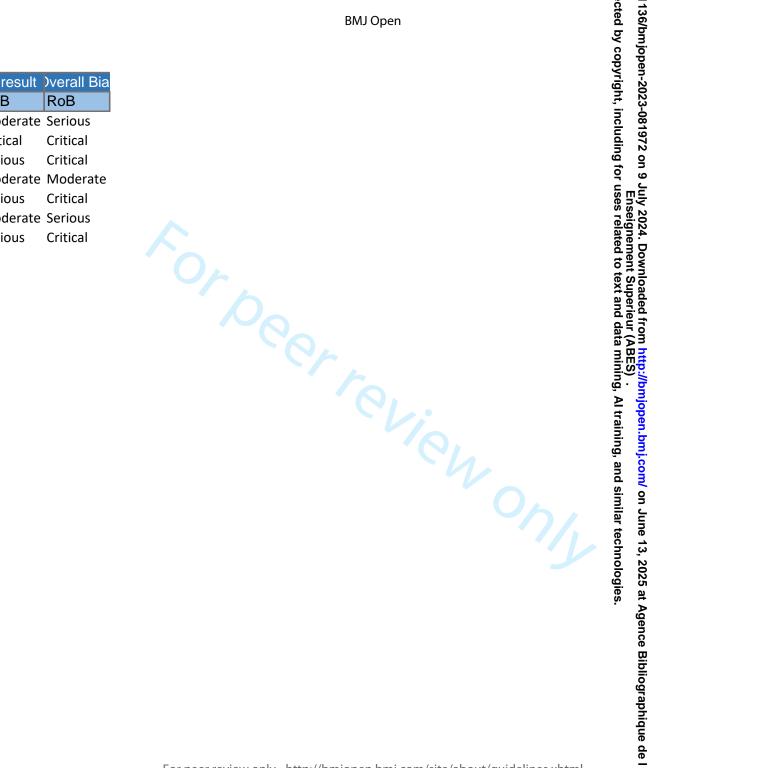
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Υ		Serious	Critical





47

## PRISMA 2020 Checklist

		-2023 	Location
Section and Topic	Item #	Checklist item	where iter
TITLE		<u> </u>	10 Toporto
Title	1	Identify the report as a systematic review.	Ln. 2
ABSTRACT		S mc	
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	Pg. 2
INTRODUCTION		902 1002	
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	Pg. 3 - 4
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	Pg. 4
METHODS		<u> </u>	
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	Pg. 5
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted identify studies. Specify the date when each source was last searched or consulted.	Pg. 4
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used	Pg. 4, Appendix
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	Pg. 4-5
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each to the methods used to collect data from reports, including how many reviewers collected data from each to the methods used to collect data from reports, including how many reviewers collected data from each to the methods used to collect data from reports, including how many reviewers collected data from each to the methods used to collect data from reports, including how many reviewers collected data from each to the methods used to collect data from reports, including how many reviewers collected data from each to the methods used to collect data from each to the methods used to collect data from each to the methods used to collect data from reports, including how many reviewers collected data from each to the methods used t	Pg. 5
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with gack outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which gesults to collect.	Pg. 4 - 5
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, indexing sources). Describe any assumptions made about any missing or unclear information.	Table. AAppendix B
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, heavy many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	Pg. 5, 7
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	Pg. <u>9 - 12</u>
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	Pg. 6
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing sum array statistics, or data conversions.	Pg. 6
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	Pg. 6
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	Pg. 6
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	N/A
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	N/A
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases). For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml	Pg. 5 <u>N/A</u>



