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Evidence Check

Evidence for smoking quitlines

An **Evidence Check** rapid review brokered by the Sax Institute for the Cancer Council Victoria. April 2019.

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This report was prepared by:

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This report was prepared by Kristin Carson-Chahhoud, Zoe Kopsaftis, Kelsey Sharrad and Adrian Esterman

Contents

Abbreviations

ACT	Acceptance and Commitment Therapy
AI/AN	American Indian/Alaskan Native
ASQ	Asian Smokers Quitline
ATC	Alcohol Tobacco Counselling
CA	Continuous Abstinence
CALD	Culturally And Linguistically Diverse
CBT	Cognitive Behavioural Therapy
CDC	Centre for Disease Control
CI	Confidence Interval
CO	Carbon Monoxide
df	Degrees of Freedom
ENDS	Electronic Nicotine Delivery Systems
GPs	General Practitioners
ITT	Intent-to-treat
MAC	Medication Adherence Counselling
MI	Motivational Interviewing
MM	Massed Mailings
n	Number
N/A	Not applicable
NAQC	North American Quitline Consortium
NHMRC	National Health and Medical Research Council
NCSCT	National Centre for Smoking Cessation and Training
NIH	National Institute of Health
NRT	Nicotine Replacement Therapy
NYSSQ	New York State Smokers Quitline
NZ	New Zealand
OR	Odds Ratio
PORTSSS	Proactive Or Reactive Telephone Smoking ceSsation Support
PRISMA	Preferred Reporting Items for Systematic reviews and Meta-Analyses

QFL	Quit For Life
QoL	Quality of Life
RCT	Randomised Controlled Trial
RM	Repeated Mailings
RR	Risk Ratio
SC	Standard Care
SD	Standard Deviation
SH	Self-help Group
SMS	Short Messaging Service
SNTQ	Swedish National Tobacco Quitline
TEQ	Technology Enhanced Quitline
TOC	Tobacco Only Counselling
UK	United Kingdom
US	United States
Vs	Versus
WHO	World Health Organization

1 Executive summary

Background and review questions

Quitlines are telephone-based services providing behavioural support for people considering or seeking to stop smoking, and advice to family, friends and professionals seeking to help others to stop smoking. In Australia, each state and territory government funds a Quitline. There is no central body that oversees quitlines in Australia. On the contrary, six different organisations deliver the eight different Quitline™ services around the country.

Although there are World Health Organization (WHO) guidelines on delivery of a quitline for smoking cessation, there are no national minimum standards for Quitline™ in Australia. This means the clinical offerings (types of counselling offered), data collection and reporting, functionalities (i.e. technological capabilities), clinical supervision processes, and evaluation differ from jurisdiction to jurisdiction.

To ensure that Quitline™ provides consistent, high quality, effective behavioural support, this rapid review of evidence commissioned by the Cancer Council Victoria provides evidence that can be used to underpin development of evidence-based Quitline™ national minimum standards to implement across Australia. Two questions have been formulated around which the evidence has been synthesised:

Question 1: What are the key components of dedicated telephone counselling services (quitlines) that have been shown to be effective for smoking cessation?

Question 2: What are the enablers of, or barriers to, the delivery of effective service components identified in Question 1?

Summary of methods:

The search included studies from 2009 onwards in English, and undertaken in Australia, New Zealand (NZ), the United Kingdom (UK), the United States (US) and Europe. Databases searched included the Cochrane Database of Systematic Reviews, PubMed/Medline, Embase and PsycInfo as well as multiple sources of grey literature. Due to the expectation of wide variability across studies, no attempt was made to undertake meta-analysis. Instead a narrative synthesis of evidence has been provided. The National Health and Medical Research Council (NHMRC) Level of Evidence table was used to appraise the quality of evidence found.

Key findings:

A total of 51 records were identified for inclusion in the narrative synthesis of evidence in this rapid review. An additional 31 records with relevant information pertaining to the key components under review were identified from grey literature. These did not meet the criteria for inclusion in the primary evidence synthesis. They have been discussed, however, within the detailed analysis of evidence (section 8 below). Level 1 evidence was available to support some key component recommendations, and this was supplemented by lower quality evidence for other areas as detailed below. Conflicting studies were common and have been discussed in detail within the analysis of evidence. Recommendations need to be assessed with consideration of limitations and contextual factors associated with each individual research study, as detailed in the synthesis of relevant papers, quality assessment and analysis of evidence below.

Question 1: Key components of quitlines shown to be effective:

Counselling competencies

Assessment of the fidelity of counselling compared to treatment protocols is reportedly undertaken as part of standard practice across many quitline services. However, studies evaluating impact of specific counselling competencies and levels of adherence to treatment protocols were lacking. A minimum set of qualifications and experience in a related discipline is typically required for counsellors. In addition, specific quitline counselling skills-based training is required with ongoing training and feedback provided from within most organisations.

Behavioural change counselling approaches

Cognitive behavioural therapy (CBT) is the standard behavioural change technique used to underpin quitline counselling. The addition of other theoretical models, including acceptance and commitment therapy (ACT)[1] and motivational interviewing (MI)[2, 3] have demonstrated the potential for increased quitting benefits. However, other techniques, such as the addition of gain-framed messaging, have not shown benefits in long-term quitting outcomes.[4, 5]

Quality assessment of service and counsellors

Among studies reporting participant satisfaction with the service and/or counsellors, satisfaction is rated as high and the service reported to be helpful. Assessment is by self-report among follow-up participants, which typically only represents half of the initial enrolling population. Therefore, these responses need to be considered in the context of the larger study population of non-responders, where non-responders are typically relapsed smokers. Of the two included studies reporting on assessment of fidelity of counselling, neither reported results related to this assessment.

Counsellor or participant-initiated follow-up calls

There is strong Level 1 evidence to support the provision of quitline initiated follow-up counselling support compared to client-initiated follow-up calls.[6, 7]

Among five individual studies evaluating quitline-initiated or client-initiated counselling sessions, four studies showed no evidence of effect on quit smoking outcomes by final follow-up. The one study showing a significant benefit on quitting outcomes by 12 months[8] was undertaken in a military population with differing levels of nicotine replacement therapy (NRT) provision between the intervention and control groups (four- to eight-week supply compared to two-week supply). The potential additive benefit of more NRT was not evaluated. Moreover, the quitline-initiated group received substantially more counselling calls at all follow-up periods, with high retention rates across the six counselling sessions. However, another study[9-11] did evaluate the additive benefit of a six-week supply of free NRT, identifying no evidence of any effect above that of standard counselling.

Counselling protocols

Level 1 evidence identified that quitline-initiated first calls increased quit attempts (51 studies), with effect estimates being slightly larger if more calls were offered and in trials specifically targeting smokers motivated to try to quit.[6] Another systematic review identified that quitline-initiated first calls are less effective than client-initiated first calls, likely related to the initial level of motivation to quit and readiness to quit.[7] However, this evidence only comes from one included study within the systematic review, therefore should be interpreted with caution.[7]

Evidence from lower quality studies around the impact of different counselling protocols was also mixed. Some studies showed no additive benefit for quitline-initiated versus client-initiated follow-up counselling[11]

or the use of NRT[11, 12] compared to standard counselling without NRT. Others, however, did show that quitline-initiated follow-up counselling[8] and the addition of pharmacotherapy[13, 14] do have greater efficacy on quitting outcomes. No dose-response correlation was observed for the duration of NRT provision, indicating that giving quitline callers higher quantities of pharmacotherapy like NRT above that of a starter-pack does not result in better smoking cessation outcomes.[15-17] A dose response was observed between the number of counselling sessions and likelihood of successful quitting outcomes regardless of NRT provision, with completion of more counselling sessions more likely to result in successful quitting outcomes.[14]

Frequency and length of calls/counselling sessions

While there is Level 1 evidence to support provision of quitline-initiated follow-up calls, there is mixed evidence about the optimal number of quitline calls/counselling sessions (with most using more than two calls) and little discussion of optimal length of calls to be provided.[6] Some studies suggest no evidence of significant increased benefit with an increased number of quitline calls[18, 19], while others report that a higher number of calls is significantly associated with better quitting outcomes.[20] For studies where there is an interaction between frequency of calls and quitting outcomes, the association is likely bi-directional, meaning better quit smoking outcomes lead to better treatment compliance and vice versa. This is because quitline participants who relapse and return to smoking are more likely to drop out of the counselling service. A paucity of evidence was available to enable any recommendation about the length of calls.

Hours of operation:

No studies evaluated the impact of differing or extended operating hours for quitline services. Therefore, it was not possible to make any recommendations about this key component of quitline counselling service provision.

Question 2: Enablers of or barriers to delivery of effective service components identified in Question 1

- The most important factor that determined compliance with the full quitline program of five calls was the provision of NRT. Smokers who received NRT were more likely to be adherent to the counselling program compared to those who did not receive NRT. Face-to-face skills-based training of counsellors was more effective than online training at improving smoking cessation outcomes among clients who quit smoking, through increased compliance to best-practice protocols.

According to multiple studies, smokers with lower levels of adherence to the quitline service are typically:

- Females
- Younger people
- Those with only high school education (as opposed to less or more education than this)
- Those with children at home
- Those who smoked less than 20 cigarettes a day
- Those living with a smoker
- Those with a failed quit attempt in the past.

Facilitators and barriers were often intertwined and related across services. For example, while access to resources/budgets was identified as a barrier in some organisations resulting in poor uptake of recommended guidelines, it was identified as an enabler among organisations which did have good uptake of guidelines. Key inter-related barriers and enablers included:

- State quitline budgets to facilitate uptake of best practice recommendations

- Technical capacity and capabilities of quitline service providers (particularly in relation to technical capacity and capability to implement recommendations related to technology in new or innovative ways)
- Priorities of individual state funders/organisation directors (particularly in relation to reach of target populations)

Recommendations

Inconsistent data was identified in this rapid review for most of the key components to underpin Quitline™ services. Certainly, this rapid review did not identify any strong evidence to deviate from the current Victorian Quitline™ protocol consisting of two pre-quitting quitline-initiated follow-up calls, plus four post-quitting calls (based on recommendations in the seminal paper by Zhu and Pierce[21]), underpinned by CBT using trained counsellors.

Based on the available evidence, authors of this review recommend that state/territory and federal policy makers as well as senior managers of Quitlines™ consider implementing the following as a national set of minimum standards:

- A generic approach to counselling with a standardised core protocol can be considered for the majority of tobacco users, as extensive tailoring of services based on characteristics of individual participants contacting the Quitline™ do not appear to be associated with successful quitting. However, there may be merit in considering a tailored approach for some populations of Quitline™ callers, such as young callers, pregnant women, culturally and linguistically diverse (CALD) populations, Indigenous populations and those with mental health conditions
- Providing a two-week starter pack of free NRT to eligible Quitline callers is likely to increase smoking cessation outcomes
- All counsellors should be trained health professionals
- Counselling sessions should be monitored intermittently to measure compliance with best practice protocols, enabling identification of additional training requirements
- Face-to-face booster training should be provided to counsellors to supplement online training, and easy access provided to treatment manuals within each service, to reinforce compliance with best-practice guidelines
- The most commonly used behavioural approach is CBT, however, ACT and MI have also shown benefits in smoking cessation outcomes. Therefore, consultation with an appropriate organisation could be made for advice on the best approach or combination of approaches, including the optimal number of sessions for the specific technique/s taken
- In the situation where a service needs to be scaled down due to limited resources, the focus should be on providing counselling to clients who initiate the first quitline contact, or to those known to be highly motivated to make a quit attempt, rather than quitline counsellors making the initial call to smokers who are less motivated to quit.

As detailed in the report below, these recommendations should be considered as a package approach to increase the likelihood of successful increases in smoking abstinence among Quitline™ callers. The authors also strongly suggest that key stakeholders are engaged to help to build the evidence base that is currently lacking for several key components including: the ideal number and duration of contacts, addition of ACT and/or MI as an adjunct to CBT, ideal hours of operation and minimum counselling competencies required.

2 Background and introduction

Cigarette smoking is a major risk factor for the development of many diseases, including cancers, cardiovascular and respiratory diseases, stroke, peripheral vascular disease, abdominal aortic aneurysm, type 2 diabetes, peptic ulcers, macular degeneration and infertility[22] Many well-conducted epidemiological studies over the past 40 years have established a clear link between tobacco smoking and many different types of cancer. These include cancers of the lung, oral cavity, pharynx, oesophagus, stomach, bowel, liver, pancreas, nasal cavity and paranasal sinuses, larynx, uterine cervix, ovary, urinary bladder, kidney, ureter and bone marrow (myeloid leukaemia).[23]

Approximately 12% of Australians aged 14 years and over are currently daily smokers[24], however, by worldwide standards, this smoking rate is comparatively low. For example, current estimates for smoking prevalence in adults are: 15% in the US[25], 15% in the UK[26] and 16% in NZ[27], 26% in the Netherlands[28], 34% in Japan[28], 36% in France[29], 37% in Greece[29] and 59% in the Russian Federation.[30]

Smoking rates in Australia have declined from approximately 36% in 1977, to 26% in 1998 and 14% in 2014–15.[31] This decline to our current smoking rate is likely the result of tobacco control activities undertaken by federal, state and territory governments, and non-governmental organisations such as the Cancer Council of Australia, the Australian Council on Smoking and Health, and Action on Smoking and Health. Activities have included mass media quit smoking campaigns, legislation to ban smoking in public areas, plain packaging legislation, and increases in the tobacco excise.[31] In particular, the Australian Government established and funded the National Tobacco Campaign in 1997, which is ongoing. However, the trend in decreasing smoking rates has plateaued recently, with daily smoking prevalence remaining relatively stable between 2013 (12.8%) and 2016 (12.2%).[32] Furthermore, smoking contributes to 9% of the national Australian disease burden and is the single most important reversible risk factor for premature death, putting two million smokers at risk unless they quit.[33, 34] Smoking is also a major contributor to health disparity. Smoking prevalence remains as high as 45% (2014–15) in the Indigenous population and prevalence has actually increased by 7% between 2013 and 2016 in those with mental health conditions.[35] This pattern is also apparent outside the Australian context with smoking prevalence at 40–45% in Indigenous New Zealanders and Americans and up to 30% of all cigarettes smoked by adult Americans consumed by people with a mental health condition.[36-38] Hence, a redoubling of efforts to further reduce smoking rates is warranted.

Internationally, several different interventions have been used to help people quit smoking. These include brief advice from General Practitioners (GPs), self-help materials, medications such as nicotine replacement therapy (NRT), bupropion hydrochloride and varenicline tartrate[39], as well as psychological therapies including Cognitive Behavioural Therapy (CBT) and Acceptance and Commitment Therapy (ACT).[40] Recent evidence suggests that a combination of these strategies is most effective. Supplementation of pharmacotherapy with behavioural therapy improves the odds of a successful quit attempt three-fold.[41] There is a wide spectrum of behavioural interventions available to support quit attempts including: brief advice from a health professionals, intensive multi-session interventions delivered either in person or via telephone; and technology-based programs. In hospitalised patients, intensive behavioural therapy programs have been identified as effective for smoking cessation.[42]

Many countries around the world also make use of telephone helplines to assist smokers to quit (quitlines). This is because quitlines provide a valuable service to smokers in the community, being sources of

knowledge about cessation strategies and providing structured counselling.[43-45] They are easy to access and appeal to a broad cross-section of tobacco users.[31] Quitlines provide confidential advice to people wishing to cease smoking and are staffed by trained counsellors. The support offered by quitlines may include mailed materials, recorded messages, counselling at the time of the call, call-back from a counsellor and combinations of these elements.[46] Quitlines can also provide access to subsidised NRT for certain populations, send written materials in the post and works with the client to establish an individualised quit plan.[47] While the telephone service remains the core of quitline businesses, they have also ventured into alternative means of information dissemination including short message service (SMS) and online service channels such as websites and e-mails.[47] Although the perception of quitlines is largely that they only provide call-back counselling—which may be a deterrent to individuals uninterested in this type of intervention—the operators are also able to match the smoker to other more preferred treatments.

Quitline interventions are therefore complex and the quality of their counselling content can vary from service to service, as can aspects of their delivery (e.g. the number, timing and length of calls and who initiates them; whether NRT is also provided etc.). In order to maximise the likelihood that quitlines are providing the cessation benefits demonstrated in trials, a standardised approach to service provision across Australia based on best-practice evidence is needed. This is especially important given that resource limitations in some jurisdictions preclude quitline outcome evaluation.

A 2013 Cochrane review concluded that telephone counselling is effective, and that quitline-initiated follow-up calls (call-back counselling) enhances their usefulness both for those who self-refer to quitline, as well as when quitline makes the initial contact. Telephone quitlines provide an important route of access to support for smokers. However, the review found little evidence about what aspects of the quitline service were most beneficial to assist smokers to quit.[6] Variability in quitline services can occur across several areas including: content provision[48], theoretical practices underpinning service provision[1], training[49], and assessing and reporting reach of the service.[50]

In Australia, there is no central body that oversees quitlines. Instead, six different organisations deliver the eight different Quitline™ services around Australia, one for each state and territory.[31] Guidelines for service delivery and training of counsellors are available from the World Health Organisation (WHO)[51, 52] and currently recommend combining a behavioural intervention (such as quitline) with NRT or cessation medications. There have been efforts to establish local practice protocols within Australia before[31, 53], however, this has not resulted in a standardised nation-wide protocol.

As yet no formal, evidence-based, national minimum standards are available to underpin and standardise Quitline™ services in Australia. This means the clinical offerings (types of counselling offered), data collection and reporting, functionalities (i.e. technological capabilities), clinical supervision processes and evaluation differ from jurisdiction to jurisdiction.

To ensure that quitlines provide consistent, high quality, effective behavioural support, this rapid review of evidence commissioned by the Cancer Council Victoria provides evidence that can be used to underpin development of evidence-based Quitline™ national minimum standards that are implemented across Australia. Two questions have been formulated around which the evidence has been synthesised:

Question 1: What are the key components of dedicated telephone counselling services (quitlines) that have been shown to be effective for smoking cessation?

Question 2: What are the enablers of or barriers to the delivery of effective service components identified in Question 1?

3 Methodology

Criteria for study inclusion

Study types: Included studies were eligible if they could be classified according to the NHMRC level of evidence, including: systematic reviews of randomised controlled trials, randomised controlled trials, pseudo-randomised controlled trials, comparative studies with concurrent controls, comparative studies without concurrent controls, case series with either post-test or pre-test/post-test outcomes.

Participants and interventions: Studies were included if they were conducted with any participants recruited from within a quitline service, used data from quitline participants or collected data from funders/counsellors of quitlines.

Outcomes: Studies had to evaluate a key component of quitline service delivery, including at least one of the following:

- Counselling competencies required
- Behaviour change counselling approaches and adherence to these
- Quality assessment of service and/or counsellors
- Counsellor or participant-initiated follow-up calls
- Counselling protocols and adherence to these
- Frequency and length of calls/counselling sessions
- Hours that service is open.

Additional outcomes and analysis methodology

Additional outcomes: Additional outcomes related to referral pathways and efficacy were also evaluated in studies identified for inclusion based on the above criteria.

Referral pathways refer to the means by which participants within studies were recruited.

Efficacy assessment refers to outcome measures as defined by individual study authors including:

- Quit attempts
- Reduced numbers of cigarettes smoked
- Smoking cessation at 3, 6, or 12 months (or other time period)

Barriers and enablers of effective service components identified in Question 1 were also evaluated to answer review Question 2. These were defined by the Cancer Council as:

'Enablers' are system and other supports that have been identified by individual study authors and may have included (but were not limited to): workforce requirements e.g. qualifications, training, skills, supervision; awareness campaigns; and appropriate resourcing.

'Barriers' were identified by individual study authors and may have included (but were not limited to): service, resource or skill-related issues impeding optimal service delivery.

Sub-group analyses: Where data was available, sub-group analyses were conducted for tailoring to the following priority populations:

- Culturally and linguistically diverse (CALD) populations
- Indigenous populations
- Mental health
- Pregnant women
- Substance use disorders
- Young people.

Tailoring of services to meet priority population needs may have included (but were not limited to) tools/resources, staff training, designated staff, translation services, cultural competence and counselling methods.

Information pertaining specifically to age, gender and rural/remote locations has been discussed where available within the narrative synthesis of individual studies.

Analysis of evidence: Data was analysed through narrative synthesis with characteristic and outcome evidence also documented within tables based on the NHMRC evidence hierarchy (Table 1). Where no or limited evidence was available from studies meeting the inclusion criteria for the rapid review to address a specific outcome, this is stated and a summary of available (lower quality) evidence from observational studies, surveys and/or qualitative investigations is provided.

Strength of the evidence to be included: This review included strong evidence in relation to the review questions as well as evidence which is medium or weak in relation to the review questions (e.g. a study which suggests an intervention is promising but requires more rigorous research). Equivocal/conflicting evidence in relation to the review questions were noted.

NHMRC levels of evidence:

Included studies were categorised according to the NHMRC evidence hierarchy, as outlined in Table 1.

Table 1: NHMRC evidence hierarchy

Level of evidence	Study design
I	A systematic review of level II studies
II	A randomised controlled trial
III-1	A pseudo-randomised controlled trial (i.e. alternative allocation or some other method)
III-2	A comparative study with concurrent controls (i.e. non-randomised experimetal trials, cohort studies, case-control studies, interrupted time series studies with a control group)
III-3	A comparative study without concurrent controls (i.e. historical control study, two or more single arm studies, interrupted time series studies without a parallel control group)
IV	Case series with either post-test or pre-test/post-test outcomes

Evidence was then summarised according to the NHMRC matrix grading system for recommendation (Table 2). Components evaluated included the evidence base, consistency, clinical impact, generalisability and applicability.

Table 2: NHMRC matrix of evidence quality

Component	A	B	C	D
	Excellent	**Good**	**Satisfactory**	**Poor**
Evidence base	Several level I or II studies with low risk of bias	One or two level II studies with low risk of bias or a systematic review or multiple level III studies with low risk of bias	Level III studies with low risk of bias, or level I or II studies with moderate risk of bias	Level IV studies, or level I to III studies with high risk of bias
Consistency	All studies consistent	Most studies consistent and inconsistency may be explained	Some inconsistency reflecting genuine uncertainty around clinical question	Evidence is inconsistent
Clinical impact	Very large	Substantial	Moderate	Slight or restricted
Generalisability	Population/s studied in body of evidence are the same as the target population in question	Population/s studied in the body of evidence are similar to the target population in question	Population/s studied in body of evidence differ to target population in question, but it is clinically sensible to apply this evidence to the target population	Population/s studied in body of evidence differ to target population and hard to judge whether it is sensible to generalise to target population
Applicability	Directly applicable to Australian context	Applicable to Australian context with few caveats	Probably applicable to Australian context with some caveats	Not applicable to Australian context

Search strategy

Countries included: The review evaluated and summarised evidence from Australia, Europe, NZ, UK and US.

Search terms: The review included evidence searched from:

- The peer-reviewed literature including searches of the Cochrane Database of Systematic Reviews, PubMed/Medline, Embase and PsycInfo (see Appendix 1 for search details and results).
- Grey literature (i.e. agency reports from the Cancer Council, international organisation reports including Australian Institute of Health and Welfare and the World Health Organization (WHO), and guidelines including Smoking Cessation Guidelines for Australian General Practice, Royal Australian College of General Practitioners Support Smoking Cessation: A guide for health professionals, the WHO Guidelines for Smoking Cessation Telephone Counselling and North American Quitline Consortium Guidelines (see Appendix for search details and results).

Limitations to the search strategy: Studies were included only in English and the review was limited to studies published from 2009. However, seminal papers prior to this which were considered important for Cancer Council Victoria were also included.

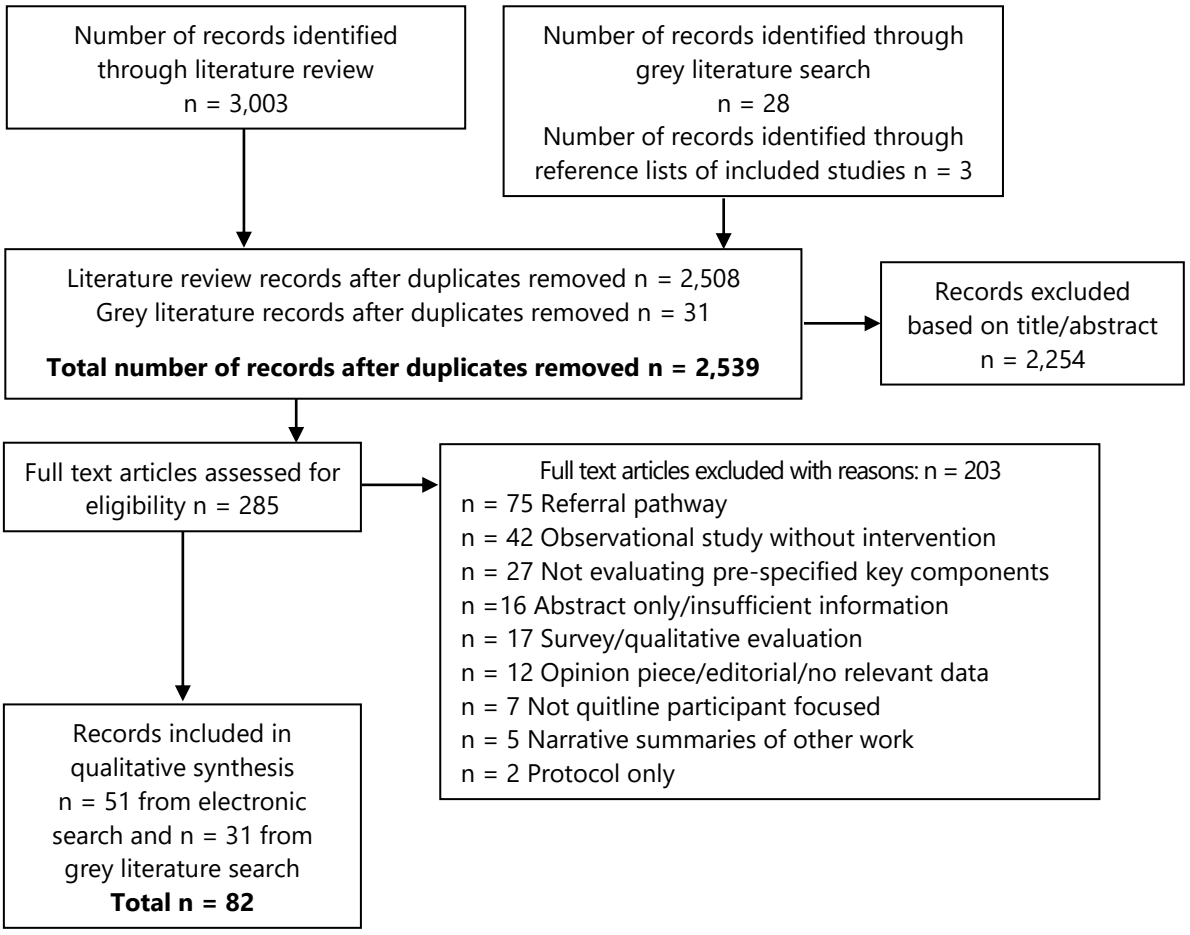
Search terms: All searches were limited to English, were published since 1 January 2009 and were conducted in human subjects. A full list of the search terms and results are included in the appendix.

A search of electronic database was conducted on 29 October 2018.

4 PRISMA flow diagram

In total 3,034 records were identified from the database and grey literature search. Once duplicates were removed a total of 2,539 records were screened for inclusion eligibility. Based on title/abstract screening, 2,254 records were excluded and considered not relevant, leaving 285 records requiring full text review. Of these, 203 records were excluded resulting in inclusion of 82 records representing 80 studies and/or guidelines for this rapid review of evidence. Figure 1 summarises the search process and outlines reasons for study exclusion.

Figure 1: PRISMA flow diagram of studies identified for inclusion in this rapid review of quitline services



5 Synthesis of relevant papers

Overview of findings of the comprehensive search strategy:

In total, 51 records were identified from the literature search for inclusion across the six NHMRC evidence categories. This was supplemented with guidelines, reports and key articles from the grey literature search, which are synthesised further in the section VII analysis of evidence. See section IV PRISMA diagram (Figure 1) for more details of the initial search. Four studies assessed level I evidence, 21 studies level II evidence, two studies level III-1 evidence, four studies level III-2 evidence, five studies level III-3 evidence and 15 studies level IV evidence. Of these 51 studies, all examined at least one key component of quitline counselling as per the pre-specified inclusion criteria.

Given the diverse reporting methods and inconsistent terminology used for smoking cessation studies, quitline interactions will be classified as either 'quitline-initiated' or 'client-initiated' depending on who initiated first contact and/or follow up calls.

NHMRC level I: Systematic reviews of level 2 studies

Four systematic reviews were identified providing level I evidence. One of these (Medical Advisory Secretariat 2010) only evaluated the evidence from a 2006 Cochrane review. Therefore, this systematic review will not be discussed further in favour of the most recent update of the Cochrane review by Stead et al. 2013.[6]

The systematic review by Stead et al. in 2013 identified 77 studies for inclusion that evaluated quitline-initiated or client-initiated follow-up telephone counselling to assist smoking cessation offered to smokers or recent quitters. These 77 studies included almost 85,000 individual participants with a median trial size of 820. Only six of the studies included less than 100 participants, while six other studies, all involving callers to quitlines, had more than 3000 participants. Sixty of these 77 studies were conducted in the US, eight in Australia, two in Spain, three in the UK, one in Hong Kong, one in Norway and two in Germany. Studies within this review were grouped into three broad categories: trials of interventions for smokers who contacted a helpline (n = 15 studies); trials assessing the effect of providing access to a helpline (referral pathways; n = 2 studies); and trials that offered support proactively in other settings, not initiated by calls to quitlines (n = 51 studies). There were eight additional studies that did not fit within any of these three categories with one included study unaccounted for by review authors. Of note, most of the studies included in the Stead et al. review did not meet the criteria for inclusion as individual randomised controlled trials (RCTs) within this rapid review for several reasons, including: studies from countries other than Australia, Europe, NZ, UK and US; conducted/published prior to 2009 and not primarily conducted in the quitline setting and/or with

quitline callers (e.g. quitline intervention was part of a community study in the general practice setting or quitline was only one component of an intervention in one arm).

The Tzelepis et al. 2011 systematic review included 24 randomised controlled trials evaluating recruitment channel (quitline initiated-treatment, smoker-initiated treatment or mixed) and methodological quality for follow-up telephone counselling calls initiated by quitline. [7] A total of 37,339 participants were included across these 24 studies, all published prior to December 2008 (meaning all included studies in this systematic review did not meet the criteria as individual studies for inclusion in the rapid review). Most studies were from the US (n = 15), three from Australia, two from Spain, two from the UK, one from Canada and one from China.

Another systematic review by Schwindt et al. 2017 examined the impact of tobacco quitlines on persons with a mental illness, identifying four studies for inclusion with 1,412 participants.[54] The number of participants within individual studies ranged from 123 to 577, and the population characteristics, smoking status and recruitment strategies differed between studies. Three were randomised controlled trials and one a quasi-experimental prospective study. Two were conducted in the US, one in Australia and one in the Netherlands. Of note, none of the four studies identified in the Schwindt et al. 2017 review were included in the 77 studies identified in the Stead et al. 2013 review. Within the Stead et al. review, three of the Schwindt et al. studies were classified as excluded but relevant due to design components not meeting the criteria of the Cochrane review, while the fourth study was published in 2016, after publication of the Cochrane review.

Tabulation of included studies

Source	Setting	n-values		Description of Intervention and Comparator		Outcomes	Effect
		Study	Participant	Intervention	Comparison		
Medical Advisory Secretariat 2010[55]	World-wide	n = 1 Cochrane review; n = 48 studies in the review	Over 36,000 participants	Evaluated one Cochrane systematic review published in 2006 *"Telephone counselling for smoking cessation"* intervention included quitline-initiated counselling calls with number of calls ranging from 1–12 over weeks or months; average 10–20 min duration	Standard advice; General information; Different intensity quitline service	• Statistically significant increase in smoking cessation at 6 months for **quitline-initiated follow-up calls** in addition to provision of materials, compared to brief counselling through a single counselling session (Risk Ratio (RR) = 1.63; 95% Confidence Interval (CI) 1.23–1.50) • **Quitline-initiated follow-up counselling** on its own (i.e. without provision of additional materials) had a modest benefit on smoking cessation at 6 months compared to a single counselling session (RR = 1.29; 95% CI 1.19–1.40) • 3/7 studies showed in increase in **quit rates** or sustained abstinence while remaining studies showed no significant effect • Statistically significant increase in **smoking cessation** at 6 months for additional quitline initiated calls vs provision of materials or brief counselling at a single call (RR = 1.63; 95% CI 1.23–1.50)	↑ ↑ ↔ ↑

Source	Setting	n-values		Description of Intervention and Comparator		Outcomes	Effect
		Study	Participant	Intervention	Comparison		
						• Quitline-initiated follow-up counselling had a modest benefit on **smoking cessation** at 6 months (RR = 1.29; 95% CI 1.19–1.40)	↑
Stead 2013[6]	World-wide	n = 1 Cochrane review; n = 77 studies in the review	Almost 85,000 participants	Quitline- or client-initiated follow-up telephone counselling to assist smoking cessation offered to smokers or recent quitters	Lower intensity or brief counselling, self-help materials or different counselling interventions	• Groups randomised to receive **multiple sessions of quitline-initiated follow-up counselling** had higher **quit rates** compared to those receiving single counselling sessions initiated by the client (R = 1.37; 95% CI 1.26–1.50) • Evidence was mixed about whether increasing **the number of calls** altered quit rates, however most trials used more than two calls • Studies comparing **different counselling approaches** during a single quitline contact did not detect significant differences • Quitline-initiated follow-up counselling was associated with increased quitting observed through pooling of 51 studies (RR 1.27; 95% CI 1.20 – 1.36) • The relative extra benefit of counselling was smaller when the **counselling protocol** provided included counselling in addition to pharmacotherapy (usually nicotine replacement therapy) than when the control group only received self-help material or a brief intervention	↑ ↔ ≈ ↑ N/A
Schwindt 2017[54]	World-wide	n = 4 studies with 1,412 participants	n = 1,412 participants	Studies that evaluated the efficacy or effectiveness of quitline interventions for adult participants (aged 18 years and over) diagnosed with a mental illness	Quitline with adjunctive treatments or another smoking cessation intervention	• Significantly higher **smoking cessation rates** were observed for two of the four included studies • Only one of the four studies identified an association between **smoking abstinence** and a significant improvement in depressive and psychotic symptoms as well as mental health functioning for all groups	↔ ↔
Tzelepis 2011[7]	World-wide	n =24 studies	n = 37,339 participants	Quitline-initiated primary call and follow-up telephone counselling for smoking cessation for adults (>18 years) in the general community; i.e.	Quitline-initiated follow-up telephone counselling following client-initiated first call	• **Quitline-initiated follow-up telephone counselling** significantly improved **point prevalence abstinence** at 6–9 months compared to printed materials or no intervention (RR =1.26, 95% CI 1.11–1.43, p = <0.001). This was not sustained at 12–15 months • **Telephone counselling** initiatives using both active recruitment (quitline-initiated treatment) (RR = 1.35, 95% CI 1.02–1.80, p = .04) and	↑ ↑

Source	Setting	n-values		Description of Intervention and Comparator		Outcomes	Effect
		Study	Participant	Intervention	Comparison		
				described as 'active recruitment'	for smoking cessation for adults (>18 years) in the general community; i.e. described as 'passive recruitment'	passive recruitment (smoker-initiated treatment) (RR = 1.22, 95% CI 1.08–1.38, p = .001) were superior to print materials or no intervention • **Quitline-initiated follow-up telephone counselling** significantly improved **continuous abstinence** at 6–9 months compared to printed materials or no intervention (RR = 1.58, 95% CI 1.26–1.98, p< .001), this was sustained at 12–18 month follow up (RR = 1.40, 95% CI 1.23–1.60, p< .001) • Both **active recruitment (p = 0.02; first call initiated by quitline counsellors) and passive recruitment (p = 0.001; first call initiated by client)** showed benefit for **continuous abstinence** at 12–18 months follow up	↑ ↑

Key: ↑ = increase; ↓ = decrease; ↔ = mixed; ≈ = no difference; N/A = Not applicable

NHMRC level II: Randomised controlled trials

Twenty-one randomised controlled trials were identified for inclusion, published between 2010 and 2016. Sample size ranged from 121 to 5,752. The majority (n = 16) were conducted in the US, two in the UK, and one each in Australia, the Netherlands and NZ.

Tabulation of included studies

Source	Setting	n-values	Description of Intervention and Comparator		Outcomes	Effect
			Intervention	Comparison		
Bricker 2014[1]	Uninsured callers to the South Carolina State	n = 121 uninsured quitline callers	Acceptance and Commitment therapy (ACT) over five sessions plus two weeks of nicotine replacement therapy (NRT)	Cognitive and Behavioural therapy (CBT) over five sessions plus two weeks of NRT	• ACT participants completed significantly **more calls** (1.1 more calls on average) than CBT participants when comparing two different **behavioural change techniques** • **More calls** predicted higher **30-day point prevalence abstinence** at 6-month follow-up for ACT (Odds Ratio (OR) = 1.6; 95% CI 1.1–2.6;	↑ ↑

Source	Setting	n-values	Description of Intervention and Comparator		Outcomes	Effect
			Intervention	Comparison		
	quitline, US				p = 0.03) but not for CBT (OR = 1.6; 95% CI 0.9–3 0; p = 0.10) • **Quit rates** of 30-day point prevalence abstinence at 6-month follow-up for ACT were 31% compared to 22% in the CBT group (OR 1.5; 95% CI 0.7–3.4; p = 0.32) • Among participants depressed at baseline (n = 47) quit rates were 33% in ACT and 13% in CBT groups (OR 1.2; 95%CI 1.0–1.6' p = 0.10) identifying an improvement **in mental health** outcomes	≈ ≈
Bullen 2010[12]	Dependent smokers who called the NZ quitline	n = 1,100 quitline callers	Two weeks of nicotine patches and/or gum prior to their target quit date followed by usual care (8 weeks of patches and/or gum plus support calls from quitline advisor)	Usual care alone (8 weeks of patches and/or gum plus support calls from Quitline advisor)	• Six months after quit day **7-day point prevalence** abstinence was observed in 22.7% of participants in the pre-cessation group and 21.0% in the control group (n = 125 and n = 116 participants respectively), showing no additional increase in cessation rates for pre-cessation NRT • Self-reported **continuous smoking abstinence** was 18% in both the pre-cessation group (n = 99) and control group (n = 97) • **Reduced daily cigarette consumption** was observed in both groups by their quit date, going from 19 cigarettes per day to 7 in the intervention arm and 16 in the control arm • By six-month follow-up among those who relapsed, both groups reported smoking **fewer cigarettes** than at entry into the trial, with an average of approximately 11 cigarettes per day in both groups	≈ ≈ ≈ ≈
Burns 2016[56]	Colorado quitline callers, US	n = 1,495 quitline callers	Eight-week supply of nicotine patches shipped in 4-week batches; dosing followed the normal Nicoderm package insert with patches distributed per normal protocol by mail from the quitline distribution centre; plus, usual quitline protocol	Single 4-week supply of nicotine patches – the amount available under state policy for smokers of ≤20 cigarettes per day at the time plus usual quitline protocol	• Smoking rates including 7-day and 30-day **point prevalence and continuous abstinence** did not differ between study groups by 6-month follow-up • Intervention participants who requested the full 8-week supply of NRT were significantly more likely to **complete all counselling calls** (33.5%) compared to the intervention participants who only received the 4-week supply of NRT (1.6%; p<0.0001) • Intervention participants who requested the full 8-week supply of NRT were significantly more likely to obtained 30-day **point prevalence abstinence** (29.3%) compared to intervention	≈ ↑ ↑

Source	Setting	n-values	Description of Intervention and Comparator		Outcomes	Effect
			Intervention	Comparison		
					participants receiving the 4-week supply of NRT (15.7%; p<0.001)	
Bush 2012a[19]	Oklahoma Tobacco quitline callers, US	n = 2,000 quitline callers	CBT cessation-related weight concerns program integrated into usual quitline practices. The weight concerns program included three additional calls with a weight coach and specialised support material adapted from an in-person CBT weight concerns intervention	Usual quitline practices including a mailed quit guide, 5 counselling calls with a quit counsellor, free NRT (2 weeks for insured and 8 weeks for uninsured participants) and referral to community-based cessation resources	• Average **number of counselling calls** completed for the intervention was 4.1 compared to 3.0 in the control arm • The intervention arm reported a 3.5% increase in **quit rate** compared to the control arm by 6-month follow-up, however, these results were not significant; Likewise, intention to treat quit rates identified no differences between intervention and control groups (17.1% and 17.8% respectively) • In the intervention arm 30.0% reported perceived weight change compared to 50.8% in the control group (p = 0.0004) with a perceived change of -3.4 pounds in the intervention arm compared to +1.8 pounds in the control arm (p = 0.01)	↑ ≈ ↑
Carlini 2012[57]	Indiana and Washington quitline callers, US	n = 2,985 previous quitline callers with a final sample of n = 521 smokers	Interactive voice response screening plus the interactive voice response intervention, consisting of automated questions to identify and address barriers to re-cycling in quitline support, followed by an offer to be transferred to the quitline and reinitiate treatment	Interactive voice response providing a greeting and screening for current smoking, followed by a message thanking them for the information	• **Proactive calls (i.e. quitline-initiated first call)** resulted in a re-enrolment rate of 28.2% in the intervention arm and 3.3% in the control arm	↑
Carlin-Menter 2011[18]	New York quitline callers, US	n =4893 quitline callers in 2-month period; n = 1,923 eligible participants	Offer of 2 callbacks from the quitline. Callback counselling included setting a quit date on the intake call and provision of contact information and preferred times for callbacks. Client-centred cessation session strategies used, including checking smoking status, provision and use of nicotine patches, motivational	Standard care: offer of 4 callbacks from the quitline. Callback counselling included setting a quit date on the intake call and provision of contact information and preferred times for callbacks. Client-centred cessation session	• **Call duration** averaged 8 minutes (range: 2.48–20.15 minutes), with no difference between intervention and control groups • Mean **number of callbacks** completed were similar for the intervention group 0.89 (0.87) compared to 1.04 (1.1) for the standard care group (P>0.05) • Reasons for not accepting callbacks were recorded overall; 39% reported being 'too busy', 30% believed the calls were unhelpful, 14% said they were not ready to quit • Of the 57% of all participants who accepted callbacks 89**% said they were helpful in their quit effort**	≈ ≈ N/A ↑

Source	Setting	n-values	Description of Intervention and Comparator		Outcomes	Effect
			Intervention	Comparison		
			interviewing and CBT	strategies used, including checking smoking status, provision and use of nicotine patches, motivational interviewing and CBT	• Mean number of nicotine patches did not differ between intervention 19.4 (14.1) and control 20.1 (13.9) (P>0.05) according to self-report • Overall 48% of all participants **reduced their cigarette consumption** by 50% or more • 7-day non-smoking prevalence rate increased by 64% for every additional **callback** completed • 30-day non-smoking prevalence rate increased by 73% for every additional **callback** completed • Cost per quitter in the intervention group was $US442 for 131 quitters, cost per quitter in the control group was $US445 for 135 quitters	N/A ≈ ↑ ↑ N/A
Danaher 2015[58]	California and online, US	n =1683 total, n = 421 web only users, n = 421 quitline only callers, n = 417 web+quitline callers, n = 424 control	**Quitline+Web:** See description of 'Quitline Only' and 'Web Only' below. Counsellors accessed the online dashboard enabling access to real-time metrics regarding the individual's web intervention use. Printed cessation self-help guide **Quitline Only:** proactive follow-up calls delivered by trained quitline counsellors. Calls followed a smokers' protocol adapted for smokeless tobacco users. Counsellors used computer assisted telephone interviewing to guide calls and schedule future calls. Motivational interviewing and CBT were also used. Four follow up calls offered. Printed	Mailed the printed cessation self-help guide only.	• **At 3- and 6-month follow-up repeated point prevalence of all tobacco abstinence was improved** in the Web Only group vs. control (OR = 1.14, 95% CI 1.03,1.94, p = 0.033) as well as the 'Quitline Only' group vs. control (OR =1.54, 95% CI 1.13,2.11, p = 0.007) • When comparing groups of individuals who were not offered any form of Quitline intervention vs. those who did receive quitline intervention, **3- and 6-month reported point prevalence** of all tobacco abstinence was significantly greater in those who received the quitline intervention (OR = 1.26, 95% CI 1. 01,1.56, p = 0.038) • Repeated point prevalence of all tobacco abstinence was more likely in older people (β = 0.04, p = 0.012; OR = 1.23, 95% CI 1.10,1.37) and males (β = 2.46, p = 0.037; OR1.04, 95% CI 1.17,123.67) who received the quitline intervention • 70% of all participants reported using the printed self-help guide, 93% of these individuals read some or all of the material, 12% read the material more than once. No difference in usage identified between groups • Web intervention access did not differ between Web Only (90.0%) and Quitline+Web (90.4%) groups, 65.4% of all web users made	↑ ↑ N/A ≈ ≈

Source	Setting	n-values	Description of Intervention and Comparator		Outcomes	Effect
			Intervention	Comparison		
			cessation self-help guide **Web Only:** Fully automated tailored and interactive web program using CBT themes and strategies as text, activities and videos. Emphasis on the phases: planning to quit, quit, staying quit. Printed cessation self-help guide		multiple visits to the content • 41.4% of all participants allocated to a group involving quitline participated in **at least one call**. Of these individuals: 9.7% had one call, 10.1% had two calls, 6.7% had three calls, 8.0% had four calls, 6.9% had all 5 calls • Quitline-only group had significantly **more individuals with at least one call** (χ^2 = 6.14, p = 0.013, OR = 0.71, 95% CI 0.54, 0.93); mean number of calls did not differ between groups: Quitline only mean = 3.13 calls; Quitline+Web mean = 3.10 calls • Participating in at least one call was significantly related to **6 months tobacco abstinence** (χ^2 = 7.72, p = 0.005, OR = 1.61, 95% CI 1.15, 2.26) • Reported **6-month tobacco abstinence** was 11% higher in participants receiving quitline calls than those who did not • 347 individuals received at least one quitline call, 85.6% of them **found the calls helpful** and 93.8% would recommend the service to others; compared to Quitline Only, the Quitline+Web group rated both helpfulness (p< 0.05) and future recommendation (p<0.05) higher	N/A ≈ ↑
Docherty 2014[10] *Secondary analysis of data from Ferguson 2012	Government-funded quitline, UK	n = 2,591, quitline callers	See Ferguson 2012 **Secondary analysis to investigate if use of 'non-trial' support confounded outcomes of Ferguson 2012. 'Non-trial' support included: Over the counter NRT, NRT from other health professionals, bupropion, varenicline, NHS stop smoking support, NHS one-on-one therapy, non-NHS quitline, any other support	See Ferguson 2012	• Participants seeking additional 'non-trial' support did not affect **continuous cessation at 6-month** follow-up (trial model OR 0.86, 95% CI 0.7–1.06, p = 0.11; secondary model OR 0.84, 95% CI 0.66–1.07, p = 0.17) • Adjusting for 'non-trial' support also had no effect on the following outcomes published in Ferguson 2012: self-reported cessation ≥7 days (OR 0.85, 95% CI 0.67–1.07; p = 0.17); reported **cessation ≥ 3 months** (OR 0.86, 95% CI 0.66–1.10; p = 0.23); reported quit attempts lasting more than 24 hours (OR 1.15, 95% CI 0.88–1.50; p = 0.30)	≈ ≈