47

## PRISMA 2020 Checklist

PRISMA 2020 Checklist	Page 69 of 69		BMJ Open BMJ Open	
the containty assessment as a season of the search and selection process, from the number of records identified in the search forward days assessment and the review. Ideally using a flow diagram.  Study selection 16a Describe the results of the search and selection process, from the number of records identified in the search forward days assessment and the review. Ideally using a flow diagram.  Study selection 15a Describe the results of the search and selection process, from the number of records identified in the search forward days and present the review process and the review of the review process and the search forward days and present the characteristics.  Characteristics 17a Cities each included study and present its characteristics.  Characteristics 17a Cities each included study and present its characteristics.  Characteristics 17a Cities each included study and present its characteristics.  Characteristics 17a Cities each included study and present its characteristics.  Characteristics 17a Cities each included study and present its characteristics.  Characteristics 17a Cities each included study and present its characteristics.  Characteristics 17a Cities each included study and present its characteristics.  Characteristics 17a Cities each included study and present its characteristics.  Characteristics 17a Cities each included study and present its characteristics.  Characteristics 17a Cities each included study and present its characteristics.  Characteristics 17a Cities each included study and present its characteristics.  Characteristics 17a Cities each included study and present its characteristics.  Characteristics 17a Cities each included study and present its characteristics.  Characteristics 17a Cities each included study and present its characteristics.  Characteristics 17a Cities each included in the present its characteristics.  Characteristics 17a Cities each included inclu	PRISM	MA 20		
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Study selection  160 Describe the results of the search and selection process, from the number of records identified in the search included in the review.  160 Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.  170 Cite each included study and present its characteristics.  171 Cite each included study and present its characteristics.  172 Cite each included study and present its characteristics.  173 Cite each included study and present its characteristics.  174 Cite each included study and present its characteristics.  175 Cite each included study.  175 Cite each included study.  176 Cite each included study.  177 Cite each included study.  177 Cite each included study.  177 Cite each included study.	<b>-</b>	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	<del>Pg. 5</del> N/A
Los Describe the review, ideally using a flow diagram.  16b Citie studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were appropriated and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.  17b Results of Los Present results of all investigations of possible causes of heterogeneity in companing groups, describe the directions of all statistical syntheses conducted. If meta-analysis was done, present for each the summary explainable and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.  17b Reporting blases 2 17b Present results of all investigations of possible causes of heterogeneity in companing groups, describe the direction and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity in companing groups, describe the direction and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity in companing groups, describe the direction and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity in companing groups, describe the direction and its effect.  17c Present results of all investigations of possible causes of heterogeneity among study results.  17c Present results of all investigations of possible causes of heterogeneity among study results.  17c Present results of all investigations of possible causes of heterogeneity among study results.  17c Present results of all statistical syntheses conducted to assess the robustness of the review processes used.  17c Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis a seesaled.  17c Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.  17c Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.  17c Present assessments of the review processes used.  17c Present assessments of	KESULIS			
16   Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.   Fig. 1, pg. 1, p	10 Study selection	16a	the review, ideally using a flow diagram.	Fig. 1
Study characteristics   17		16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they wक्षेट्रिक होटीuded.	Fig. 1 <u>, pg. 6</u>
Fig. 3   F	13 Study 14 characteristics	17	Cite each included study and present its characteristics.	<u>AAppendix</u>
Results of individual studies   19   For all outcomes, present, for each study; (a) summary statistics for each group (where appropriate) and (b) a great estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.   Page 12	Risk of bias in	18	Present assessments of risk of bias for each included study.	Fig. 3
Results of syntheses yitheses yitheses Syntheses Synthes	18 Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) are set estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	<u>AAppendix</u>
Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summark estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If companing groups, describe the direction of the effect.   20c	21 Results of	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Pg. 6 - 12
20 Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.  21 Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis a seesed.  22 Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis a seesed.  23 Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.  24 Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.  25 Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.  26 Pg. 7NIA  27 Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.  28 Pg. 7NIA  29 Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.  29 Pg. 7NIA  20 Pg. 7NIA  20 Pg. 7NIA  21 Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.  20 Pg. 7NIA  21 Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.  20 Pg. 7NIA  21 Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.  22 Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.  23 Pg. 7NIA  24 Pg. 7NIA  25 Discussion  23 Provide a general interpretation of the review.  24 Pg. 14  25 Discuss any limitations of the review processes used.  25 Pg. 14  26 Pg. 14  27 Discussion  28 Pg. 14  29 Pg. 15 Pg. 15  29 Pg. 15  20 Discussion  29 Pg. 15  20 Discuss any limitations of the review processes used.  29 Pg. 15  20 Pg. 15  21 Present assessments of certainty (or confidence) in the protect.  20 Discussion  21 Pg. 15  22 Present assessments of certainty (or confidence) in the context of other evidence.  20 Discussion  21 Pg. 15  22 Pg. 15  23 Provide a general interpretation of the review processes used.  22 Pg. 15  23 Pg. 14  24 Prov	22 syntheses	20b		N/A
Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.  Pg. 7  Pg. 7N/A  Pg. 12-13  Pg. 12-13  Pg. 14  Pg. 15  Pg. 15		20c	Present results of all investigations of possible causes of heterogeneity among study results.	N/A
Reporting biases 21 Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed. Pg. 7  Reporting biases 21 Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed. Pg. 7N/A  Certainty of 22 Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed. Pg. 7N/A  Discussion Discussion 23a Provide a general interpretation of the results in the context of other evidence. Pg. 14  23b Discuss any limitations of the evidence included in the review. Pg. 14  23c Discuss any limitations of the review processes used. Pg. 14  23c Discuss any limitations of the review processes used. Pg. 14  23d Discuss implications of the review processes used. Pg. 14  23d Discuss implications of the review processes used. Pg. 14  24d Provide registration information for the review, including register name and registration number, or state that the review was not registered. Pg. 4  24b Indicate where the review protocol can be accessed, or state that a protocol was not prepared. Pg. 15  25c Describe and explain any amendments to information provided at registration or in the protocol. Pg. 15  25d Describe and explain any amendments to information provided at registration or in the protocol. Pg. 15  25d Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the pytiew. Pg. 15  25d Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the pytiew. Pg. 15  26d Describe and explain any amendments to information provided at registration or in the protocol. Pg. 15  27d Report which of the following are publicly available and where they can be found; template data collection forms; data extracted from included Pg. 15		20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	N/A
Certainty of voldence   22   Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.   3   2   2   2   2   2   2   2   2   2	D ti   - t	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	Pg. 7
Discussion   23a   Provide a general interpretation of the results in the context of other evidence.   Pg. 12_13	28 Certainty of	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	<del>Pg. 7</del> <u>N/A</u>
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## PRISMA 2020 Checklist

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