Source	Setting	n-values	Description of Intervention and Comparator		Outcomes	Effect
			Intervention	Comparison		
Ferguson 2012[11]	Government funded quitline, UK	n = 2,591, quitline callers	**Quitline initiated follow-up telephone counselling:** Usual care plus additional telephone counselling by a trained counsellor before, on and after their quite date (up to 4 follow-up calls post quit) **Voucher for free NRT:** 6 weeks free NRT via pharmacy with trained counsellor to advise on precautions of use	**Usual Care:** cessation support provided via telephone, email, print resource, text message and if appropriate advice to seek additional support. two follow-up calls provided at 2 days and 3 weeks after the first session	• Neither **quitline initiated follow-up telephone counselling** nor provision of free NRT resulted in any difference for any outcomes relevant to this review, compared to usual care • For **quitline initiated follow-up telephone counselling** compared to control: continuous cessation (OR 0.92, 95% CI 0.75–1.14, p = 0.46); self-reported cessation ≥7 days (OR 0.95, 95% CI 0.77–1.16, p = 0.60); reported cessation **≥ 3 months** (OR 1 01, 95% CI 0.80–1.26, p = 0.95); reported **quit attempts** lasting more than 24 hours (OR 1.04, 95% CI 0.86–1.26, p = 0.68); continuous cessation since quit date (OR 0.95, 95% CI 0.80–1.12, p = 0.55) • For provision of NRT compared to control: continuous cessation (OR 0.86, 95% CI 0.70–1.06, p = 0.16); self-reported cessation ≥7 days (OR 0.85, 95% CI 0.70–1.04, p = 0.13); reported cessation ≥ 3 months (OR 0.84, 95% CI 0.67 to 1.05, p = 0.14); reported **quit attempts** lasting more than 24 hours (OR 1.05, 95% CI 0.87 to 1.27, p = 0.60); continuous cessation since quit date (OR 1.01, 95% CI 0.86–1.19, p = 0.88) • 51.3% of participants who received any NRT used it every day, 23.9% used it most days, 8.1% once or twice a week, 6.7% less than once a week, 6.5% not at all since quit date • Individuals in the usual care group received an average of 2.44 **calls** while the **quitline initiated follow-up counselling** group received an average of 3.35 calls; 50 participants in the usual care group contacted quitline for support, while 53 did so in the quitline initiated follow-up counselling group; participants called an average of approximately one time regardless of their group	≈ ≈ ≈ N/A N/A
Fucito 2011[4]	Telephone specialists and their smoking clients who contact the	n = 28 telephone specialists n = 2,032 smoking clients (n =	Web-based structured interview and counselling using gain-framed messages (i.e. content emphasising quitting benefits)	Web-based structured interview and standard care counselling	• No significant interaction of nicotine dependence scores and **message condition** on the likelihood of achieving 7-day point prevalence smoking abstinence at the 3-month follow-up (Wald = 0.02, p = 0.90, OR = 1.10) • Among continuing smokers at 3 months, smokers who reported higher nicotine dependence scores were more likely to report	≈ N/A

Source	Setting	n-values	Description of Intervention and Comparator		Outcomes	Effect
			Intervention	Comparison		
	New York State Smokers' Quitline	810 assigned to gain-framed; n = 1,222 assigned to standard-care)			smoking more **cigarettes per day** and this effect was greater in response to standard-care messages (*b* = 2.07; t = 10.01, p<0.001) than gain-framed messages (*b* = 1.41; *t* = 5.82, p<0.001)	
Klesges 2015 [8]	Quitline callers from Memphis, Tennessee, who were adult smokers and beneficiaries of the Department of Defence military health care (TRICARE)	n = 1,298 active duty military personnel, their dependents, reservists, and retirees (n = 649 assigned to quitline initiated follow-up calls (proactive quitline); n = 649 assigned to client-initiated follow-up calls (reactive quitline)	Participants assigned to the proactive condition were scheduled for six counselling sessions over eight weeks. Trained counsellors contacted participants to deliver a cognitive behavioural intervention, with an additional call attempt if there is no response. Eligible participants also received an 8-week supply of nicotine replacement therapy (NRT) patches	Participants assigned to the reactive condition were asked to call the Quitline up to six times over the same eight weeks. Participants making contact will receive the same intervention as the proactive condition and those eligible received a 2-week supply of NRT patches	• In the **Proactive** condition, 78.89% of participants received ≥ 3 intervention calls compared to 13.87% of those in the **Reactive** condition. In the Reactive condition, 46.84% did not complete a single call compared to 3.54% in the Proactive condition • The Proactive condition was associated with greater odds of both prolonged (44.22% vs 24.9%; OR = 2.4, p =< 0.0001) and 7-day point prevalence (49.92% vs 28.20%; OR = 2.5, p< 0.0001) smoking abstinence, a difference that was maintained for prolonged smoking **abstinence at 12 months** (22.03% vs 13.41%; OR = 1.8, p<0.0001) • Prolonged smoking abstinence at 12-months favoured the **Proactive condition** in the active duty subgroup (OR = 1.643, 95% CI 1.077–2.507) and in the non-active duty subgroup (OR = 2.027, 95% CI 1.349–3.045)	↑ ↑ ↑
Klesges 2015b[59]	Quitline callers from Memphis, Tennessee, who were	n = 214 assigned to quitline initiated follow-up	Participants assigned to the proactive condition were scheduled for 6 counselling sessions over 8 weeks. Trained counsellors contacted	Participants assigned to the reactive condition were asked to call the Quitline up to 6 times over the same 8 weeks.	• At 12-month follow-up, abstinence was self-reported in 22% and 26%-point prevalence in **Proactive and Reactive conditions**, respectively. However, 48% of participants who were tested for cotinine failed biochemical verification, indicating a considerable falsification of self-reported cessation	↔

Source	Setting	n-values	Description of Intervention and Comparator		Outcomes	Effect
			Intervention	Comparison		
	adult cancer survivors and regularly smoked cigarettes	calls (proactive quitline); n = 213 assigned to client-initiated follow-up calls (reactive quitline)	participants to deliver a cognitive behavioural intervention, with up to three call attempts if there is no response. Eligible participants also received a supply of nicotine replacement therapy (NRT) patches	Participants making contact will receive the same intervention as the proactive condition and those eligible received a supply of NRT patches	• Among Proactive participants, 7 (4.1%) tested cotinine negative compared to 8 (4. 6%) in Reactive participants (OR = 0.89, CI = 0.27–2.87) • At 8-week follow-up, there were no differences between Proactive and Reactive conditions in point prevalence abstinence (Proactive: 28%, Reactive: 25%) and continuous abstinence (Proactive: 17%, Reactive: 14%) • At 12-month follow-up, neither self-reported point prevalence (Proactive: 22%, Reactive: 26%) nor **continuous abstinence** (Proactive: 13%, Reactive: 14%) were significantly different by condition • Adjusted cessation rates were less than 5% in both intervention conditions	≈ ≈ ≈ ≈
Klesges 2015c[60]	Quitline callers from Memphis, Tennessee, who were adult survives of childhood cancer and regularly smoked cigarettes	n = 260 assigned to quitline-initiated follow-up calls (proactive quitline; n = 259 assigned to client-initiated follow-up calls (reactive quitline)	Participants assigned to the proactive condition were scheduled for 6 counselling sessions over 8 weeks. Trained counsellors contacted participants to deliver a cognitive behavioural intervention, with up to three call attempts if there is no response. Eligible participants also received a 4-week supply of nicotine replacement therapy (NRT) patches	Participants assigned to the reactive condition were asked to call the Quitline up to 6 times over the same 8 weeks. Participants making contact will receive the same intervention as the proactive condition and those eligible received a 2-week supply of NRT patches	• The **Proactive condition** self-reported a higher rate of smoking cessation than those in the Reactive condition at 8 weeks (33.2% vs 17.0%, p< 0.001) but not 12 weeks (23.0% vs 18.7%, p = 0.29) • However, 80% of participants claiming abstinence failed biochemical verification, indicating marked falsification of self-reported smoking status • Adjusted **cessation rates** were less than 2% in both intervention conditions	↔ ≈
McDaniel 2015[61]	Quit for Life Program, US	n = 1,785 total; standard n = 592, TEQ-10 n = 602, TEQ-	QFL (described in the comparison column) plus interactive voice response – Technology Enhanced Quitline (TEQ) with:	Standard Quit for Life (QFL) includes 5 counselling calls (an initial assessment and planning call plus 4	• 30-day **quit rates at 6 months** were 59.4% (95% CI 53.7–63.8%) for QFL, 62.3% (95% CI 57.7%–66.9%) for TEQ-10, 59.4% (95% CI 53.7%–65.1%) for TEQ-20. This was not significant • 30-day **quit rates at 12 months** were 61.2% (95% CI 55.6%–66.8%) for QFL, 60.6% (95% CI 56.0%–65.2%) for TEQ-10, 54.9% (95% CI	≈ ≈

Source	Setting	n-values	Description of Intervention and Comparator		Outcomes	Effect
			Intervention	Comparison		
		20 n = 591	10 risk assessments (TEQ-10) or 20 risk assessments (TEQ-20) Risk assessments were pre-programmed identify relapse risk on five factors: lapses, cravings, negative affect, self-efficacy and motivation to remain quit. An algorithm was used to flag participants as 'at risk'	additional quitline-initiated outbound calls from an educated Quit Coach). Call schedule and content tailored to individual. Total of 4 calls. Participant free to call in the interim for additional support. May also access additional cessation resources e.g. print and NRT	49.0%–60.9%) for TEQ-20. This was not significant • 73.3% of TEQ participants were identified as at-risk by the **interactive voice response technology** assessments • **Positive risk assessments** identified participants less likely (OR 0.56, 95% CI 0.42–0.76) to be abstinent at 6 months	N/A N/A
Segan 2011[62]	Quitline callback service, Victoria Australia	Assessed for eligibility n = 2,307 Randomised at recruitment n = 1,444	Up to 10 post-quitting callbacks over a 3-month period to help ex-smokers integrate a smoke-free lifestyle. Topics included (i) lifestyle changes, (ii) high-risk situations and planning to confront new situations, (iii) motivation; warning signs and cessation fatigue, (iv) emotional issues and (v) weight management.	Standard callback service, including up to 4 post-quitting callbacks over 1 month	• The intervention group received calls over a **longer period** compared with the usual care group (60.9 days comprising 28.5 days for standard calls and 32.4 days for integration calls versus 42.0 days in usual care group, t = 7.07, df = 652.7, P<0.001) • There was no difference between groups in the proportion of participants reporting reaching the point of less than daily cravings (81% in each group). • The treatment condition was not significantly associated with point prevalence abstinence or measures of **continuous abstinence** at either 4- or 12-month follow-up • In addition, mean time to relapse for the baseline quit attempt was not significantly associated with treatment condition • At 4-month follow-up, 97% of participants in both groups rated the callback service as helpful (83% very; 14% somewhat), and 87% agreed that **receiving callbacks made a difference** to the success of their quit attempt	↑ ≈ ≈ ≈ ↑
Sims 2013[63]	Callers to the State of Wisconsin's tobacco	Total callers n = 2,257 Eligible callers n = 1,737	Self-help materials based on stage of change model, and up to 4 follow-up calls from quitline counsellors	No cessation counselling, only self-help materials based on stage of change model	• CI group was significantly more likely to set a quit date (59.8%) than the SH group (43.3%; p<0.002) at 1-month post enrolment in the ITT analysis as well as in the responder-only analysis (p<0.001). This	↔

Source	Setting	n-values	Description of Intervention and Comparator		Outcomes	Effect
			Intervention	Comparison		
	quitline vendor Free & Clear	Randomised and consented young adults n = 462	(Counselling Intervention (CI) group)	(SH group)	effect was not found at the subsequent study end points • The groups did not differ in the percentage of participants that actually reported making a **quit attempt** at any of the study end points. Similarly, the groups did not differ in percentage abstinent at any of the study end points for either the ITT or responder-only analysis • Within the CI group, participants who had two or more counselling sessions were somewhat more likely to report making a quit attempt (44.4%) compared to participants who had zero or one session (31.1%; p = 0.06) • Similarly, the group of participants that had **more counselling sessions** also had a marginally significant higher 7-day point prevalence abstinence rate (14.1%) compared to participants with fewer counselling sessions (5.4%; p = 0.06); follow-up time period not specified	≈ ↑ ↑
Smith 2013[17]	Callers to the State of Wisconsin's tobacco quitline vendor Free & Clear	n = 987 Quitline callers	• NRT duration (2 vs 6 weeks) • NRT type (patch only vs patch + gum) • Standard 4-call counselling (SC) vs SC + medication adherence counselling (MAC)	This study was a 2 x 2 x 2 fully crossed factorial design, yielding 8 possible treatment combinations.	• Analysis which included all main effects and interaction effects in the 2 × 2 × 2 design, yielded a statistically significant effect only for the NRT type main effect (patch only vs. combination NRT); no other main effects or interactions were significant • A higher rate of abstinence was observed for combination NRT (49.9%) versus nicotine patch only (42.3%), odds ratio (*OR*) = 1.36 (95% CI: 1.06–1.75) • Contrary to prediction, there was no significant difference between groups for 6 weeks of NRT (48.9%) versus 2 weeks of NRT (43.3%), OR = 1.26 (95% CI: 0.98–1.61) • Similarly, there was no difference in abstinence rates between groups for the **MAC treatment** (44.6%) versus no MAC treatment (47.6%), OR = 0.89 (95% CI: 0.69–1.14)	↔ ↑ ≈ ≈
Toll 2015[64]	Callers to the New York State	n = 1,948 randomised participants	Brief motivational counselling to limit or abstain from alcohol plus an alcohol reduction	Smoking cessation counselling plus a smoking cessation	• **Alcohol and Tobacco Counselling (ATC)** was associated with a significantly higher rate of smoking abstinence at 7-month follow-up compared with TOC (p = 0.03)	↑

Source	Setting	n-values	Description of Intervention and Comparator		Outcomes	Effect
			Intervention	Comparison		
	Smokers' Quitline		booklet added to standard care (Alcohol + Tobacco Counselling; ATC)	booklet added to standard care (Tobacco-Only Counselling; TOC)	• When controlling for the treatment condition, heavy-drinking status was a significant predictor of smoking abstinence, in that participants who did not report any heavy drinking were significantly more likely to quit smoking than those who reported any heavy drinking (p = 0.001).	N/A
Unrod 2016[65]	Callers to the New York State Smokers' Quitline	n = 5,752 Quitline callers consented and randomised n = 3,458 enrolled	Repeated mailings (RM) – 8 booklets sent over 12 months OR Massed mailings (MM) - all 8 booklets sent at once, plus usual care (as described in the comparison column).	Usual care: standard quitline protocol including brief counselling, 2-week starter kit of NRT (choice of patch, gum or lozenge); A 'ready to quit' kit was mailed after the initial call including a congratulatory cover letter, stop smoking guide, medication chart and two single page fact sheets about dealing with nicotine withdrawal and maintaining abstinence	• **Abstinence rates** were 61.0% at baseline (relapse-prevention study), and 41.9%, 42.7%, 44.0% and 45.9% at the 6-, 12-, 18- and 24-month follow-ups, respectively • **Repeated Mailings** (RM) intervention consistently produced higher abstinence rates, however analysis comparing MM or RM against usual care did not find significant differences or group x time interactions • Analyses of smoking status at follow-up among the subset of participants (n = 2108) who had achieved abstinence at baseline also failed to reveal significant group differences in outcomes, with similar rates across conditions • With regard to receipt of intervention, among responders at the 12-, 18-, and 24-month follow-ups, 12.5% of the MM group and 8.0% of the RM group did not endorse receipt of a single booklet • 90% of responders **reported having read the intervention booklets**. At the 6- and 12-month follow-ups, abstinence rates were 42.8% and 43.70%, respectively, among those who reportedly read the booklets, compared with 27% and 29% among those who did not read the booklets (*P*s <0.03)	N/A ↔ ≈ N/A N/A
van der Meer 2010[66]	Callers to the Dutch national smoking cessation quitline	Randomised participants n = 485 daily smokers with past major depression	Eight sessions of quitline-initiated follow-up telephone counselling with a mood management component—consisting of a self-help manual, two extra telephone counselling sessions, and supplementary homework	Eight sessions of quitline-initiated follow-up telephone counselling. This control intervention consisted of strengthening stop-smoking skills, namely social support,	• **Mood management intervention** resulted in significantly higher prolonged abstinence rates at 6- and 12-month follow-up (30.5% and 23.9% vs 22.3% and 14.0%) or both follow-ups • 7-day point prevalence rates were also higher in the experimental group, though this was not statistically significant • Subgroup analysis identified that quitting was associated with improvements in depressive symptoms	↑ ≈ N/A

Source	Setting	n-values	Description of Intervention and Comparator		Outcomes	Effect
			Intervention	Comparison		
			assignments and advice. The manual included modules on behavioural activation, cognitive restructuring and social skills training, including exercises for reading and practising at home	increasing self-efficacy, self-rewarding and relapse prevention	• No difference found between experimental and control conditions on using pharmacotherapy aids for cessation—50% of participants used no pharmacotherapy, 38.2% used NRT, 8.9% used bupropion or nortriptyline and 3.0% used NRT combined with bupropion or nortriptyline	≈
Zhu 2012[67]	Asian-language speaking smokers calling the California Smoker's Helpline's Asian-language lines	n = 1124 callers assigned to telephone counselling; n = 1,153 callers assigned to self-help only	The telephone counselling group included self-help materials and up to 6 counselling sessions. Self-help materials included a Chinese, Korean or Vietnamese translated 28-page self-help manual to motivate smoking quit attempts and utilising coping strategies to prevent relapse. The counselling sessions consisted of a comprehensive 30–40 min pre-quit session with up to 5 follow-up relapse-prevention calls (10–15 mins each), and were conducted in the smokers' native Asian language	Callers assigned to the self-help group were provided with the same self-help materials as the telephone counselling group. No counselling sessions were provided	• **Telephone counselling** increased the 6-month prolonged **abstinence rate** among all smokers compared with self-help (counselling vs self-help, 16.4% vs 8.0%, difference = 8.4%, 95% CI = 5.7%–11.1%, p<0.001) • Counselling also increased the 6-month prolonged abstinence rate for each language group compared with self-help (counselling vs self-help, Chinese, 14.8% vs 6.0%, difference = 8.8%, 95% CI = 4.4%–13.2%, p<0.001; Korean, 14.9% vs 5.2%, difference = 9.7%, 95% CI = 5.8%–13.8%; p<0.001); Vietnamese, 19.8% vs 13.5%, difference = 6.3%, 95% CI = 0.9%–11.9%, p = 0.023 • The **counselling group** had a higher **quit attempt rate** than the self-help group (counselling vs self-help, 54.9% vs 43.3%, difference 11.6%, 95% CI 7.5%–15.7%, p<0.001	↑ ↑ ↑

Key: ↑ = increase; ↓ = decrease; ↔ = mixed; ≈ = no difference; N/A = Not applicable

NHMRC level III-1: Pseudo-randomised controlled trials

Two pseudo-randomised controlled trials were identified for inclusion, published in 2014 and 2010. Sample sizes were 1,212 and 2,032 for each study respectively. One was conducted in Sweden and one in the US.

Tabulation of included studies

Source	Setting	n-values	Description of Intervention and Comparator		Outcomes	Effect
			Intervention	**Comparison**		
Nohlert 2014[68]	Callers to the Swedish National Tobacco Quitline	Quitline calls n = 1,212 Randomised n = 1,129	Counsellor initiated follow-up (described as proactive service): those who called on even dates were offered a call back service with several callbacks.	Reactive service (client-initiated follow-up): those who called on odd dates were informed that they could themselves call back whenever they liked, with no counsellor-initiated callbacks.	• There were no statistically significant differences in outcome between **proactive and reactive service** at the 12-month follow-up, in either point prevalence or continuous abstinence, or in either intent-to-treat (ITT) or responder-only analyses. Of those who responded to the 12-month follow-up, 47% were point prevalent abstinent and 35% were continuously abstinent for responder only analyses, while 27% were point prevalent abstinent and 21% continuously abstinent for all participants, classifying non-responders as smokers • The predictive model from the multivariable logistic regression analyses, which included only the variables known at baseline, showed that not smoking the week before baseline was the strongest predictor for both point prevalence (OR 3.2) and continuous abstinence (OR 3.7) at the 12-month follow-up	≈ N/A
Toll 2010[69]	Callers to the New York State Smokers' Quitline	n = 28 quitline specialists providing counselling and print materials to n = 2,032 smokers	Specialists working at the quitline received gain-framed counselling and materials to provide to their callers. Gain-framing refers to the theory that when gains are made prominent in a decision situation, people are averse to risk	Specialists received standard care messages and print materials to provide callers.	• Specialists who received **gain-framed counselling** used gain-framed statements statistically significantly more frequently than those providing standard-care counselling • **Gain-framed counselling** was associated with a statistically significantly higher rate of **abstinence** at the 2-week follow-up (23.3% in gain-framed group vs 12.6% in standard care group, p<0.001), but not at the 3-month follow-up (28.4% vs 26.6%, p = 0.48) • Statistically significantly more callers in the gain-framed group than the standard-care group made an **attempt to quit** smoking (p<0.001)	↑ ↔ ↑

Source	Setting	n-values	Description of Intervention and Comparator		Outcomes	Effect
			Intervention	Comparison		
					• When surveyed at 3-month follow-up, callers in both groups reported use of a similar number of NRT products, indicating no differences in medication adherence between groups • Those in the **gain-framed** group had statistically significantly higher expectations of their health than those in the standard care group (p = 0.02)	≈ ↑

Key: ↑ = increase; ↓ = decrease; ↔ = mixed; ≈ = no difference; N/A = Not applicable

NHMRC level III-2: Comparative studies with concurrent controls

Four comparative studies with concurrent controls were identified for inclusion, published between 2009 and 2013. Sample size ranged from 770 (for those completing follow-up) to 1,710. Two were conducted in the US, one in Sweden and one in Australia.

Tabulation of included studies

Source	Setting	n-values	Description of Intervention and Comparator		Outcomes	Effect
			Intervention	Comparison		
Burns 2010a[70]	Callers to the Colorado Quitline before and during a Spanish-language media campaign, US	Pre-campaign n = 1,169 Latino callers and post campaign n = 1,842; n = 77 participants responded to the follow-up	Spanish Latino Quitline media campaign designed by a firm under contract to the Colorado State Tobacco Education and Prevention Partnership. The ad campaign delivered positive, supportive and encouraging	Same Spanish Latino campaign evaluated on a non-Latino cohort of Quitline callers during the same time-period	• Six-month **abstinence** was significantly higher among Latinos during the campaign (18.8%) compared to pre-campaign (9.6%; p<0.05) • Six-month **abstinence** was significantly lower among non-Latinos during the campaign (8.8%) compared to before the campaign (16.5%; p = 0.01) • 7-day point prevalence identified a similar pattern to six-month abstinence with a benefit among Latino smokers during the media campaign compared to pre-campaign (41.0% and 29.6% respectively; p = 0.06) and a significant worsening among non-Latinos post- compared to pre-	↑ ↓ ↑

Source	Setting	n-values	Description of Intervention and Comparator		Outcomes	Effect
			Intervention	**Comparison**		
		survey (n = 243 Latinos)	messages about quitting through actors portraying key family members aired in the Spanish language only on predominantly Spanish-language television and radio and in Latino-attended movie theatres. The campaign urged audience members to call the Colorado Quitline, which offered free NRT and five counsellor-initiated follow-up counselling sessions		campaign (24.9% compared to 34.8%; p<0.05) • An increase in **quitline calls** were observed among Latino quitline callers by 390 per month during the pre-campaign period (,169 over three months) to an average of 614 per month during the campaign • During the campaign Latino participants were less likely to stop being coached after 1 call, more likely to complete the program and were more likely to receive 1 NRT package (4-week supply), compared to pre-campaign counterparts, however, these results were not statistically significant • Average **number of counselling calls** was marginally higher among Latinos than non-Latinos during the campaign (3.0 compared to 2.6 calls respectively; p = 0.06)	↑ ≈ ↑
Burns 2010b[71]	Smokers calling the Colorado Quitline, US	n = 1,710 Quitline callers	Light to moderate smokers (≤ 20 cigarettes per day) when a state Quitline reduced NRT supply from 8 weeks to 4 weeks	Heavy smokers (> 20 cigarettes per day) who were consistently eligible for 8 weeks of NRT during the same time-period	• **Smoking abstinence** declined by nearly a quarter among light to moderate smokers (29.9% compared to 39.3%; p<0.01) under the reduced NRT protocol • Heavy smokers reported no difference in **abstinence rates** (28.6% compared to 28.4%)	↓ ≈
Lindqvist 2013[2]	National tobacco Quitline, Sweden	n =772 Quitline callers	Motivational interviewing (MI) by counsellors trained in MI	Standard treatment by counsellors trained in CBT	• At 12-month follow-up, reported 6-month **continuous abstinence** was greater in the **Motivational Interviewing (MI)** group than the standard group (OR 1.48, 95% CI 1.00–2.19; p = 0.047), likewise for point prevalence abstinence (OR 1.48, 95% CI 1.00–2.19; p = 0.047)	↑

Source	Setting	n-values	Description of Intervention and Comparator		Outcomes	Effect
			Intervention	**Comparison**		
Miller 2009b[14]	Low-income callers to the Quitline service from Adelaide, Australia	n = 1,000 intervention; n = 366 comparison group	Usual service of multisession counselling from the Quitline plus access to one week's worth of heavily subsidised nicotine replacement therapy (NRT)	Usual Quitline service only	• The **response rate** in the NRT group was significantly higher than in the comparison group (0.67% vs 0.25%, X^2 = 283, p<0.001) • The average number of **cigarettes smoked per day** among both groups who reported smoking at each follow-up remained significantly lower than at baseline • Those in the NRT intervention group were more likely than the comparison to have made an attempt to quit some time before the 12-month follow-up, with statistically higher **quit rates** observed among the NRT group at 3-month and 6-month but not at the 12-month follow-up • The NRT group received more **callbacks** on average compared to the comparison group (6.3 vs 5.5 calls, p<0.001) • Within the NRT group, those who had **quit** at 6 months used a significantly larger number of NRT vouchers than those who did not quit (6.0 vs 4.2, t = 7.6, df = 625, p<0.001)	↑ ≈ ↑ ↑ ↑

Key: ↑ = increase; ↓ = decrease; ↔ = mixed; ≈ = no difference; N/A = Not applicable

NHMRC level III-3: Comparative studies without concurrent controls

Five comparative studies without concurrent controls were identified for inclusion, published between 2010 and 2015. Sample size for individual participants ranged from 1,895 to 26,334. All five studies were undertaken in the United States.

Tabulation of included studies

Source	Setting	n-values	Description of Intervention and Comparator		Outcomes	Effect
			Intervention	**Comparison**		
Augustso	US	n = 50 states	Nationwide mass	Call and visitor data monitored before,	• 132% increase in **client-initiated calls** (207,519 additional	↑

Source	Setting	n-values	Description of Intervention and Comparator		Outcomes	Effect
			Intervention	**Comparison**		
n 2012[72]	nationwide	and n = 3 districts	media campaign featuring former smokers talking about their experiences living with diseases caused by smoking; Intended to encourage smokers to call quitline portal or visit website	during and after campaign and compared to data from corresponding weeks in 2011 (previous year)	calls); 365,194 calls in total compared to 207,519 calls during the comparator period in 2011	
Carlini 2015[73]	Relapsed tobacco quitline users in New York State, US	n = 3,510 past quitters invited for intervention and n = 22,824 in comparison group	Re-engaging past quitline participants using messages consecutively delivered through interactive voice response followed by postcard and email reminders, two short messaging services (SMS) texts and a final cycle of interactive voice responses	Registry participants not selected for the study	• **Quitline-initiated interactive voice response (IVR) calls** resulting in re-engagement with the quitline service were successful among 12.2% of the intervention sample (n = 859 people) compared to 1.9% of the comparison group re-engaging with the quitline service (p<0.001) • Just over half of participants were available for follow-up with 79.9% reporting a **quit attempt** lasting 24 hours or more in the last 90 days with 24.5% reporting 7-day point prevalence • In the intention to treat analysis **quit attempts and quit rates** were 42.6% and 13.1% respectively	↑ ↑ ↑
Cummins 2015[74]	Asian-language speaking smokers calling the California Smoker's Helpline's	n = 1,339 California n = 70 Colorado n = 215 Hawaii n = 162 New	A multi-state smoking cessation program promoting quitline services to 3 Asian-language-speaking communities: Chinese, Korean and	Smoking status and quitting history 7 months after enrolment in the quitline service compared to earlier efficacy trial of single-state program in California	• Although the **rate of receiving counselling** was higher in the multi-state program (91.6%) than in the efficacy trial (87.2%; p<0.05), they received **fewer counselling sessions** (mean: 4.1 vs 4.9; P<0.05) and **fewer minutes of counselling** across all sessions (58.2 vs 72.0; p<0.05) than those in the efficacy trial • Those in the multi-state program reported higher rates of using nicotine patches (43%) and any quitting aid (53.1%) than those in the efficacy trial (9.1% and 12.9%, respectively;	↔ ↑

Source	Setting	n-values	Description of Intervention and Comparator		Outcomes	Effect
			Intervention	**Comparison**		
	Asian-language lines	York n = 87 Washington n = 22 Texas	Vietnamese. Smokers chose their level of service (counselling, self-help materials or both) and received free nicotine patches if medically eligible. Quitline counsellors were bilingual and bicultural		p<0.05) • There were significantly higher rates of **quit attempts** among participants in the multi-state program than among those in the efficacy trial (65.3% vs 54.9%, p<0.05) • There were no significant differences in 30-day abstinence rates (32.3% for both groups) • The 180-day **abstinence rates** were higher in the multistate than in the efficacy trial (18.8% vs 16.4%, respectively), but the difference was not significant	↑ ≈ ≈
Cummings 2010[75]	Callers to the New York State Smokers' Quitline (NYSSQL)	n = 2442 adult daily smokers	Five groups of smokers were mailed 2-, 4-, 6-, or 8-week supplies of free nicotine patches, as well as instructions and a self-help smoking cessation guide. Group 1 received 2-weeks supply, Group 2 received 4-weeks supply, Group 3 consisted of Medicaid/uninsured smokers who received 6 weeks of nicotine patches contingent upon first 2 weeks of use, Group 4 received 6 weeks supply, and Group 5 consisted of		• The number of patches reportedly used was related to the number of free patches sent to subjects, with a significantly greater number of patches used by those receiving the 6- and 8-week supplies relative to those who only received a 2- or 4-week supply of free patches, though this was not the case for Group 3 • Quit rates at 12 months were higher for smokers in the groups who received either 2 (Group 1), 6 (Group 4), or 8 (Group 5) weeks of free patches. Quit rate for the 4-week supply did not differ significantly from the 6- or 8-week groups • There is no consistent dose response relationship between the number of free patches given to smokers and smoking status outcomes, adjusted for age, gender, race, education level and number of cigarettes smoked per day at time of enrolment	N/A ↔ ≈

Source	Setting	n-values	Description of Intervention and Comparator		Outcomes	Effect
			Intervention	**Comparison**		
			uninsured smokers and received 8 weeks supply			
Cummings 2011[76]	Callers to the New York State Smokers' Quitline (NYSSQL)	n = 2806 adult smokers	Participants were sent either a 2-week supply of nicotine patches, a 4-week supply, or a 6-week supply. Additionally, participants received a free stop smoking guide and 1 counsellor-initiated follow-up call		• 85.4% reported using the nicotine patches sent to them—the amount used varied in direct proportion to the amount sent. Overall, participants used 51.8% of the patches sent out • The 7- and 30-day **prevalence rates** did not differ significantly between the 3 groups (p = 0.403) • The cost per quit was not significantly different between the 3 groups • Overall, 45.9% reduced their **cigarette consumption** by 50% or more, with no differences by study group	↑ ≈ N/A ≈

Key: ↑ = increase; ↓ = decrease; ↔ = mixed; ≈ = no difference; N/A = Not applicable

NHMRC level IV: Case series with post-test or pre-test/post-test outcomes

Fifteen studies using a case series design with post-test or pre-test/post-test outcomes were identified for inclusion, published between 2012 and 2018. Sample size ranged from 176 quitline funders/providers who responded to the invitation for one study (Saul 2014) up to 189,993 quitline callers in another study (Bush 2012b). The majority (n = 13) were conducted in the United States, one study was conducted in two countries (United States and Canada) and one study was conducted in Sweden.

Tabulation of included studies

Source	Setting	n-values	Study description	Outcomes	Effect
Bombard 2013[77]	Quitline data from the American Cancer Society across 10 states in US	n = 1718 pregnant women n = 246 completed follow-up; n = 24,321 non-pregnant women n = 4,123 completed follow-up	Analysed telephone quitline data between January 2006 and December 2008 for women 18–44 years; Pregnant women were offered self-help materials only, self-help materials with counselling or counselling only; Pregnant women received pregnancy tailored coaching which included up to 8 counselling sessions, 3 of which could be booster sessions; Pregnant women were ineligible to receive NRT from quitline; Counselling protocol for non-pregnant women differed by state; In general all non-pregnant women were offered self-help materials and/or counselling and up to five counselling sessions with one to two booster sessions; Non-pregnant women automatically received self-help materials when they received counselling	• Average **frequency of counselling** sessions for pregnant women was 2.3 occasions and for non-pregnant women 2.5 occasions • Most common **referral pathway** for pregnant quitline callers was by a healthcare provider (54%), whereas non-pregnant callers most often heard of the quitline from mass media (59%) • By 7-month follow-up 26.4% of pregnant women and 22.6% of non-pregnant women reported **quitting** • Adjusting for non-responders (assumed to be smoking) and non-disclosers, the adjusted quit rates were 2.9% for pregnant women and 3.5% for non-pregnant women, meaning the **adjusted quit rate** was approximately twice as high for pregnant and non-pregnant women who received counselling versus those who received self-help material only ($p<0.01$ for both groups)	↓ N/A ≈ ↑
Bush 2012b[78]	16 state quitlines in US	n = 16 states with n = 85,541 calls pre-tax increase and n = 104,452 calls post tax-increase	Analysed telephone quitline data between December 2007 and May 2008, and between December 2008 and May 2009 with a 62-cent increase in the federal cigarette tax and increase in other tobacco taxes enacted in February 2009, resulting in a total tax increase of $1.01 per pack on 1 April 2009	• A 23.5% increase in **total call volume** was observed comparing the pre-tax (85,541 calls) and post-tax periods (104,452 calls), with the largest percent increase being 94.1% occurring in March 2009 • The number of tobacco users per month who received **at least one counselling call** increased during March and April 2009 compared to the same time in the previous year • although fewer calls enrolled in the multi-call program (4–5 counselling calls) after tax, they completed slightly more	↑ ↑

Source	Setting	n-values	Study description	Outcomes	Effect
				counselling sessions compared with those who enrolled before tax (1.9 versus 2.2 sessions respectively; p<0.0001)	↑
				• By seven-month follow-up participant quit rate for 7-day and 30-day point prevalence did not differ significantly before versus after tax (7-day rates were 30.7% before and 28.7% after)	≈
Davis 2015[79]	National multimedia campaign and quitline, US	n = 14,775 average calls per week to quitline in the 4 weeks pre and post the media campaign n =30,304 average calls per week during the campaign period	Nationwide multimedia campaign from 19 March to 10 June 2012. Primarily run via the television it also included radio and video ads on websites including YouTube. Graphic and emotional content was featured in the campaign and all television and radio (in limited markets) ads were tagged with the quitline number or a smoke-free web address. Ads usually ran prior to 8pm to correspond with quitline operating hours	• An increase of 100 **television** gross rating points had a strong positive correlation with **calls** to the quitline (β = 89.3, p<0.001) where the ad was tagged with the quitline number	↑
				• When the **ad was tagged with the web address**, there was still a positive correlation between an increase of 100 television gross rating points and **calls** to the quitline, though this was not as strong (β = 29.4, p<0.001) ○ The difference in correlation coefficients was significant (p<0.001)	↑
				• Analysis predicted that had all **ads been tagged** with the quitline number rather than some with the web address, approximately 140,000 more calls would have been made during the campaign period	N/A
DeLaughter 2014[80] *Pilot study	Alabama and Mississippi quitline, US	n = 2522 participants; n = 1,735 completed 4 quitline counselling sessions	12-month community based, multi-element quitline-facilitated peer navigation intervention integrated into the social networks of smokers with low income. Existing ex-smoking clients of quitline who were participating in their final quitline call at 6-month post successful quit attempt were recruited to become peer-navigators. These individuals received a 25-minute telephone training session equipping them with the tools to: market the quitline using their personal success story and persuade other smokers to provide their contact details to the quitline. Once the potential client provided their contact details attempts were made by the quitline to contact them	• During a 4-month period 11 **peer-navigators** were recruited from the quitline's existing eligible client list and underwent training; they were predominantly female (79%)	N/A
				• Out of 11, 4 peer-navigators returned **referral slips** from smokers known to them for a total of 23 smokers referred to the quitline	N/A
				• Attempts to contact the current smokers resulted in 3 new clients, all female and over 45 years old	N/A
				• Future improvements to protocol include: recruiting peer-navigators at the beginning of their cessation journey rather than at the 6-month point; simplifying the consent form for new smoker referrals; text messaging suggested	N/A

Source	Setting	n-values	Study description	Outcomes	Effect
			to begin services	facilitator	
Duke 2014[81]	Florida quitline, US	n =141,221 quitline callers registered n =53,513 web users registered	Examination of the effect of a sustained media campaign about smoking cessation on registrations to quitline and a web-based service over a 35-month period. Campaign materials contained graphic content and emotive personal testimony and ads featured the Florida based quitline number and web address. A national campaign ran concurrently, see Davis 2015	• Registrations for the quitline surpassed the web service • An increase in **television ads** in a given market was associated with an increase of 7 quitline registrants per week (β = 6.8, P<0.001) and two web-coach registrants (β = 1.8, P<0.003) • **Ads** highlighting free NRT resulted in more weekly registrants than those with no mention of free NRT (β = 31.8, P<0.001)	N/A ↑ ↑
Fildes 2015[82]	Quitline data from Nevada state, US	n =1471 Nevada residents who are current smokers	Analysed outcome data for Nevada residents who enrolled in the Nevada quitline program for free smoking cessation services between 1 August 2013 and 31 July 2014. At 7-months post enrolment, outcome data related to abstinence was collected using the North American Quitline Consortium (NAQC) Minimal Data Set questionnaire	• The 7-month post-intervention follow-up data was available for 25.4% of the sample • **Quit rates** showed that 34.6% reported continuous abstinence at 7 months, whereas 35.1% were abstinent at the 7-day point prevalence and 31.9% were abstinent at the 30-day point prevalence • **Patient satisfaction** with the program revealed 77.6% of participants reported being very or mostly satisfied	N/A ↑ ↑
Goesling 2012[83]	Callers to the Free & Clear telephone quitline based in Seattle, Washington, US	Initial dataset n = 7,357 n = 5,291 participants included in final analysis	Three items (confidence, stress, and urges) were added to an existing telephone protocol to explore the effect of self-efficacy on cessation outcomes	• Nicotine dependence (p<0.001) and stress (p<0.001) were related to baseline self-efficacy, with higher dependence and higher stress associated with lower self-efficacy for being able to quit in the future • Gender was correlated with baseline self-efficacy, with men reporting more confidence at baseline. However, this result was only marginally significant after controlling for nicotine dependence and stress (p<0.06). • Higher baseline self-efficacy was associated with higher **rates of quitting** (OR = 1.12, p<0.01) • No evidence existed of overconfidence leading to diminished cessation success (p = 0.69) • Shorter **duration of quit attempts**, shorter time to relapse, and stronger urgers were associated with lower self-efficacy	N/A N/A N/A N/A N/A

Source	Setting	n-values	Study description	Outcomes	Effect
Kerkvliet 2014[13]	Enrolees to the South Dakota quitline, US	n = 11,603 full data sets of n = 26,876 enrollees	This study described the types of services requested by South Dakota quitline participants and the associated cessation outcomes across service types	• Frequencies of **cessation services requested** were coaching/varenicline (64.6%), coaching/bupropion (5%), coaching/NRT (22.6%), and coaching only (5.4%) • **Abstinence rates** for service types were the following: coaching/varenicline (49.8%), coaching/bupropion (47.3%), coaching/NRT (42.9%), and coaching only (40.3%) • Chi-square analysis and confidence interval comparisons identified significantly higher abstinence (p< .05) for **varenicline/coaching** in comparison to coaching only or coaching/NRT	N/A N/A ↑
Kerkvliet 2015[84]	South Dakota quitline, US	n =10, 720 quitline callers registered n =4,935 quitline callers followed up and included in analysis	Examination of the association between self-reported mental health conditions and use of a quitline. Toll-free service for tobacco users, those who request cessation services were offered 5 quitline initiated follow-up coaching sessions delivered by trained health coaches. Eight weeks of complimentary NRT also provided, delivered in staggered batches following designated quitline calls	• **Quit attempt rate** was significantly higher in the mental health condition group (74.5%) compared to those with no mental health condition (70.0%, p = 0.007) • **Quit rate** was significantly lower in the mental health condition group, compared to the no mental health condition group (ITT = 16.4% vs. 21.5%, *p*<0.001) • Both the mental health conditions group (mean 1.35 (0.73)) and no mental health conditions (mean 1.36 (0.71)) group were overall highly **satisfied** with the service on a scale out of 4. There was no difference between groups (p = 0.9) • There was no difference in the extent to which the quitline **met the participants needs** regardless of group (p = 0.06) approximately 90% of participants in both groups believed their needs were mostly met • Approximately 96% of participants in both groups would **use the quitline again** (p = 0.4)	N/A N/A N/A N/A N/A
Kuiper 2015[85]	Callers to the Asian Smokers' quitline, US	n = 5,771 callers from 48 states	The objective of this study was to examine characteristics of Asian Smokers' Quitline (ASQ) callers, how they heard about the quitline, and their use of the service	• 31% of callers were Chinese (Cantonese or Mandarin), 38% were Korean, and 31% were Vietnamese • About 87% of ASQ callers were male, 57% were aged 45–64 years, 48% were uninsured, and educational attainment varied • Ninety-six percent of all tobacco users were daily cigarette	N/A N/A N/A

Source	Setting	n-values	Study description	Outcomes	Effect
				smokers	
				• Most callers (54%) were **referred by newspapers or magazines**	N/A
				• Nearly all eligible callers (99%) received nicotine patches	N/A
				• About 85% of smokers enrolled in counselling; counselled smokers completed an average of 4 sessions	N/A
Nohlert 2018[86]	Callers to the Swedish National Tobacco Quitline (SNTQ)	n = 612 callers who returned the baseline questionnaire	The aim was to assess if self-perceived abilities to cope measured at baseline would predict abstinence at the 12-month follow-up. This was measured by two questions—one relating to the likelihood of the participant being smoke-free in one year, and one relating to the likelihood of the participant being able to handle stress and depressive moods without smoking	• Both variables at baseline were significant predictors for abstinence, however, only the perceived ability to handle stress and depressive mood without smoking remained significant in the adjusted analyses	N/A
				• The strongest predictor for abstinence in the adjusted analyses was smoking status in the week before baseline with an OR = 3.30 for point prevalence, and OR = 3.97 for 6-month continuous abstinence	N/A
Rabius 2012[87]	Callers to quitlines in various states across US	n = 45,510 callers and n = 3,522 RCT participants	This study evaluated how effectively African Americans are served by telephone counselling on quitlines. Empirical data from quitline callers was used, and to investigate effectiveness of counselling and quitting success among African Americans, data from a previous study by the author was reanalysed	• In all locations, African Americans were significantly more likely than non-Hispanic Whites to request **counselling**; (74% versus 67% in Texas, $p<0.01$; 79% versus 74% in Louisiana, $p<0.01$; and 92% versus 85% in DC, $p<0.05$)	N/A
				• African Americans tend to use a quitline in greater proportions than their proportional representation in smoking communities.	N/A
				• African American quit rates were equivalent to those of non-Hispanic 'whites' as were their levels of **satisfaction** with the service and the **number of counselling sessions** completed	≈
				• The effect of **counselling** when compared to self-help materials was higher overall ($p<0.05$ among African Americans; $p<0.001$ among non-Hispanic Whites), however the trend towards lower quitting rates among African Americans in both treatment groups was not significant.	≈
				• There were no significant differences between African Americans and non-Hispanic Whites in reported 30-day	

Source	Setting	n-values	Study description	Outcomes	Effect
				point prevalence of abstinence from smoking among respondents	≈
Saul 2014[88]	Quitline funders and providers in US and Canada	Potential participants n = 273, with n = 176 quitline funders and providers responding to initial, n = 83 'key responders'	The research team identified practices that increased either the reach or efficacy of quitlines, as well as identified practices that were considered future strategies – those under consideration or being discussed by quitlines without much evidence. These practices were categorised by efficacy and reach, and a rating scale was established. Researchers aimed to determine the extent to which different practice types were implemented within and across quitlines, the patterns of implementation grouped by research evidence level, and the relationship between implementation of practices and either spending levels for quitlines or actual treatment reach outcomes	• Implementation rates ranged from 3% (n = 2; text messaging) to 92% (n = 57; providing a multiple-call protocol). More than half of the quitlines implemented 13 practices • A higher proportion of quitlines implemented **A-level practices** than C-level practices for efficacy (p = 0.026), and a higher proportion of quitlines implemented A-level practices than D-level practices for efficacy (p = 0.033). • Implementation of **practices showing higher levels of evidence** (B level) for increasing reach showed a moderate, but significant, positive correlation with both treatment reach (r = 0.39; P = 0.007) and spending per smoker (r = 0.36; P = 0.006). • Only 1 practice, conducting **mass media promotions** for the mainstream population, was moderately but significantly positively correlated with treatment reach (r = 0.41; p = 0.004) • The strongest relationship was found between quitline spending per smoker and treatment reach (r = 0.80; p<0.001).	N/A N/A ↑ ↑ N/A
Vickerman 2015b[89]	Quitline data from North Carolina and Texas state, US	n = 2 states n = 715 Quitline callers during a 2012 national tobacco education campaign	Analysed telephone quitline outcome data via a survey 7-month post enrolment during the Centres for Disease Control and Prevention's Tips from Former Smokers (Tips) campaign from 19 March to 10 June 2012. The 12-week Tips campaign for smoking cessation predominantly advertised on television as well as radio, online video and banners, print media, and out-of-home advertising. Resources offered included the national quitline number or the National Cancer Institute's website which promoted the quitline number. Callers indicating readiness to	• At 7 months post enrolment, 27.7% of participants reported tobacco **abstinence** for 7 or more days, and 24.5% reported abstinence for 30 or more days. • Callers with high nicotine dependency scores were less likely to quit (quit ≥7 days model, adjusted OR, 0.71 [95% CI, 0. 57–0.89], p = 0.003; quit ≥30 days model, adjusted OR, 0.74 [95% CI, 0.58–0.93], p = 0.01) than those with lower scores • Callers who completed **more counselling calls** were more likely to quit (quit ≥7 days model, adjusted OR, 1.15 [95%	↑ N/A ↑

Source	Setting	n-values	Study description	Outcomes	Effect
			quit within 30 days were eligible for a multiple-call program in North Carolina and Texas. The program included an initial assessment and planning call plus 3–4 additional counselling calls, as well as nicotine replacement therapy (NRT) benefits	CI, 1.01–1.30], p = 0.03; quit ≥30 days model, adjusted OR, 1.15 [95% CI, 1.01–1.30], p = 0.03) than those who completed fewer calls	
Zhang 2014[90]	Quitlines in 23 states, US	n = 91,911 callers	This study examined the effect of the Centre for Disease Control (CDC)'s National Tobacco Education Campaign: Tips from Former Smokers (Tips) on quitline callers' cessation outcomes.	• The number of quitline callers and callers who received **counselling** and/or NRTs increased by 88.6% and 70.8% respectively • The number of **quit attempts** increased by 24.7%, from 11,616 to 14,489 • The number of 7+ day quits increased by 22.1%, from 6,821 to 8,328 • Successful cessation outcomes increased with increasing **number of counselling calls** completed. No consistent relationship between the Tips campaign and cessation outcomes by number of calls completed was found • For **multiple-call** enrollees who completed at least one call, higher **exposure to Tips campaign** was associated with significantly more quit attempts and 7+ day quits	↑ ↑ ↑ ≈ ↑

Key: ↑ = increase; ↓ = decrease; ↔ = mixed; ≈ = no difference; N/A = not applicable

6 Quality assessment of evidence

Overall scoring of the included evidence according to the NHMRC body of evidence matrix components can be seen in Table 3 for Question 1, which relates to key components of a quitline service; and Table 4, for Question 2, relating to barriers and facilitators to use.

Review Question 1 – key components

Evidence Base [A rating]

The grade of evidence assessed in this review is rated as **excellent**. The studies included for review included multiple Level I studies (n = 4) and several Level II studies (n = 21). These high-level studies were supported by a number of less methodologically robust studies, including: Level III-1 (n = 2), Level III-2 (n = 4), Level III-3 (n = 5), Level IV (n =15). The quantity of evidence as well as the lack of any major methodological issues in the Level I and II studies included for review were the reasons for grading the evidence base component as excellent **(A rating).**

Consistency [B rating]

The consistency of the evidence, i.e. the extent to which the studies presented consistent results, is deemed to be **good**. Individual study outcomes relating to key components of a quitline service demonstrated a mix of neutral and positive effectiveness. This was further reflected in the findings of the Level I studies. While there is some inconsistency in the presented results this can be explained by understanding the nature of smoking cessation interventions in research and the inherent variability in intervention protocol and population which may influence the final outcome. The majority of studies used self-reported data and reported their outcomes at commonly accepted follow-up intervals (e.g. 3, 6, 12 months) using appropriate odds or risk ratios and confidence intervals. As explained in Section VII of this review, evidence for the effectiveness of individual components of a quitline service is varied, again this is likely due to the lack of consistently reproduced interventions available in the published literature. Hence, the consistency of the evidence presented in this review is satisfactory, demonstrating explainable inconsistency **(B rating).**

Clinical impact [C rating]

The clinical impact of the results presented in this rapid review are **good**. There is currently not an accepted and endorsed definition of clinical significance for smoking cessation. However, a recent Cochrane Systematic Review found that at the individual level, behavioural interventions compared to minimal intervention improved smoking cessation with a risk ratio of 1.57; this was reduced to a risk ratio of 1.24 when compared to individuals who were offered pharmacotherapy.[91] Many of the studies demonstrated affect sizes similar to these figures. However, this was noted in both intervention and control groups in most instances, indicating that any intervention is better than none when it comes to provision of quitline services to smokers. **(B rating)**

Generalisability [B rating]

The generalisability of the results presented in this review is rated as **good** overall. Outcomes may be generalised to the Caucasian Australian population; two included studies were conducted in Australia and the rest were performed in other developed Western nations, e.g. the US and the UK. Of note, there are generalisability issues for certain key components such as the content of counselling protocols. The US tend to offer follow up counselling calls from quitline only to people willing to set a quit date within a month, whereas Australia quitlines typically offer at least two pre-quitting callbacks to see if it is possible to increase a smoker's motivation to change. This allows quitline counsellors to help people cut down (primarily for financial and skill development benefits) with clients for whom the prospect of sudden cessation is overwhelming or frightening. This difference in approach means that quit rates for US services are often higher than for Australian-based studies as they work with more motivated clients. No studies were identified or included in this study that involved the Australian Indigenous population. Despite this, there was evidence supporting cultural tailoring for Asian-language, which may be transferrable for the benefit of the large population of Asian people in Australia who have English as a second language. Though numbers of included studies were small for the following demographics, they are represented in the evidence base in this review: young people, individuals with a mental health condition, those with alcohol dependency and pregnant women. Given the similarity of the populations represented in the included studies to the target population and in acknowledgment of the lack of studies including indigenous Australians, the generalisability of the evidence was rated as good (B rating).

Applicability [B rating]

The evidence included in this review is considered to be **good** and hence applicable to the Australian population. Two included studies were conducted in Australia (Victoria and South Australia) and as such are likely to be the most applicable to the Australian population. However, the great majority of the remainder of the studies were delivered in English speaking, developed Western countries and may be applicable to the Australian context providing there is similar resourcing and infrastructure. **(B rating)**

Table 3: ***NHMRC body of evidence matrix summarising the evidence base for key components of a quitline service. Review author rating decisions are highlighted in grey***

Component	A	B	C	D
	Excellent	**Good**	**Satisfactory**	**Poor**
Evidence base	Several level I or II studies with low risk of bias	One or two level II studies with low risk of bias or a systematic review or multiple level III studies with low risk of bias	Level III studies with low risk of bias, or level I or II studies with moderate risk of bias	Level IV studies, or level I to III studies with high risk of bias
Consistency	All studies consistent	Most studies consistent and inconsistency may be explained	Some inconsistency reflecting genuine uncertainty around clinical question	Evidence is inconsistent
Clinical impact	Very large	Substantial	Moderate	Slight or restricted
Generalisbility	Population/s studied in body of evidence are the same as the target	Population/s studied in the body of evidence are similar to the	Population/s studied in body of evidence differ to target population in	Population/s studied in body of evidence differ to target population

	population in question	target population in question	question, but it is clinically sensible to apply this evidence to the target population	and hard to judge whether it is sensible to generalise to target population
Applicability	Directly applicable to Australian context	Applicable to Australian context with few caveats	Probably applicable to Australian context with some caveats	Not applicable to Australian context

Review question 2 – barriers and facilitators

Evidence Base [B rating]

Regarding barriers and enablers to quitline use, the evidence base was deemed to be **good**. The studies included for review included multiple Level II studies (n = 4) as well as some Level III-2 (n = 1) and Level IV (n = 1). The studies lacked any major methodological issues, however, a greater quantity of studies to answer question 2 would have been preferred; hence the good rating **(B rating).**

Consistency [C rating]

The consistency of the evidence, i.e. the extent to which the studies presented consistent results, is deemed to be **satisfactory** for question 2. Individual study outcomes relating to NRT as an enabler for success demonstrated inconsistent results, this is likely a result of heterogeneous intervention design and sample characteristics. It was not possible to establish consistency for enablers to quitline use as the identified enablers were supported by single studies. Given the inconsistent intervention design and small pool of studies the consistency of the evidence presented in this review is satisfactory, owing to explainable inconsistency **(C rating).**

Clinical impact [C rating]

The clinical impact of the results presented in this rapid review, for question 2, are **satisfactory**. While the clinical impact of the evidence for barriers and enablers to quitline use is deemed moderate, the factors uncovered in this review do form some direction for future interventions seeking to improve exiting efforts. **(C rating)**

Generalisability [B rating]

As with review question 1, for question 2 generalisability of the evidence was found to be **good**. Outcomes may be generalised to the Caucasian Australian population; studies addressing barriers and enablers to quitline use were performed in developed Western nations, e.g. US and NZ. There is currently a paucity of literature on barriers and enablers relating specifically to Australian people. Given the similarity of the populations represented in the included studies to the target population and in acknowledgment of the lack of studies generalisable to indigenous Australians, the generalisability of the evidence was rated as good **(B rating)**.

Applicability [B rating]

Once again, applicability to the Australian population was deemed to be **good** overall for the evidence base pertaining to question 2. The studies were delivered in English speaking, developed Western countries and may be applicable to the Australian context providing there is similar resourcing and infrastructure. There is

however a need for further literature in this area specific to the Australian context and taking into account specific barriers and facilitators relating to high risk subgroups, including Indigenous Australians and those with mental health conditions **(B rating).**

Table 4: ***NHMRC body of evidence matrix summarising the evidence base for barriers and facilitators to quitline use. Review author rating decisions are highlighted in grey***

Component	A	B	C	D
	Excellent	**Good**	**Satisfactory**	**Poor**
Evidence base	Several level I or II studies with low risk of bias	One or two level II studies with low risk of bias or a systematic review or multiple level III studies with low risk of bias	Level III studies with low risk of bias, or level I or II studies with moderate risk of bias	Level IV studies, or level I to III studies with high risk of bias
Consistency	All studies consistent	Most studies consistent and inconsistency may be explained	Some inconsistency reflecting genuine uncertainty around clinical question	Evidence is inconsistent
Clinical impact	Very large	Substantial	Moderate	Slight or restricted
Generalisbility	Population/s studied in body of evidence are the same as the target population in question	Population/s studied in the body of evidence are similar to the target population in question	Population/s studied in body of evidence differ to target population in question, but it is clinically sensible to apply this evidence to the target population	Population/s studied in body of evidence differ to target population and hard to judge whether it is sensible to generalise to target population
Applicability	Directly applicable to Australian context	Applicable to Australian context with few caveats	Probably applicable to Australian context with some caveats	Not applicable to Australian context

7 Analysis of evidence

Review Question 1

Key components of quitline services

Studies meeting the NHMRC inclusion criteria were available to assess six of the seven pre-specified key components for this rapid review of evidence. The exception was for 'hours that service is open'. Where appropriate, this has been supplemented with relevant data from studies not meeting criteria for inclusion based on the NHMRC evidence grading.

Counselling competencies required

Assessment of fidelity of counselling compared to treatment protocols is reportedly undertaken as part of standard practice across many quitline services. However, studies evaluating the impact of specific counselling competencies were lacking. A minimum set of qualifications and experience in a related discipline is typically required for counsellors. In addition, specific quitline counselling skills-based training is required, with ongoing training and feedback provided from within most organisations.

A study of the Swedish National Tobacco Quitline (SNTQ) by Lindqvist et al. [2] reported that counsellors are trained health professionals such as nurses, dentists, dental hygienists or psychologists who undergo six months of training in tobacco cessation methods to become SNTQ counsellors. In this controlled clinical trial, half of the counsellors also underwent a two-day training course in motivational interviewing to compare the addition of this approach to standard care on quitting outcomes. Counsellors allocated to the standard treatment arm also underwent additional training totalling approximately 40 hours over the study period. A significant benefit was observed by six-month follow-up for continuous abstinence, with motivational interviewing increasing quit rates by 5%.

A study by McDaniel et al.[61] reported on a three-arm RCT centred around the Quit for Life program operating in US by Alere Wellbeing (formerly Free and Clear). Quit coaches were required to have a bachelor's degree in a related field and complete more than 200 hours of training as well as receive ongoing supervision and feedback. Randomly selected counselling recording sessions were rated for compliance with the study protocol for fidelity, with the primary criterion being whether the counsellor focused the call on identified relapse risk(s). The rating was undertaken by two independent reviewers (a staff member and a quit coach supervisor). Any protocol deviations were addressed with individual feedback from the quit coach supervisors and ongoing training for all quit coaches. No outcomes about fidelity were reported.

Additional relevant data from studies not meeting criteria for inclusion in the rapid review:

A study by Lorencatto et al. in 2014[48] that did not meet criteria for inclusion in this rapid review of evidence, did evaluate treatment fidelity by comparing counselling manuals to 75 audio-recorded transcripts from the UK national quitline service. Compliance varied substantially across the 45 different smoking cessation behavioural change techniques being evaluated, with less than half (41.8%) of the treatment manual successfully delivered on average. Lorencatto et al. report that identifying gaps in current practice by coding recorded interviews to treatment manuals can be used as a means to identify training needs. Moreover, the low fidelity identified in this study highlights the need to establish routine procedures for monitoring delivery of behavioural support.

The Michael et al[92] study assessing counsellor effects on quit rates for the Arizona Smoker's Helpline in the US identified that 2% of differences in quit rates and 4% of the Outcome Rating Scale variability, being a proxy measure for life satisfaction, can be attributed to variability in the service provided by individual counsellors ($p = 0.003$). This compares to provider variability of between 6% and 10% among psychotherapists.[92] Michael et al. reports the use of treatment guidelines as a means to train staff based on key principles outlined in the US Public Health Guidelines for Treating Tobacco Use[93] and in the Tobacco Dependence Treatment Handbook.[94]

Relevant results from grey literature search not meeting inclusion criteria for this rapid review:

In an audit by Brose, McEwen and West[95] evaluating 46,237 one-to-one treatment episodes in the UK, 7.6% of variance in carbon monoxide verified four-week quit rates could be attributed to differences between individual specialist practitioners and 6.4% due to differences between services. However, specialist practitioner and service factors contributing to these differences were not described. The number of one-to-one treatment episodes delivered by the practitioner was not associated with successful quit attempts, suggesting that busier practitioners were not necessarily more effective.

One study by Brose et al.[96] evaluating a training program for all stop smoking practitioners in the UK (not just those involved in quitline services) used 25 multiple-choice questions to evaluate the national online knowledge training program developed by the National Health Service Centre for Smoking Cessation and Training. Authors of this study report that although standards for training and delivery exist in the UK, they are not mandatory, and practice has drifted away from initial guidance. There are no minimum entry requirements to work as a stop smoking practitioner and practitioners have a wide range of professional backgrounds (e.g. nursing, pharmacy and administration). These variations may impact smokers' chances of successfully quitting.[96] The training program was used for an average of 145 minutes (SD 172 minutes), with the time spent on the program significantly predicting the change in overall assessment scores for knowledge ($p < 0.001$). A quadratic trend identified that after spending 441 minutes (7 hours and 21 minutes) on the training, any additional time would not further increase knowledge scores. Improvements in knowledge for those who spent at least five minutes on the training was significantly larger than for those who spent less time on training ($p<0.001$).

A study by Michie, Churchill and West in 2011 developed and applied a system to identify competences required to deliver individual and group-based behavioural support for smoking cessation.[97] Ninety-four competencies were identified of which 59 were cited in at least two guidance documents. Seventeen of these were supported by RCT evidence and nine by evidence from the services. However, these competencies are not specific to quitline services. Fourteen competencies were cited in at least two source documents and at least two RCTs, being: ability to: (1) provide information on the consequences of smoking and smoking cessation; (2) provide information on withdrawal symptoms; (3) facilitate barrier identification and problem solving; (4) facilitate relapse prevention and coping; (5) facilitate action planning/develop treatment plan; (6) facilitate goal setting; (7) measure CO; (8) advise on stop smoking medication; (9) assess current and past smoking behaviour; (10) assess current readiness and ability to quit; (11) assess past history of quit attempts; (12) offer appropriate written materials; (13) prompt commitment from the client there and then; and (14) give options for additional and later support. The nine behaviour change techniques associated with higher success rates in the English Stop Smoking Services were: (1) strengthen ex-smoker identity; (2) elicit client views; (3) measure CO; (4) give options for additional and later support; (5) provide rewards contingent on stopping smoking; (6) advise on changing routine; (7) facilitate relapse prevention and coping; (8) ask about experience of stop smoking medication being used; and (9) advise on stop smoking medication.

Behaviour change counselling approaches and adherence to these

Cognitive and behavioural therapy is the standard behavioural change technique used to underpin quitline counselling. The addition of other theoretical models, including acceptance and commitment therapy (ACT)[1] and motivational interviewing (MI)[2, 3] have demonstrated the potential for increased quitting benefits. However, other techniques, such as the addition of gain-framed messaging, have not shown benefits in long-term quitting outcomes.[4, 5]

Within the Schwindt et al. systematic review of quitline services for patients with mental illnesses[54], one study by Rogers et al. (2015)[3], used a multi-session manual-based counselling protocol based on motivational interviewing and CBT with accompanying homework assignments. This study identified a significantly higher 30-day abstinence rate compared to the control.

An RCT comparing ACT with CBT for smoking cessation delivered to quitline callers in South Carolina, US, identified that ACT was more effective than CBT for increasing the number of completed calls ($p = 0.001$), though no statistically significant benefit was observed for point prevalence abstinence by 6-month follow-up.[1] In this context ACT focuses on willingness to experience physical cravings, emotions and thoughts that trigger smoking (i.e. acceptance) while making value-guided behaviour changes (i.e. commitment). Although similar to CBT in terms of teaching skills to cope with smoking cues, the philosophy of ACT is based on Relational Frame Theory.[98] This theory posits that trying to control learned associations, such as between an urge and smoking, creates a paradox whereby new associations are formed that interfere with behaviour change. For example, distraction from urges leads to more urges.[1] Both the ACT and CBT interventions were delivered over a five-session counselling protocol in combination with NRT. In the case of this RCT, ACT acceptance components taught skills on: increasing willingness to experience urges that cue smoking; changing the function of smoking urges, and; responding differently to smoking urges (e.g. noticing and not acting on urges). Commitment components focused on helping individuals articulate values guiding quitting (e.g. love of one's children) and taking actions to quit that are guided by those values. CBT was the standard CBT-based counselling intervention delivered by Alere, the organisation that runs the South Caroline quitline, and offered through that quitline. Sessions focussed on assisting participants to develop a quit plan and teaching skills such as distraction, stimulus control, and changing the content of thoughts about smoking. The first session for both groups was 30-minutes with each subsequent call lasting 15-minutes. Adherence to ACT and CBT were evaluated by audio recording calls, which were then each independently rated by two trained raters. Inter-rater agreement was high and did not differ by study arm (proportion of positive agreement 0.99 for ACT and 0.91 for CBT based on the ACT adherence raters' manual and the Alere Call Quality Management Tool, which is used in multiple National Institute of Health (NIH)-funded trials.

A 2010 study by Toll et al.[5] and subsequent secondary analysis of the same dataset by Fucito et al.[4] assessed the effectiveness of using gain-framed messages within counselling ($n = 810$) compared to standard care counselling and printed materials ($n = 1,222$) within the New York State quitline service. Gain-framed messages emphasise the benefits of quitting smoking (i.e. gain-framed) compared to the losses of continued smoking (i.e. loss-framed). Delivery of counselling by specialists trained to use gain-framed statements resulted in a significantly higher rate of abstinence at two-week follow-up for the gain-framed group (23.3%) compared to standard care (12.6%). However, these significant results were not maintained by three-month follow-up (abstinence levels were 28.4% and 26.6% for intervention and control groups respectively).

A study evaluating the Swedish Quitline (SNTQ)[99] reported that standard counselling consisted of a mixture of motivational interviewing, cognitive behavioural therapy and pharmacological consultation. Regular call monitoring with supervisors is performed for quality assurance in addition to quality assessment (fidelity)

for provision of motivational interviewing assessed by an independent, university-based coding laboratory. No data was reported on adherence to counselling protocols within this study and both intervention and control comparison groups received the same counselling, but on a proactive schedule (where clients are offered a number of callbacks) or reactive schedule (where only incoming calls by clients are attended). No differences were observed in quit outcomes at six- or 12-month follow-up. Another study of the SNTQ[2] evaluated the addition of motivational interviewing to standard quitline counselling compared to standard counselling alone. Audio-recordings of the treatment sessions at six-week intervals were undertaken with the five randomly selected sessions from each counsellor, coded using the Swedish translation of the motivational interviewing treatment integrity code. Based on this coding, counsellors trained in motivational interviewing delivered a significantly higher level of motivational interviewing compared to the standard treatment counsellors for all skills variables assessed. This includes: empathy; motivational interviewing spirit; complex reflections; motivational interviewing adherent utterances ($p<0.001$ for all); and open questions ($p = 0.009$). A significant benefit was observed for the motivational interviewing group by six-month follow-up, improving continuous abstinence quit rates by 5%.

Another study this time by Lindqvist et. al also evaluated the SNTQ[2], in a controlled clinical trial design (n = 772) comparing standard treatment or standard treatment with motivational interviewing added to the treatment protocol of the first session. Motivational interviewing was delivered by six to eight different counsellors who underwent training in motivational interviewing through a two-day workshop made up of didactics and practical exercises. No difference between groups was observed for seven-day point prevalence. However, a statistically significant benefit was observed for six-month continuous abstinence, with motivational interview increasing quit rates by 5% (19% versus 14%; $p = 0.047$).

Additional relevant data from studies not meeting criteria for inclusion in the rapid review:

A study by Lorencatto et al. 2014[48] which did not meet criteria for inclusion in this rapid review of evidence, did evaluate treatment manuals and transcripts of 75 audio-recorded behavioural support sessions from the UK national quitline service. The purpose of this study was to evaluate fidelity, as behavioural support is often not delivered as specified in the service treatment manual.[48] In this study, fidelity was evaluated by coding interview transcripts using taxonomy of 45 smoking cessation behavioural change techniques within treatment manuals. An average of 41.8% of manual-specified behavioural change techniques were delivered per session (Standard Deviation (SD) 16.2), with fidelity varying by counsellor (32%–49%). The highest fidelity was observed in pre-quit sessions (46%) and the behavioural change technique of 'give options for additional support (95%). The lowest fidelity was reported among quit-day sessions (35%) and the technique of 'set graded tasks' (0%). The duration of the session produced a positive correlation with fidelity, showing a longer session included higher compliance to the treatment protocol ($p<0.01$).

Relevant results from grey literature search not meeting inclusion criteria for this rapid review:

A study by West, Evans and Michie also published in 2011[100] evaluated a taxonomy of behavioural change techniques compared to service success rates across UK stop-smoking services. Of the 30 treatment manuals available for coding (from a possible 145 services that were contacted), 14 group-support behavioural change techniques were identified. On average seven behavioural change techniques were identified in each manual and two were positively associated with four-week quit rates, being 'communicate group member identified' and a 'betting game' (where a financial deposit is lost if a stop-smoking 'buddy' relapses). However, this is not specific to quitline counselling.

Another study by West et al. identified the behavioural change techniques from treatment manuals across 43 UK-based stop-smoking services.[101] From 43 possible behavioural change techniques, stop-smoking service manuals included a mean of 22 (range 9–37). As described above, nine behavioural change

techniques were significantly associated with both self-reported and carbon monoxide validated four-week abstinence rates.

Quality assessment of service and/or counsellors

Participant satisfaction with quitline service and/or counsellors:

Among studies reporting on participant satisfaction with the service and/or counsellors, satisfaction is rated as high and the service reported to be helpful. Assessment is by self-report among follow-up participants, which typically only represents half of the initial enrolling population. Therefore, these responses need to be considered in the context of the larger study population of non-responders, where non-responders stereotypically are relapsed smokers. Of the two included studies reporting that fidelity of counselling was undertaken, neither reported satisfaction results related to these assessments.

Participant satisfaction with a one-off quitline counselling session with the addition of two weeks of NRT and self-help materials was reported among 373 callers to the Nevada quitline (25.4% of initial sample).[82] Data analysis identified that 68. 4% were very satisfied, 9.2% were mostly satisfied, 0.4% were somewhat satisfied, 9.4% were not at all satisfied and 12.6% responded 'don't know'. Fildes et al. concluded that satisfaction level is likely related to the participants smoking status post-intervention. The intervention consisted of a single nurse-designed counselling session that was holistic in nature and included physical, emotional, mental and spiritual effects of nicotine dependence, two weeks of NRT by mail and a packet of self-help and other education materials collaboratively developed by a nurse researcher and certified addictions registered nurse-advanced practice, health educator and clinical counselling director. By seven-month follow-up, 34.6% of contactable participants (n = 373) reported continuous abstinence, 35.1% reported seven-day point prevalence and 31.9% reported 30-day point prevalence. The reporting of a continuous abstinence rate that is higher than the 30-day and seven-day point prevalence abstinence rates is odd and suggests a reporting error. Authors of this study compare the smoking cessation outcomes to an older (1996) study comparing single-session counselling with 7.5% quit rates and 9.9% quit rates for the multiple session counselling by 12-month follow-up.[102] However, this study did not include pharmacotherapy as part of the intervention.

Another study evaluating participant satisfaction was the Rabius et al. study, which assessed the effectiveness of quitline services in African American callers from Texas, Louisiana, Washington and District of Columbia African Americans through an RCT.[87] Mean satisfaction on a four-point Likert scale showed no difference between callers from the three locations (3.5, 3.3 and 3.3 respectively) or between non-Hispanic White's from the same three locations (3.4, 3.3 and 3.2). By seven-month follow-up quit rates (30-day point prevalence) were 10% and 12% among African Americans and non-Hispanic Whites.

No difference was observed between groups for satisfaction among callers of the New York State Smokers' quitline[5] for gain-framed messages (92.4% reporting 'very satisfied' with the initial quitline contact) compared to standard-care (91.4% reporting 'very satisfied' p = 0.32). Another assessment of the New York State Smoker's quitline, this time by Unrod et al.[103] also reported that participants were highly satisfied with the services they received with an overall mean score on the Client Satisfaction Questionnaire of 25.47 (SD 2.85; questionnaire range 8–32) at baseline with no differences observed between the three treatment groups evaluated. High levels of satisfaction were also reported among the groups that received *Forever Free* relapse prevention booklets, with a mean score of 25.76 (SD 4.61) at six months and 26.09 (SD 4.69) by 12 months.

Satisfaction was also measured in the Saul et al. study which asked the question: *"How helpful was the Quitplan Helpline as a whole?"*[16] Nearly three-quarters (73.8%) of callers reported a response of 'very

helpful', with responses differing significantly between the different NRT protocol groups, which compared an eight-week shipment of NRT compared to a split-shipment of five weeks then three weeks. A response of 'very helpful' was reported among 77.2% of the single-shipment group (i.e. one shipment of eight weeks), compared to 81.1% in the two-shipment group (i.e. full eight-week supply over two shipments) and 57.8% of the five-week one-shipment group (i.e. those only receiving the first part of the intended eight-week shipment; p = 0.004). No difference in 30-day point prevalence abstinence was observed between groups by seven-month follow-up. Therefore, although participant satisfaction increased when more NRT was provided, this had no impact on quit rates.

In the Segan et al. RCT comparing extended callbacks to ex-smokers to prevent relapse over the longer term (beyond one-month cessation), 97% of participants in both trial groups rated the callback service as helpful (83% very and 14% somewhat). Belief that the callbacks made a difference to the success of their quit attempt was reported by 87% of participants and most believed that the number of calls received from quitline was 'about right' (84% in usual care group and 81% in intervention). Intervention participants were more likely to say that they received too many calls (11% compared to 2%), while usual care participants were more likely to say they received too few calls (14% versus 8%; p<0.001).

Among the 347 participants in the Danaher et al. 2015[58] study who received at least one quitline counselling call about smokeless tobacco use, 85.6% described the call as helpful and 93.8% stated that they would recommend the program, with 63.3% recording the highest rating of 'definitely will recommend'. When comparing quitline-only with the web and quitline groups, participants in the web and quitline groups reported higher ratings of both program helpfulness (p<0.05) and ratings of recommendation (p<0.05). Among the 1147 participants who reported on the usefulness of the self-help material, 79% described it as useful, with level of reported usefulness varying by condition (p<0.001), being: web-only (mean 2.70), web and quitline (mean 2.61), quitline only (mean 2.49) and control (mean 2.35). This suggests that the participant assessment of usefulness was dependent on what other service they received at the time.

A study by Kerkvliet, Wey and Fahrenwald[84] which evaluated prevalence and outcomes of quitline among people with and without a mental health condition, assessed satisfaction of the service to be high. The service consisted of five follow-up counselling sessions by trained health coaches from the South Dakota quitline, combined with a tobacco cessation product including NRT (in the form of gum, patch or lozenge) or medications bupropion hydrochloride or varenicline tartrate, provided free for an eight-week trial period. Medications were delivered in staggered increments following designated coaching sessions and mailed directly to the participant's home (physician referral required for varenicline or bupropion). Of the 12,173 quitline callers who enrolled in the service between September 2010 and August 2012, 951 did not receive an evidence-based service (i.e. no medication or at least one counselling session). Using a four-point Likert scale, with one being 'most satisfied' and four being 'least satisfied', the average service satisfaction rating was 1.36 (SD = 0.71) for the group with a mental health condition (n = 894) compared to 1. 5 (SD = 0.73) for the group without a mental health condition (n = 4041), showing no evidence of any significant differences between groups. The extent to which quitline met the participants' needs was assessed as 87.7% for the mental health condition group and 89.8% for the 'no mental health condition' group (p = 0.06). When asked if they would use the quitline again, 96.3% of participants with a mental health condition responded 'yes definitely' or 'yes I think so' compared to 96.9% of the 'no mental health condition' group. Of note, participant satisfaction responses were taken between 6.5 months and 7.5 months post enrolment, with response rates from 44.0% of the original callers self-reporting a mental health condition compared to 48.0% of the group with no mental health condition (p<0.001). The main reported difference for the response rates were a greater proportion of invalid phone information in the mental health condition group. A significantly higher abstinence rate was observed for varenicline tartrate plus coaching compared

to coaching only or coaching with NRT after a seven-month follow-up.[13] The range of abstinence across these four treatment protocols was similar, being 49.8% for varenicline tartrate plus counselling; 47.3% for bupropion hydrochloride plus counselling; 42.9% for NRT plus counselling; and 40.3% for counselling alone.

Fidelity of counselling

A study evaluating the Swedish Quitline (SNTQ)[99] reported that standard counselling consisted of a mixture of motivational interviewing, cognitive behavioural therapy and pharmacological consultation. Regular call monitoring with supervisors was performed for quality assurance in addition to quality assessment (fidelity) for provision of motivational interviewing assessed by an independent university-based coding laboratory. No data was reported regarding adherence to counselling protocols within this study and both intervention and control comparison groups received the same counselling, but on a proactive schedule (i.e. quitline counsellor offers a number of callbacks) or reactive schedule (i.e. where only incoming calls are attended). Likewise, the McDaniel et al.[61] study evaluating a three-arm RCT centred around the Quit for Life program assessed fidelity through compliance ratings from recorded counselling sessions. This was undertaken by two independent reviewers (a staff member and a quit coach supervisor). Any protocol deviations were addressed with individual feedback from the quit coach supervisors and ongoing training for all quit coaches. However, no outcomes about fidelity were reported. An evaluation of the New York State Smokers' quitline by Toll et al. in 2010[5] assessed fidelity of counselling delivery through ratings of interview audiotapes with eight independent tape raters blinded to study hypothesis, rating a random sample of approximately 20% of all tapes (around 400 tapes divided into 50 per rater). A validated adherence system was used by raters that evaluated discriminability (i.e. the capacity to discriminate) between the two types of counselling in the use of two gain-framed statement items, being: achieving benefits and avoiding negative consequences; and four standard quitline interview items, being: assessing current smoking, assessing quit attempts, assessing medication use and assessing intentions to quit. Seven-point scales were used to evaluate adherence, where 1 was 'not at all' and 7 was 'extensively'. A reliability sample of 10 recordings revealed a high level of inter-rater reliability by use of the model for random effects (range of average intraclass correlation coefficient estimates for all six items = 0.87–0.99). Statistically significant differences were observed between groups on the two gain-framed statement items, with specialists trained in gain-framed messaging providing gain-framed counselling more frequently than those providing standard-care counselling (for achieving benefits, gain-framed mean frequency rating was 3.9 versus 1.4 in the standard-care group; $p<0.001$; and for avoiding negative consequences, mean frequency rating was 1.5 compared to 1.0 in the standard care group; $p<0.001$). No differences were observed between the two counselling groups on the four standard quitline interview items. Similar methodology was applied in the Toll et al. 2015 study, which evaluated the use of brief motivational counselling to limit or abstain from alcohol plus an alcohol reduction booklet added to standard quitline tobacco counselling, as compared to smoking cessation counselling plus a smoking cessation booklet added to standard care.[104] Reliability sample with 10 recordings coded by seven raters revealed a high level of inter-rater reliability (mean intraclass correlation coefficient = 0.88–0.99). Adherence outcomes differed significantly in the expected directions, with the alcohol plus tobacco group using alcohol-focused statements significantly more frequently compared to the tobacco-only group. Standard care quitline outcomes did not differ significantly between the two groups. Unlike the 2010 Toll study that showed no statistically significant difference at long-term follow-up, the 2015 Toll study did result in a statistically significant 7-day point prevalence abstinence from smoking at seven-month follow-up in the alcohol plus tobacco quitline intervention arm (13.5%) compared to the tobacco only comparison arm (10.3%; OR 1.37; 95% CI 1.04–1.80; $p = 0.03$).

Additional relevant data from studies not meeting criteria for inclusion in the rapid review:

A study by Lukowski et al.[105], which was not identified for inclusion in this rapid review as it only evaluated participant demographics among quitline callers, did mention a minimum dataset for evaluation as part of North American Quitline Consortium (NAQC) recommendations. In addition to the 18-question version of the NAQC checklist, a series of mental health screening questions were also asked during the intake interview among quitline callers. However, results regarding implementation of this checklist and degree of adherence were not reported.

Identified in the grey literature search, the full NAQC dataset includes nine broad categories and is available via the NAQC website.[106] A copy of the checklist is included in Appendix 2. This checklist is a supplement to the *"Quitline services: Current Practice and Evidence Base"* guide.[107] The checklist includes a summary of the evidence, current status of each service among quitlines and recommendations and questions for consideration. Additional older resources were also identified as being produced by the NAQC regarding quality assessment of service provision, including:

- Telephone Quitlines: A resource for development, implementation and evaluation published in 2004[108]
- Quitline Operations: Back to basics: A compilation of lessons learned from the North American
- Quitline Consortium's third conference call training series published in 2005[109]
- Quitline Operations: A practical guide to promising approaches also published in 2005.[110]

A study by Lorencatto et al. 2014[48], which did not meet criteria for inclusion in this rapid review of evidence, did evaluate treatment fidelity by comparing counselling manuals and to 75 audio-recorded transcripts from the UK national quitline service. Compliance varied substantially across the 45-different smoking cessation behavioural change techniques being evaluated, with less than half (41.8%) of the treatment manual successfully delivered on average. The researchers report that identifying gaps in current practice by coding recorded interviews to treatment manuals can be used as a means to identify training needs. Moreover, the low fidelity identified in this study highlights the need to establish routine procedures for monitoring delivery of behavioural support.

Relevant results from grey literature search not meeting inclusion criteria for this rapid review:

Evaluation of quitline operations is encouraged in the NAQC 2003 resource.[111] These guidelines recommend the implementation of a quality improvement plan to measure and track the program's performance, involving the collection of objective behavioural data, as well as subjective satisfaction data, from telephone follow-up surveys conducted with randomly selected callers.

Counsellor- or client-initiated follow-up calls

Across a wide array of study designs, counsellor-initiated calls do offer a benefit on smoking cessation outcomes compared to client-initiated calls based on level 1 evidence.

Twelve studies delivering counsellor-initiated calls pooled together in a meta-analysis by Stead et al. identified a benefit in quitting outcomes at final follow-up compared to different comparator groups. The sub-group of studies (n = 15) evaluating trials of interventions for people calling quitlines within the Stead et al. Cochrane review [6] identified 12 studies with counsellor calls back to people who had initiated contact with the quitline. The number of calls varied with three studies reporting more than one schedule and small differences were observed in level of support across the control groups. Twelve studies with 30,182 participants were able to be pooled within a meta-analysis to assess the effect of additional counsellor-initiated support, identifying a statistically significant benefit on quitting outcomes at longest follow-up in favour of the counsellor-initiated support (RR 1.38; 95% CI 1.28–1.49; $p<0.00001$; n = 12 studies with 30,182 individual participants). Due to substantial heterogeneity ($I^2 = 71\%$) re-analysis using the random effect

model was undertaken, providing a very similar estimate of effect (RR 1.41; 95% CI 1.20–1.66). The three studies carrying the most weight within the meta-analysis all had significant results, as did three additional studies, suggesting benefit from these types of interventions in many settings but not all. Telephone counselling initiated by quitline counsellors for the initial call identified increased quitting (51 studies, n = 30,246 participants; RR 1.27; 95% CI 1.20–1.36). Following a meta-regression controlling for differences in baseline support, maximum number of calls and motivation, the smoking cessation benefit was slightly better among those offered more calls and among smokers who were motivated to try a quit attempt. For studies that did not identify a benefit for counselling, author's report that the unstructured counselling provided in those interventions might have explained the lack of effect and that counselling and pharmacotherapy support received within the control group due to the well-developed Stop Smoking Service provided by the UK health system may contribute to the lack of effect. Other studies showing a lack of effect offered free NRT included one study with a factorial design and the another that was conducted in young adults, a population for whom Stead et al. report there is limited evidence for any effective interventions. One study of a Medicare Stop Smoking program compared an intervention giving participants access to a quitline that offered the choice of a client-initiated hotline with pre-recorded messages and ad hoc counselling; or a practice service in addition to coverage for the nicotine patch.[112] The control group consisted of pharmacotherapy coverage only. The quitline significantly increased quitting at 12 months from 15.8%–19.3% (RR 1.22; 95%CI 1.07–1.39).

Another systematic review by Tzelepis et al.[7] found that quitline counsellor-initiated telephone counselling increased prolonged and continuous smoking abstinence for both actively recruited smokers (first call initiated by quitline counsellors) and passively recruited smokers (first call initiated by the client). Among the 24 RCTs published prior to 31 December 2008, seven studies had active recruitment, 16 passive recruitment and one mixed recruitment. When compared with control groups receiving self-help materials or no intervention, the counsellor-initiated telephone counselling resulted in a statistically greater effect for seven-day point-prevalence abstinence at 6–9 months (R 1.26; 95% CI 1.1–1.43; p<0.001) but not at 12–15 -month follow-up.

Among the five lower level evidence studies evaluating differences between counsellor- and participant-initiated follow-up calls, four reported no difference between groups at final follow-up (usually from six to 12 months), but typically did report short-term cessation benefits. The one study showing a significant benefit on quitting outcomes by 12 months[8] was undertaken in a military population with differing levels of NRT provision between the intervention and control groups (four to eight-week supply compared to two-week supply). The potential additive benefit of more NRT was not evaluated. Moreover, the quitline-initiated group received substantially more counselling sessions at all follow-up periods, with high retention rates across the six counselling sessions. However, another study[9-11] did evaluate the additive benefit of a six-week supply of free NRT, identifying no evidence of any effect above that of standard counselling.

Three distinct studies by Klesges et al. evaluated the efficacy of either counsellor-initiated or client-initiated follow-up calls for tobacco quitline services among active duty military and TRICARE beneficiaries (the health plan of military personnel)[8], adult cancer survivors[59] and adult survivors of childhood cancer.[60] Participants (n = 1,298) evaluated in the military and TRICARE study, received eight weeks of counselling and up to an eight-week supply of free NRT, with the reactive group receiving a two-week NRT supply. Proactive treatment was associated with greater odds of prolonged abstinence (44.22% vs 24.96%; OR = 2.7; p<0.0001) and seven-day point prevalence abstinence (22.03% vs 13.41%; OR = 1.81' p<0.0001) by 12-month follow-up. However, for both cancer survivor studies[59, 60], no difference in long-term smoking abstinence was observed for proactive (counsellor-initiated phone calls) compared to reactive counselling (participant-initiated calls). The adult survivors of childhood cancer study (n = 519) showed a significant

benefit of the proactive counselling plus four-weeks of NRT compared to reactive counselling with two-weeks of NRT by eight-week follow-up (33.2% vs 17.0%; p<0.001), but this was not maintained at 12 months (23.0% vs 18.7% p = 0.29). Of note, in both cancer survivor studies, falsification of self-reported abstinence through biochemical validation was very high (80% in adult survivor of childhood cancer and 48% in the adult cancer survivor studies). Klesges et al. report that traditional smoking cessation interventions are ineffective among cancer survivors, which is consistent with other studies researching this area.

A study by Nohlert, Ohrvki and Helgason also reported no evidence of any effect on tobacco cessation outcomes by 12-month follow-up in a study comparing proactive services (i.e. quitline counsellors offering a number of callbacks) and reactive services (where only incoming calls are attended) at the Swedish Quitline, SNTQ.[99] The counselling program is delivered by trained health professionals including nurses, dentists, dental hygienists or psychologists with primary or secondary prevention experience. In addition, callers are provided with printed material partly tailored to the client's needs and motivation to quit is offered free of charge. Among the 586 participants responding at 12 months (59% of original sample), intention-to-treat point prevalence abstinence was 26% in the proactive group and 29% in the reactive group (p= 0. 331). Six-month continuous abstinence (at the 12-month contact period) was 36% and 34% (responder only) for proactive and reactive counselling groups respectively (20% and 22% respectively for intention to treat).

One multifactorial 2 x 2 study called the PORTSSS trial (Proactive or Reactive Telephone Smoking ceSsation Support) from the UK evaluated the efficacy of more intensive proactive counselling (i.e. once or twice before quit date, then at 3, 7, 14 and 21 days post quit date), versus standard telephone counselling (i.e. one week before quit date, day of quit date, as well as two days and three weeks post quit date) and whether the offer of a voucher for six-weeks of free NRT has any additional impact over standard counselling.[9-11] No difference in smoking cessation outcomes for counsellor or participant-initiated follow-up calls were observed.

A study by Carlini et al.[73] used multiple means to re-initiate contact with past quitline participants as the focus of the study (quitline intervention incorporating strategies to re-engage past callers), resulting in 12.2% of intervention participants (n = 859 people) compared to 1.9% of the comparison group re-engaging with the quitline service (p<0.001). Just over half of participants were available for follow-up with 79.9% reporting a quit attempt lasting 24 hours or more in the last 90 days with the intention-to-treat analysis identifying quit attempts of 42.6%. Seven-day point prevalence abstinence was observed in 24.5% of participants, with the intention to treat analysis identifying a quit rate of 13.1%.

Counselling protocols and adherence to these

Level 1 evidence identified that quitline initiated first calls increased quit attempts (51 studies), with effect estimates being slightly larger if more calls were offered and in trials specifically targeting smokers motivated to try to quit.[6] Another systematic review identified that quitline-initiated first calls are less effective than client-initiated first calls, likely related to the initial level of motivation to quit and readiness to quit.[7] However, this evidence only comes from one included study within the systematic review (also described above under 'counsellor- or client-initiated follow-up calls).[7]

Evidence from other lower quality studies around the impact of different counselling protocols was also mixed. Some studies showed no additive benefit for quitline-initiated follow-up versus client-initiated follow-up counselling[11] or the use of NRT[11, 12] compared to standard counselling without NRT. Others, however, did show that quitline-initiated follow-up counselling[8] and the addition of pharmacotherapy[13, 14] do have greater efficacy on quitting outcomes. No dose-response correlation was observed for the duration

of NRT provision, indicating that giving quitline callers higher quantities of pharmacotherapy like NRT above that of a starter-pack does not result in better smoking cessation outcomes.[15-17] However, a dose response was observed between the number of counselling sessions and likelihood of successful quitting outcomes regardless of NRT provision.[14] Note: adherence to counselling protocols by quitline counsellors is assessed under the 'Fidelity of counselling' sub-heading above.

Medication such as NRT as an adjunct to standard quitline protocols

After six months follow-up in the PORTSSS RCT[9-11] involving 2,591 smokers, 17.7% of those offered NRT reported smoking cessation compared with 20.1% not offered the therapy.[11] Of those offered more intensive proactive counselling (i.e. once or twice before quit date, then at three, seven, 14 and 21 days post quit date), 18.2% reported abstinence compared to 19.6% receiving standard support (i.e. one week before quit date, day of quit date, as well as two days and three weeks post quit date). Of participants eligible to receive NRT, 71.9% redeemed the vouchers and were sent at least one supply with 21.0% requesting a second supply. The use of non-trial cessation support (i.e. obtaining NRT via a pharmacist or doctor) did not explain the smoking cessation outcomes showing no evidence of any effect for the addition of NRT over counselling alone.[10]

Another study by Klesges et al. evaluating proactive counselling (i.e. quitline-initiated follow-up calls) plus an eight-week supply of NRT versus reactive counselling (i.e. client-initiated follow-up calls) with a two-week supply of NRT among military personnel identified a significant benefit in favour of the proactive arm on prolonged abstinence and seven-day point prevalence by 12-month follow-up.[8] The proactive arm had a higher retention rate within the smoking cessation service with 79% of participants receiving three or more intervention calls, compared to 14% of those in the reactive condition. In the proactive group, only 3.54% of participants did not receive a single call compared to 46.84% in the reactive group. Call completion rates for remaining counselling sessions were as follows: at least one call (53.16% vs 96.46%), two calls (30.20% vs 87.37%), three calls (13.87% vs 78.89%), four calls (6.93% vs 71.34%), five calls (2.93% vs 64.10%) and six calls (2.47% vs 55.47%) for the reactive and proactive conditions respectively ($p < 0.0001$ for all). The counselling protocol consisted of six phone sessions, with the first continuing from the screening call if the participant had time, each session lasted <40 minutes covering the following:

- Session 1: preparing the smoker to quit and facilitating a targeted quit date
- Session 2: setting a quit date, preparing to quit and using the nicotine patch
- Session 3: the targeted quit date, problem solving strategies for difficult situations
- Session 4: provision of support
- Session 5: developing an individualised short-term relapse prevention plan
- Session 6: developing a long-term relapse prevention plan.

Participants in the reactive group were encouraged to call the quitline at their convenience. If they called on at least six occasions, they would receive the same intervention as those in the proactive condition. Participants in the proactive condition were recommended the nicotine patch with dosage based on smoking rate. If participants had successfully quit on their targeted quit date, they received another four weeks of patches with tapered dosing up until eight weeks. Those in the reactive condition received two weeks of NRT with instructions to buy more on their own. Authors did not report treatment efficacy based on participants who actually used NRT compared to those who did not. Therefore, it is not possible to determine from this study if using different doses of NRT had an impact on treatment efficacy. Evaluation of different NRT doses was, however, evaluated in the Cummings et al. study.

The Cummings et al. 2010 study ,which evaluated four different durations of free nicotine patches (two-, four-, six- and eight-weeks supplies), found that quit rate for the four-week supply group did not

significantly differ from the six- and eight-week supply groups.[15, 76] However, quit rates at 12-month follow-up were higher for smokers in the groups who received either two-, six- or eight-weeks of NRT. These results identify no clear dose response relationship between smoking outcomes and the number of free nicotine patches sent to smokers. This suggests that providing callers with additional free NRT above that of a starter pack does not increase their chances of quitting and remaining smoke-free. The lowest quit rate was observed among Medicaid/uninsured smokers who could receive up to six weeks of patches based on quitting efforts made in the first two weeks of calling the quitline. A correlation was seen between the number of patches actually used and quitting outcomes in a multivariate logistic regression model where a positive relationship was observed between the number of patches used and quitting success. This is to be expected as those who quit are more likely to continue using the patches, while those who relapse will discontinue use.

Another study by Saul et al. which evaluated two different regimens of NRT supply—an eight-week single-shipment supply or a split supply of five weeks, followed by a further three-week supply of NRT if callers continued with counselling—determined no difference in 30-day point prevalence by seven-month follow-up.[16] Callers in the eight-week two-shipment group completed significantly more calls (mean 3.0) compared to the five-week one-shipment group (2.4) or eight-week single-shipment group (1.7; $p<0.001$). For individuals completing follow-up at seven months, participants in the two-shipment group used NRT significantly longer (48.8 days) compared to those in the single-shipment group (33.5 days) or five-week one-shipment group (28.9 days; $p = 0.007$).

One Australian pseudo-RCT evaluated the addition of subsidised NRT to a standard population quitline service as an incentive to motivate low-income smokers into a quit attempt.[14] At study entry, participants were mailed vouchers in packs of 10 (one weeks' worth) for redemption of NRT at a subsidised rate of 75% off the usual recommended retail price. The standard quitline program incorporated multiple sessions of counselling, with the number and length of sessions determined by the caller over a 12-week period. The intervention group included 1000 participants (65.3% female) and the control group consisted of 377 participants (62.1% female). Of the 10,170 vouchers that were distributed, pharmacy records indicate that 3,741 were redeemed (36.8% uptake), with 80.9% of those who received vouchers reporting using at least one of them. The majority of study participants were contacted at least once for a proactive counselling session (quitline-initiated follow-up), with no significant differences evident between study groups (94.7% of intervention participants and 95.9% of comparison participants received one or more calls). The average number of calls in total from quitline was 6.6 (SD 3.7) for the intervention arm and 5.8 (SD 3.9) in the control arm ($p<0.001$). Participants in the NRT group received more follow-up quitline calls than those in the comparison group (mean 6.3 vs 5.5 calls respectively; $p<0.001$). Of note, individuals who successfully quit in the NRT group had a similar number of callbacks compared to those who successfully quit in the comparison group (mean 7.8 and 7.7 callbacks respectively). This suggests that the provision of more counselling sessions among individuals motivated to quit, regardless of the addition of NRT, is associated with better quitting outcomes. However, the proportion of quitters in the intervention group was higher than the control group for unadjusted quit rates at three-month (46.0% and 29.5%; $p<0.001$) and six-month follow-up (37.1% and 26.2%; $p<0.001$) but not at 12 months (33.2% and 28.0%). Quit attempts were also higher in the intervention arm compared to control arm (83.8% versus 74.8%; $p<0.001$).

Another factorial RCT conducted on the Wisconsin quitline by Smith et al.[17], tested the effect of different NRT durations (two-week supply versus six-week supply), NRT type (nicotine patch-only compared to nicotine patch plus nicotine gum) and standard four-call counselling compared to the same counselling in addition to medication adherence counselling. This 2 x 2 x 2 design yielded eight possible treatment combinations. Counselling was consistent with the US Public Health Clinical Practice Guideline.[93] For the primary outcomes of seven-day and 30-day point prevalence abstinence at six-month follow-up, a

statistically significant result was only observed for the NRT type main effect, with a higher abstinence rate observed for combination NRT (49.9%) compared to nicotine patch only (42.3%; OR = 1.36; 95% CI 1.06–1.75). Of note, smoking cessation guidelines recommend combination NRT for nicotine-dependent smokers.[113] No significant difference was observed comparing six-weeks of NRT (48.9%) to two-weeks of NRT (43.3%; OR = 1.26; 96% CI 0.98–1.61) or standard counselling (47.6%) to medication adherent counselling (44.6%; OR = 0.89; 95% CI 0.69–1.14). An analysis evaluating the joint effect of NRT duration and type on seven-day point prevalence abstinence at six months revealed that participant quit rate for those who received two weeks of patch-only NRT (38.4%) and six weeks of patch-only NRT (46.2%) did not significantly differ. However, participants receiving combination NRT for two weeks (48.2%) or six weeks (51.6%) had a significantly higher abstinence rate when compared with the two-week patch-only NRT.

The Bullen et al. 2010 study[12] evaluated standard quitline services in NZ compared to the addition of pre-cessation NRT. A reduction in daily cigarette consumption was observed in both the pre-cessation NRT intervention group and the usual practice control groups by their quit date, going from 19 cigarettes per day to seven in the intervention arm and 16 in the control arm. However, no difference was observed between groups on quitting outcomes. By six-month follow-up among those who relapsed, both groups reported smoking significantly fewer cigarettes than at entry into the trial, with an average of approximately 11 cigarettes per day in both groups. This suggests that standard quitline services in NZ can significantly reduce the number of cigarettes smoked among callers after relapse, but the addition of pre-cessation NRT does not provide any additional benefit to this outcome. No significant differences were observed by six-month follow-up between intervention participants who received NRT two weeks before their quit date plus usual quitline care or the control population who received usual quitline care, for either seven-day point prevalence (22.7% and 21% respectively), or continuous smoking abstinence (18% in both groups).

A study by Kerkvliet and Fahrenwald involving 11,603 callers to the South Dakota quitline evaluated the frequency of specific service requests where pharmacotherapy was provided at no cost to the caller.[13] The most common request was coaching with varenicline tartrate (64.6%) followed by coaching with NRT (22.6%), coaching alone (5.4%) and coaching with bupropion hydrochloride (5%). Although a significantly higher abstinence rate was observed for varenicline tartrate plus coaching compared to coaching only or coaching with NRT after seven months follow-up, all service options resulted in cessation rates of over 40% (range 40.3%–49.8%).

Other quitline protocols:

The doctoral thesis by Goesling[114] discusses the Free and Clear telephone quitline service based in Washington, US, where participants receive up to five outbound follow-up phone calls made proactively by a team of quit coaches. There were 5,291 eligible participants enrolling in the quitline in the study evaluation period of November 2009 and February 2010. Three items were added to the standard telephone protocol: confidence, stress and urges. To standardise delivery and timing of questions, quit coaches received multiple in-depth training sessions for the new protocol and were provided with instructions on how to incorporate these new items in follow-up calls. The questions asked were:

- On a scale from 1–10, where 1 is 'not at all confident' and 10 is 'highly confident', how confident are you that you can quit (or stay quit if already quit) for good?
- On a scale from 1–10, in the last week, how often have you felt difficulties were piling up so high that you could not overcome them? (1 = never; 10 = very often)
- On a scale from 1–10 where 1 is 'no urges' and 10 is 'strongest urges', how strong have your urges or cravings been to smoke during the past day?

During the initial quitline call, counsellors collected information on: smoking variables, nicotine dependence, confidence to quit and current stress level. Participants were then given the opportunity to set a quit date and the counsellor assisted the participant to develop a personalised plan to prepare for meeting the quit date. Barriers to success were identified with potential strategies to overcome these. Dysfunctional cognitions were identified, such as 'I probably won't succeed because I failed in my last attempt', with alternative cognitions such as 'quitting is like learning to ride a bike, falling off is part of the process' developed in their place. Participants were also given practical advice such as removing exposure to cigarettes in the house, and had scripted discussions around smoking cessation medication use, including contraindications and appropriateness. Following the initial counselling session, proactive follow-up counselling initiated by quitline counsellors was offered within a few days of the quit date and, assuming the participant reported abstinence at the first follow-up call, the next call was provided within 7–10 days, then again in two- to three-weekly intervals after that until a maximum of four follow-up calls were provided. If the participant reported a relapse at any time period, the next call would be scheduled based upon a new quit date. The follow-up calls were less structured than the baseline assessment with information collected about: date of call, how call was completed (intervention or letter if unable to reach), quit status, duration of quit attempt, self-efficacy, urge to smoke, stress and medication status. Call variables shifted based on availability at contact, quit status and willingness to set a new quit date if the participant had relapsed, allowing for comparison based on number of completed calls/counselling sessions rather than on number of attempts to contact the participant.

A Wisconsin-based RCT of 410 young adult smokers (18–24 years)[63] compared a quitline-based counselling intervention with up to four callbacks plus self-help materials with self-help material alone mailed to the participant. No difference was observed for intention-to-treat seven-day point prevalence abstinence at one-, three-, or six-month post-enrolment. Intervention group participants were more likely to set a quit date (59.8%) compared to the self-help group by one-month post-enrolment (43.3%; $p<0.002$), however, this result was not carried over to subsequent follow-up periods. Participants who received two or more counselling sessions were somewhat more likely to report making a quit attempt (44.4%) compared to those who received zero to one session (31.1%; $p = 0.06$). Similarly, participants who received more counselling sessions had a higher abstinence rate (14.1%) compared to those with fewer counselling sessions (5.4%; $p = 0.06$).

Adherence to the protocol in the Unrod et al. study[103] was assessed by asking participants whether they received and read the intervention materials (repeated mailings of eight "*Forever Free*" relapse prevention booklets, or massed mailings with all eight booklets sent upon enrolment or usual care consisting of brief counselling and NRT). Among responders, 12.5% of the mass mailings group and 8.0% of the repeated mailings group did not report receipt of a single booklet and 90% of those who received them reported having read the booklet. Those who did not receive the booklets had a lower abstinence rate across all follow-up points compared to those who received the booklets. However, the difference was not statistically significant. At the six- and 12-month follow-up periods, abstinence rates were 42.8% and 43.7% respectively among those who reportedly read the booklets compared to 27% and 29% among those who reportedly did not read the booklets ($p<0.03$). When comparing groups, repeated mailings produced higher abstinence rates, though the results did not produce a statistically significant differences at six-, 12-, 18- and 24-month follow-ups.

Differences in counsellors delivering the quitline protocols

Among individual studies within the Stead et al. Cochrane review[6], those that did not recruit participants on the basis of their willingness to make a quit attempt typically included content that was individualised to enhance motivation or to support a quit attempt where appropriate. Counselling was most commonly

provided by professional counsellors or trained healthcare professionals, not necessarily by government funded quitline counsellors. One trial used trained postgraduate students and three used trained peer counsellors.

A study by DeLaughter et al.[80] also explored the role of training peers to increase referrals to quitline in Alabama and Mississippi, US. Of the initial 96 successful quitters who were contacted by quitline, 24 were recruited agreeing to participate (75% women) and of these 11 were trained with four actively referring 23 friends and family over two months. From these 23, three friends/family (all women) were enrolled in quitline.

Additional relevant data from studies not meeting criteria for inclusion in the rapid review

A study by Linde et al.[115] that did not meet criteria for inclusion in this review surveyed quitlines across 50 states in US, Washington DC and Guam to identify the number of treatment protocols offered, types of tobacco products they were intended to treat (e.g. cigarettes or cigars) and how counsellors triaged callers reporting use of non-cigarette tobacco and nicotine containing products. Thirteen organisations provided USA quitline interventions and 11 of these made up the evaluation sample. Every quitline service participating in the evaluation had at least one established tobacco cessation intervention protocol, i.e. a plan for treatment with specific procedures/languages used when someone called the quitline. Seven out of the 11 providers (63.6%) reported treating every caller the same, adapting words such as 'cigarette' with 'hookah' or 'cigar' depending on the individual's reported smoking habits. Only one service provider used a specialised protocol for smokeless tobacco use in addition to a standard protocol for all other callers. Three service providers referred participants to third party resources for other information about non-cigarette tobacco and nicotine containing products. No tailored protocols were available for non-cigarette tobacco and nicotine containing products, therefore the efficacy of such a protocol is unknown.

Relevant results from grey literature search not meeting inclusion criteria for this rapid review

Declining success rates across stop smoking services were observed in England between 2004 and 2007, with substantial variability identified across the 151 local services.[116] In response, the Department of Health in England commissioned the National Centre for Smoking Cessation and Training (NCSCT) in 2009. Objectives of this centre were to 1. identify competencies required to deliver, manage, and commission smoking cessation reports, 2. develop and implement methods of assessment to ensure that practitioners, managers and commissioners obtain these competencies, and 3. commission and provide training and continuing support to enable staff to achieve the required level of competence.[116] NCSCT Directors Andy McEwen, Robert West and Susan Michie and Leonie Brose (post supported by the NCSCT) have undertaken several research evaluations in line with these objectives as reported below.

An audit by Brose et al. in 2011[117] covering 126,890 treatment episodes across 24 stop-smoking services in the UK, identified substantial variation in success rates among smokers depending on the treatment protocols used. Smokers using single NRT had higher quit rates compared to those not using medication (OR 1.75; 95% CI 1.39–2.22, $p<0.001$), combination NRT was more effective then single NRT (OR 1.42; 95% CI 1.06–1.91; $p = 0.019$) and varenicline tartrate was more effective then single NRT (OR 1.78; 95% CI 1.57–2.02, $p<0.001$). Carbon monoxide validated four-week abstinence did not significantly differ among those using bupropion hydrochloride compared to single-dose NRT (OR 1.12; 95% CI 0.96–1.30, $p = 0.16$). Of note, those using pharmacotherapy such as varenicline tartrate and combination NRT to assist with quit attempts had a significantly higher nicotine dependence level than those without medication or single NRT ($p<0.001$).

Another audit by Brose, McEwen and West[95] evaluating 46,237 one-to-one treatment episodes in the UK produced similar results. Clients who used single NRT, bupropion hydrochloride, combination NRT and

varenicline tartrate were significantly more likely to have successful four-week carbon monoxide validated quit attempts compared to those using no medication.

A 2014 Brose et al. study evaluated if variability in stop-smoking services across England were due to variable uptake in training provision of the NCSCT. It was identified that 22.7% of practitioners completed the online knowledge training with 4.3% completing the face-to-face skills training during the evaluation period. A 2.5% improvement in success rate was observed between 2008 and 2010 (pre) and 2011 and 2013 (post) across all services ($p = 0.01$). The degree of improvement in successful abstinence among clients for each service was predicted by the number of practitioners completing the face-to-face skills-based training, adjusted for the number completing online training. While associated with improvement, for those who just completed the online knowledge training, improvement was marginal.[116] This suggests that face-to-face training to improve compliance with best-practice guidelines is more effective than online training. On average, for every additional practitioner who completed the face-to-face training there was an additive increase of 0.22 points in smoking cessation success rates among clients.[116]

Frequency and length of calls/counselling sessions

While there is Level 1 evidence for follow up calls to increase cessation, there is mixed evidence about the optimal number of quitline calls/counselling sessions, optimal timing and length of calls to be provided. Most studies suggest no evidence of significant increased benefit with an increased number of quitline calls [6, 18, 19, 118], while a few studies report that a higher number of calls is significantly associated with better quitting outcomes.[6, 20] Certainly, this rapid review did not identify any strong evidence to deviate from the current Victorian Quitline™ protocol consisting of two pre-quitting quitline-initiated follow-up calls plus four post-quitting calls (based on recommendations in the seminal paper by Zhu and Pierce[21]). A paucity of evidence was available to enable any recommendation about the length of calls.

Studies evaluating frequency/length of counselling as primary focus

Level 1 evidence identified in the Stead et al. systematic review, which included 77 studies, evaluated differences in the number of calls to/from a quitline ranging from one to 12. The duration and frequency of these calls were also variable, with between 10- and 20-minutes being common, although the initial call could be longer, and calls spaced over weeks or months.[6] Within the sub-group of studies investigating the effect of additional quitline-initiated first calls, review authors separated studies by intensity of intervention. Using only the more intensive interventions (those with more follow-up counselling sessions) in two trials that reported outcomes for two different interventions (opposed to an intervention and control group), a marginal increase in the pooled effect size was observed (data was not shown). One study, Smith et al. 2004, did not detect a difference between groups receiving two or six follow-up calls after an initial 50-minute session.[119] Another study, Rabius et al. 2007, evaluated six different intervention formats that differed in number of calls, duration and use of brief booster calls at four and eight weeks after counselling. No clear dose response effect was observed.[120] Five brief counselling calls plus boosters were no less effective than the standard American Cancer Society protocol of five longer calls and boosters. Direct comparison between two studies reporting more and less intensive interventions showed marginally significant differences in favour of the more intensive intervention in one study (RR 1.32; 95% CI 1.01–1.74;[102]), but not in the other (RR 1.05; 95% CI 0.89–1.23;[121]).

A study by Carlin-Menter et al. comparing the efficacy of offering two versus four counselling callbacks after the initial call to the New York State Smokers quitline found no significant difference between study groups for seven- or 30-day cessation rates.[18] Overall, 48% of participants who continued smoking had reduced their cigarette consumption by 50% or more by three-month follow-up. The use of NRT did not differ between groups nor did the cost per quit attempt. However, it is worth noting that the average number of callbacks actually completed in the two-callback group was 0.89 compared to 1.04 in the four-

callback group, with only 14% of the four-callback participants completing more than two counselling callbacks. This suggests that adherence to the protocol may be an important contributor to the outcome suggesting no evidence of an effect, more so than the actual provision of two compared to four callbacks. When evaluating smoking cessation outcomes on a dose response basis, a positive association was observed between the number of completed callbacks and quit rates at three months for seven- and 30-day quit rates.

Another study by Segan et al. evaluated the impact of extended callback counselling to prevent relapse over the longer term (beyond one-month cessation). They provided the intervention group with 4–6 extra calls delivered 1–3 months after quitting compared to the usual four calls provided in the first month after quitting. They found no significant difference on continuous abstinence at 12-month follow-up.[118] Of the 352 intervention participants (those scheduled to receive the extra post quitting calls), 74% accepted extra post-quitting calls with a mean of 4.3 calls received. The average total number of post-quitting calls between groups was 7.1 in the intervention arm (over 60.9 days) and 5.4 in the usual care arm (over 42.0 days), a difference of 1.7 calls ($p<0.001$). Standard post-quitting calls were longer in the intervention group (mean 16.2 minutes) compared to usual care group (15.0 minutes; $p = 0.001$), and integration callbacks (extended intervention) was even longer (18.0 minutes). Intervention participants were more likely to say that they received too many calls (11% compared to 2%), while usual care participants were more likely to say they received too few calls (14% versus 8%; p<0. 001).

Studies where frequency/length of counselling was impacted by intervention

For some studies, delivery of certain interventions such as AC[1], a weight control program as an adjunct to quitline[19] and acceptance of an eight-week supply of NR[56], resulted in an increased utilisation of counselling calls compared to the control group. In the Bricker et al. RCT[1], delivery of ACT instead of CBT (standard care) resulted in 1.1 more calls on average ($p<0.001$), in a protocol originally outlining a total of five calls for each group. For every one-call attempt, ACT participants completed a call 36% of the time compared with only 13% of the time for CBT participants ($p<0.0001$). Importantly, more calls predicted higher 30-day point prevalence abstinence at six-month follow-up for ACT (31%; OR 1.6; 95% CI 1.1–2.6; $p = 0.03$) but not for CBT (22%; OR 1.6; 95% CI 0.9–3.0; p- 0.10) when evaluating the dose-response association. The length of calls did not significantly differ by treatment arms with an average of 23.64 minutes for ACT compared to 22.01 minutes for the CBT group. However, a comparison of abstinence among the 47 participants who were identified as depressed at baseline identified an increased quit rate of 33% with delivery of ACT compared to 13% with CBT (OR 1.2; 95% CI 1.0–1.6).

A study by Bush et al. evaluating the impact of a weight control program as an adjunct to quitline practices experienced an average of 4.1 successful calls by quitline counsellors in the intervention arm compared to 3.0 in the control arm.[19] However, the weight control intervention was designed to include more calls compared to the usual care control population (five compared to eight counselling calls). No significant difference in 30-day abstinence outcomes at six-month follow-up were observed, with the intervention arm reporting 36.8% compared to the control population with 33.3%. Likewise, intention-to-treat quit rates identified no differences between intervention and control groups (17.1% and 17.8% respectively).

Intervention participants in the Burns et al. 2016 study who requested the full eight-week supply of NRT were significantly more likely to complete all counselling calls (33.5%) compared to the intervention participants who only received the four-week supply of NRT (1.6%; $p<0.0001$).[56] Smoking rates including seven-day and 30-day point prevalence as well as continuous abstinence did not differ between study groups by six-month follow-up among those actually receiving the intended interventions. However, intervention participants who requested the full eight-week supply of NRT were significantly more likely to obtained 30-day point prevalence abstinence (29.3%) compared to intervention participants receiving the

four-week supply of NRT (15.7%; p<0.001). This suggests that sustained dedication (and motivation) to quit was more likely to predict abstinence rather than the provision of additional NRT.

Population-wide studies impacting frequency of calls to quitline

Similarly, some population-wide interventions did result in an overall increase in quitline calls during the study evaluation period, such as following targeted advertising[70, 79] and the introduction of increased tobacco taxation.[78] An increase in quitline calls were observed among Latino quitline callers in the Burns et al. 2010 study, from 390 per month during the pre-campaign period (1,169 over three months) to an average of 614 per month during the campaign.[70] During the campaign, Latino participants were less likely to stop being coached after one call, more likely to complete the program and were more likely to receive one NRT package (four-week supply), compared to pre-campaign counterparts, however, these results were not statistically significant. The average number of counselling calls was marginally higher among Latinos than non-Latinos during the campaign (3.0 compared to 2.6 calls respectively; p = 0.06). Six-month abstinence was significantly higher among Latinos during the culturally-tailored media campaign (18.8%) compared to pre-campaign (9.6%; p<0.05). However, there was a significantly lower six-month abstinence rate among non-Latinos during the campaign (8.8%) compared to before the campaign (16.5%; p = 0.01). Authors of this study speculate that the media campaign was most effective at recruiting Mexican men living and working in Colorado, compromising the largest demographic segment of US immigrants coming from a country where 39.1% of men are smokers. Therefore, this culturally-tailored campaign reached an audience in demand of this service who were not previously accessing it. Authors report that additional research is needed about changes in knowledge, attitudes and cessation, quitlines and NRT usage to determine the exact components of the media campaign that may have contributed to the improved quit rates. A similar pattern was identified for seven-day point prevalence identified with a benefit among Latino smokers during the media campaign compared to pre-campaign (41.0% and 29.6% respectively; p = 0.06) and a significant worsening among non-Latinos post-campaign compared to pre-campaign (24.9% compared to 34.8%; p<0.05).

Another study[79, 81] evaluating the addition of 100 television gross rating points per week for quitline-tagged ads was associated with an increase of 89 calls per week to the quitline in a typical area code in the US (p<0.001). The 'Tips' campaign reportedly was responsible for an additional 170,000 calls to quitline during the campaign. The same campaign was evaluated by other authors across 23 US states in a 2014 study[90], identifying that the number of quitline callers increased by 88.6% (48,738 in 2011 to 91,911 during Tips) and the number of callers who received counselling and/or NRT increased by 70.8% (40,546 in 2011 to 69,254 in Tips) during similar weeks in 2011 (i.e. the previous year).[90]

A 23.5% increase in total call volume was observed in the Bush et al. study[78], which compared call volumn in periods before and after the federal tax on cigarettes increased, and the price of packs rose by $1.01 on 1 April 2009. Call volume increased from pre-tax (85,541 calls) to post-tax periods (104,452 calls), with the largest percent increase of 94.1% occurring in March 2009. The number of tobacco users per month who received at least one counselling call increased during March and April 2009 compared to the same time in the previous year. Although fewer calls enrolled in the multi-call program (4–5 counselling calls) after tax, they completed slightly more counselling sessions compared with those who enrolled before tax (1.9 versus 2.2 sessions respectively; p<0.0001). In the after-tax period, differences were identified in characteristics of callers including: age slightly younger (41.9 versus 41.2 years); fewer callers aged 18–24 years (11.5% after tax compared to 13.6% before tax); more white callers; higher number with less than a high school education; more likely to live with a smoker; shorter duration of cigarette smoking and more likely to report hearing about the quitline from family or friends or their healthcare provider rather than from the media.

No significant difference was observed in seven-day and 30-day quit rates by seven-month follow-up before versus after the tax increase (seven-day rates were 30.7% before and 28.7% after the tax increase).

Studies reporting data on utilisation of counselling protocols (frequency of calls)

Among other studies, process measures for counselling implementation have been reported, showing a significant drop-off in counselling numbers after the first call. Moreover, a greater uptake of counselling (higher treatment compliance) is associated with increased efficacy for smoking cessation outcomes. The interaction is likely bi-directional, meaning better quit smoking outcomes lead to better treatment compliance, as people who relapse and return to smoking are more likely to drop-out of the counselling service.

In the Zhu et al. study[67] of Asian-language tailored counselling compared to self-help material in the US, the initial counselling session was received by 86.9% of the 2,277 participants. This fell to 11.8%, 12.7%, 13.3% and 12.4% for the remaining four counselling sessions respectively. Thirty-nine percent of participants received five or more follow-up calls as specified in the quitline protocol. This resulted in a quit rate in the counselling group double that reported in the self-help group. Six-month prolonged abstinence was higher in the counselling group then in the self-help group (20.0% vs 9.5%; $p<0.001$) as was seven-day point prevalence at four-months (38.2% vs 18.6%) and seven-months (40.0% vs 23.9%; $p<0.001$). When expressed in terms of an odds ratio, the odds of achieving six months prolonged abstinence were 2.26 times higher in the counselling group than among those who received only self-help materials in the intention-to-treat analysis, and 2.38 times higher in the complete-case analysis.

A three-state evaluation of the same Asian-language counselling program had a higher rate of receiving the initial counselling call (91.6%).[74] Although participants in the multi-state program were more likely to be counselled, they received fewer counselling sessions (mean 4.1 compared to 4.9 in the one-state Zhu et al. study) and fewer minutes of counselling across the sessions (58.2 vs 72.0; $p<0.05$). However, multi-state participants reported a much higher nicotine patch use (43.0% vs 9.1%) and use of any quitting aids (53.1% vs 12.8%). Of note, the one-state Zhu et al. study involved randomisation of participants into either the counselling or self-help arms, while the multi-state study allowed for self-selection. Therefore, those who chose to undertake counselling may have a higher motivation to quit than those randomised in the RCT. Among the 5,771 callers in the nation-wide Kuiper et al. evaluation[122], 85% received counselling (92% among Chinese callers, 88% for Korean callers and 76% among Vietnamese callers). Callers participating in counselling and attended at least one session had an average number of four counselling sessions in total, with no difference between language groups. Nearly all (99%) of eligible callers received nicotine patches and had heard about the quitline from advertising in newspapers and magazines. Across all three studies, the majority of callers were male (80%–90%).

Reported counselling implementation in the New York quitline evaluation of a three-month recruitment period by Goesling 2012[114] reflects a similar pattern of attrition over time. The initial data set consisted of 7,357 callers, of which 5,291 callers were included in the evaluation, with 75.2% speaking with a quit coach on the same day as their registration call ($n = 3,981$). Of the 5,291 callers, 88.3% ($n = 4671$) received at least one follow-up counselling session, 67.8% ($n = 3,591$) had two follow-up calls, 44.2% ($n = 2338$) received three follow-up calls and 21.1% ($n = 1,119$) received all five counselling sessions. Characteristics of participants less likely to receive follow-up calls were: being female, younger age, higher nicotine dependence, self-efficacy and stress. Based on a chi-squared analysis, females were less likely to be adherent to counselling (receive fewer calls) and were more likely to only receive a baseline call ($p<0.001$), one follow-up call ($p<0.001$) and two follow-up calls ($p<0.05$). However, by the third counselling session, this difference shifted with no gender difference observed, though more men were likely to complete all four calls ($p<0.001$). An association was observed between the number of calls received and quitting, with

people who received more calls being more likely to have quit at least once during the data collection period (p<0.001). Of the 5,291 participants, 68% (n = 3,128) reported a quit attempt at some point during the study period.

The Miller et al. study evaluated the addition of subsidised NRT to a standard population quitline service as an incentive to motivate low-income smokers into a quit attempt.[14] The average number of total calls from quitline was 6.6 (SD 3.7) for the intervention arm and 5.8 (SD 3.9) in the control arm (p<0.001). However, participants in the NRT group received more follow-up quitline calls than those in the comparison group (mean 6.3 vs 5.5 calls respectively; p<0.001). Of note, individuals who successfully quit in the NRT group had a similar number of callbacks compared to those who successfully quit in the comparison group (mean 7.8 and 7.7 callbacks respectively). This suggests that the provision of more counselling sessions among individuals motivated to quit, regardless of the addition of NRT, is associated with better quitting outcomes. However, the proportion of quitters in the intervention group was higher than the control group for unadjusted quit rates at three-month (46.0% and 29.5%; p<0.001) and six-month follow-up (37.1% and 26.2%; p<0.001) but not 12 months (33.2% and 28.0%). Quit attempts were also higher in the intervention arm compared to control arm (83.8% versus 74.8%; p<0.001).

Another NRT based study by Saul et al. evaluated the impact of an eight-week shipment of NRT compared to a split-shipment at five-weeks then a further three-weeks' supply if they continued with counselling.[16] Participants in the eight-week two-shipment group received significantly more calls (3.0) compared to those in the five-week one-shipment group (2.4) or eight-week single-shipment group (1.7; p<0.001). The average minutes of counselling was highest in the eight-week two-shipment group (66.6 minutes) compared to the eight-week single-shipment group (45.8 minutes) and five-week single-shipment group (42.8 minutes; p<0.001). Yet no difference in 30-day point prevalence abstinence was observed between groups by seven-month follow-up.

A study by Danaher et al. 2015[58] evaluated a 2 x 2 factorial study of a web-based smoking cessation platform, quitline only, web plus quitline or control of self-help materials. Of the 838 participants assigned to a group with the quitline intervention, 41.4% had a quitline call (45.6% among the quitline only group and 37.2% among the web and quitline group). The mean number of calls for the quitline-only group was 3.13 compared with 3.10 for the web and quitline group. Of those receiving a quitline call, 9.7% had one call, 10.1% received two-calls, 6.7% had three-calls, 8.0% had four-calls and 6.9% received all five calls. The rate of drop-off is similar to the Zhu et al.[67] study mentioned above. Receiving at least one call was significantly associated with six-month abstinence (p<0.005; OR 1.61; 95% CI 1.15 –2.26), with six-month abstinence reported by 48% of participants receiving quitline calls and 37% not receiving a call. On the intention-to-treat analysis at both three- and six-month abstinence time periods, results for each group were 27.3% for web-only, 29.5% for quitline only, 28.1% for web and quitline and 21.2% for the control condition. Another factorial study by Smith et al.[17] evaluated the impact of different NRT durations (two-week supply versus six-week supply), NRT type (nicotine patch only compared to nicotine patch plus nicotine gum) and standard four-call counselling compared to the same counselling in addition to medication adherence counselling. Nearly 60% of the 987 participants completed at least three proactive counselling sessions and 18.4% completed just one. No significant difference was observed for the main effects (i.e. NRT duration, NRT type and medication adherent counselling) on counselling utilisation. A significant interaction was observed for total number of counselling minutes for six-week NRT provision (65.3 minutes) compared to the two-week group mean (61.9 minutes; p<0.05) and medication adherence counselling compared to standard counselling, with an additional seven minutes added to the call time (p<0.001). No significant gender or ethnicity differences were observed for between group interactions on smoking abstinence rates. No statistically significant difference was observed for the primary outcomes of seven-day and 30-day point prevalence abstinence at six-month follow-up.

No difference was observed in counselling calls completed for an evaluation of the 'Tips' campaign[89] across three US states (Nebraska, North Carolina and Texas) with a mean of 2.1 (SD 1.4) for the total population of 715 participants. Callers who completed more counselling sessions were more likely to have successfully quit than those who completed fewer calls using seven-day point prevalence abstinence at seven-month follow-up (OR 1.15, 95% CI 1.01–1.30, p = 0.03).

Number and length of calls provided in an evaluation of reactive counselling (i.e. where only incoming calls are answered) versus proactive counselling (i.e. where a number of callbacks are offered) among 586 callers to the Swedish Quitline, SNTQ[99], identified significant differences between groups. The mean number of calls was 4.3 (SD 4.7) and 2.1 (SD 4.3) with a range of 1–40 and 1–70 for the proactive and reactive groups respectively (p<0.001). The percentage of reactive and proactive participants receiving different numbers of calls were: one call: 19% vs 50%; two calls: 27% vs 36%; and three calls: 15% vs 7%, respectively (p<0.001 for all). The total length of calls ranged from six to 591 minutes (mean 60.1) in the proactive group compared to five to 707 (mean 34.8) in the reactive group (p< 0.001). The first call was typically longer for both groups (mean 25.1 minutes; no difference between groups) with the average call time for the second call significantly longer in the proactive group (9.6 minutes) compared to the reactive group (6.8 minutes; p= 0.004).

Another study identifying differences in frequency of calls between treatment arms was the McDaniel et al. study[61] investigating three treatment arms in the US-based Quit for Life program (five-call program): standard quitline care; standard care plus technology-enhanced quitline with 10 risk assessments; or standard care plus 20 risk assessments. In the technology-enhanced groups, participants were contacted using interactive voice response technology 10 times during the treatment period to screen on either 10 or 20 relapse risk variables. An algorithm was applied to flag participants 'at risk' if they answered screening questions over an established threshold. Those at risk were then transferred directly to a quit coach for brief intervention (approximately 15 minutes) to specifically address the risk factors that triggered the transfer. The average number of completed calls was 3.9 (SD 1.7; range 2–19) with the two intervention arms that included risk assessments receiving significantly higher calls than the standard care group, due to the additional transferred counselling calls participants received after a positive screen was identified (p< 0.001). Quitline calls across groups were: standard care mean calls: 3.66 (SD 1.48, range 2–13, n = 592); 10 risk factor group mean: 4.11 (SD 1.82, range 2–19, n = 602); 20 risk factor group mean: 4.06 (SD 1.77, range 2–17, n = 591). No significant differences in quit rates at six and 12-month follow-up were observed on intention-to-treat quit rates. A positive risk assessment did identify participants less likely to be abstinent at six-months (OR= 0.56; 95% CI 0.42–0.76).

The average frequency of counselling sessions for pregnant women in the Bombard et al. 2013 study was 2.3 occasions compared to 2.5 occasions among non-pregnant women.[77] By seven-month follow-up, 26.4% of pregnant women and 22.6% of non-pregnant women had reported quitting. After adjusting for non-responders and non-disclosers, the adjusted quit rate was approximately twice as high for pregnant and non-pregnant women who received counselling, compared to those who received self-help material only (2.9% and 3.5% respectively).[77]

This Wisconsin-based RCT of 410 young adult smokers (18–24 years) by Sims et al.[63] compared a quitline-based counselling intervention with up to four callbacks plus self-help materials, with self-help material alone mailed to the participant. Participants who received two or more counselling sessions were somewhat more likely to report making a quit attempt (44.4%) compared to those who received 0–1 session (31.1%; p = 0.06). Similarly, participants who received more counselling sessions had a higher abstinence rate (14.1%) compared to those with fewer counselling sessions (5.4%; p = 0.06). Call completion was: 26% one call, 29% two calls, 22% three calls and 14% all four calls. The mean number of calls was 2.05 (SD 1.20) with total

minutes averaging 41 (SD 25). No difference was observed for intention-to-treat seven-day point prevalence abstinence at one, three, or six-month post-enrolment.

Additional relevant data from studies not meeting criteria for inclusion in the rapid review

A study that wasn't identified for inclusion in this review (as it was conducted in the emergency department setting of a North-eastern US hospital)[20], evaluated the impact of no quitline usage (n = 583), one call only (n = 99) or greater than one call (n = 98) on smoking outcomes. By three-month follow-up the biochemically-confirmed abstinence rates were 7.2%, 9.1% and 15.3% respectively (p = 0.03). Participants who used the quitline had a median counselling time of 28-minutes. Looking at this from a different perspective, the total call duration and associated smoking abstinence rates at three-months were 0 minutes (7.2%), 1–27 minutes (11.2%) and 28–143 minutes (13.1%); p = 0.09). Although the sample size is relatively small (total n = 780) and limited to one US population, the results suggest that receiving more than one call is associated with slightly better quitting outcomes than one call only, but that having a total duration of calls that is high did not show a significant difference between the two categories of counselling.

Relevant results from grey literature search not meeting inclusion criteria for this rapid review

A study by West et al. identified the behavioural change techniques from treatment manuals across 43 UK-based stop-smoking services.[101] From 43 possible behavioural change techniques, stop-smoking service manuals included a mean of 22 (range 9–37). The number of sessions used for delivery of the smoking cessation intervention (not limited to quitline services) ranged from 1–13.

Hours of operation

No studies evaluated the impact of differing or extended operating hours for quitline services.

One US study by Klesges et al.[8] comparing proactive counselling (quitline-initiated follow-up calls) to reactive counselling (client-initiated follow-up calls) reported the hours of quitline operation being 08:00 to 17:00 Central Standard Time. These operating hours were available to participants in the reactive condition, though hours of operation were not reported for the proactive condition. Another Swedish study[99] reported operating hours of 09:00–20:00 Monday to Thursday and 09:00–16:00 on Friday, operating two or three lines a total of 51 hours per week. No evaluation was undertaken to evaluate any data around operating hours for these services.

Pathways for recommendation to the service

Interactive voice response technology was used in two studies by the same author Carlini[57, 73], to re-engage relapsed quitline callers to commence a new cycle of counselling. The automated technology resulted in a significantly increased enrolment rate compared to the control populations in both studies. In the Carlini et al. RCT[57], 66.7% of re-enrolled participants in the intervention group accepted a direct transfer to the quitline and registered in services immediately after the interactive voice response call. Remaining participants provided contact information and registered in services with quitline staff returned their voicemail. Participants who accepted re-enrolment were typically older than those who declined a new treatment cycle (mean 45.2 years compared to 41.8 years; p = 0.013) and more likely to report a chronic condition (60.9% compared to 43.4%; p = 0.001).

The most common means by which a quitline service was recommended to pregnant women differed from non-pregnant women in the Bombard et al. 2013 study.[77] Pregnant women were more likely to have quitline recommended by a health professional, while non-pregnant women were made aware of the quitline through mass media channels.

Sub-group analysis of specific populations

Limited data was available across the different sub-groups examined within this rapid review. In the absence of any eligible study data, information was obtained from studies not meeting the inclusion criteria for this review (e.g. observational studies, surveys, qualitative evaluations) to provide some dialogue around quitline efficacy within these populations.

Tailoring quitline interventions for these specific populations have been identified as a priority in a 2003 report by NAQC, developed to provide guidance to state health departments, healthcare organisations and employers for the development and maintenance of state quitlines.[111] These guidelines recommend specialised protocols for pregnant smokers (with some promising efficacy evidence) and underage smokers (where evidence is lacking). Additionally, it recommends careful consideration of cultural appropriateness of services for culturally and racially diverse callers, the provision of and access to pharmacotherapy quit aids, comprehensive staff training and supervision, as well as opportunities for constructive feedback and development, and targeting of low-income tobacco users.

Culturally and linguistically diverse (CALD) populations

Cultural tailoring of tobacco cessation interventions has potential for improved engagement and cessation benefits above that of standard smoking cessation programs. Five studies evaluated the impact of quitline services culturally tailored to CALD populations.

Within the Stead et al. 2013 Cochrane review[6], one study of quitline counselling included culturally-tailored resources for the African-American population. However it was unable to detect a significantly increased benefit from counselling with the addition of tailored print materials.[123]

A media campaign that was culturally tailored for the Spanish Latino population in Colorado, US, identified a statistically significant increase in six-month abstinence and seven-day point prevalence abstinence among Latino callers during the media campaign compared to pre-campaign.[70] Of note, an adverse effect was observed among non-Latino callers with a significant reduction in abstinence during the campaign compared to pre-campaign.

Other studies, all co authored by Shu-Hong Zhu, have evaluated the implementation and/or efficacy of an Asian-language tailored tobacco quitline protocol into Chinese, Korean and Vietnamese languages. This has been evaluated in a single randomised study in California, US, with 2,277 Asian smokers[67] across three states (California, Colorado and Hawaii) following promotion of the service with 2004 smokers[74], and on a nationwide scale across 48 states and 5,771 callers over two-years.[122] Across two of the three studies, a benefit was identified for the culturally-tailored intervention arm compared to standard callback service on smoking outcomes. The third nationwide study did not evaluate this outcome. The nationwide RCT[67] found an overall increase in six-month prolonged abstinence among all smokers compared with self-help materials (16.4% vs 8.0%; $p<0.001$), and among interventions tailored for the three different language groups compared to self-help (Chinese 14.8% vs 6.0% $p<0.001$; Korean 14.9% vs 5.2% $p<0.001$; Vietnamese 19.8% vs 13.5% $p = 0.023$). Similar efficacy results were obtained in the three-state evaluation[74], with six-month abstinence of 18.8%.

Indigenous populations

No studies were included that identified a program culturally tailored for the Indigenous population. This is despite the fact that a Cochrane review of Indigenous smoking cessation programs has identified the potential for increased efficacy among studies tailored to these populations.[124] An observational study by Cosh et al. evaluated the utilisation and effectiveness of quitline services in South Australia, identifying that

demographic variables and smoking addiction at time of registration with the quitline were similar for both Indigenous and non-Indigenous Australians.[125] Indigenous callers received significantly fewer callbacks and were significantly less likely to set a quit date compared to non-Indigenous callers. Subsequently, fewer Indigenous callers reported a successful quit outcome by three-month follow-up. The authors reported that additional research is needed to explore whether the quitline service could be tailored to make it more engaging for Indigenous Australians who smoke.

An audit of quitline callers across 14 US states (approximately 60% female) found a higher rate of tobacco use onset (i.e. commencement of smoking in the population) among American Indian/Alaskan Native (AI/AN) callers, who made up 3.5% (n = 5,957) of the study population compared to callers identifying as other ethnic groups.[105] AI/AN callers had an earlier age of tobacco use onset compared to other groups (15.9 years compared to 16.7 years respectively; $p< 0.001$) and were more likely to live with another commercial tobacco user (45.4% and 42.1% respectively). Approximately 63% of participants in both groups (i.e. AI/AN callers compared to other racial/ethnic groups) reported using NRT, with a slightly higher proportion of AI/AN callers reportedly using prescription smoking cessation medications (17.6% compared to 16.2%). A history of mental or emotional problems was more likely to be reported by AI/AN callers ($p<0.001$) as well as symptoms causing interference with life functioning ($p<0.001$). However, no difference was observed between groups about the expectation that mental or emotional issues would interfere with their quit attempts. AI/AN callers were more likely to report comorbidities related to lung health (asthma, chronic obstructive pulmonary disease and cancer), cardiovascular illnesses (heart disease, heart attack, high blood pressure; $p<0.001$ for all) and diabetes, but not stroke.

Mental health

Mental health conditions are commonly reported among smokers at levels higher than those experienced in the general population.[126] Therefore, strategies that address or consider the presence of mental health conditions among smokers who are trying to quit may improve rates of quit attempts and cessation success.[127] Five studies were identified for inclusion, one of which was a systematic review containing four additional studies.

One study by Kerkvliet, Wey and Fahrenwald[84] evaluated the prevalence and outcomes of quitline use among people with and without a mental health condition, identifying a self-reported prevalence of mental health conditions of 19.8% in the 10,720 callers to South Dakota quitline between September 2010 and August 2012 (n = 2,086 callers). The self-reported quit rate following delivery of the standard quitline service (five counselling sessions plus up to eight-weeks' supply of free NRT or other smoking cessation pharmacotherapy) among the group reporting a mental health condition was 16.4% at seven-months follow-up, compared to 21.5% among those without a mental health condition ($p<0.001$; intention-to-treat). The responder quit rate for those with and without a mental health condition was 36.9% and 44.4% respectively. The adjusted odds ratio describing the association between mental health status and tobacco cessation indicated that participants with a mental health condition are 23% less likely to quit ($p<0.05$) than those without.

CBT is reportedly the theoretical approach typically used to underpin quitline counselling protocols.[1, 6, 113] However, one alternative theoretical framework was identified as having the potential to increase quitting efficacy among quitline callers with mental health issues, above that of CBT. In the Bricker et al. study[1], a comparison of abstinence among the 47 participants who were identified as depressed at baseline identified an increased quit rate of 33% with delivery of Acceptance and Commitment Therapy (ACT) via the quitline, compared to 13% with CBT (OR 1.2; 95% CI 1.0–1.6).

The Schwindt et al.[54] systematic review of quitline services for smoking cessation among people with a mental illness identified four studies for inclusion. All four studies identified positive outcomes associated with quitline services plus an adjunctive component for smoking cessation. Only one study was associated with significant improvements in depressive and psychotic symptoms as well as mental health functioning for all groups.[128] However, between group differences were not observed for these factors, meaning both the intervention and comparison groups benefited. Likewise, in the van der Meer et al. study[66], quitting was associated with reduced depressive symptoms regardless of treatment group assignment. Exacerbations of depression were not associated with cessation outcomes in a third study[62] and the fourth included study did not report on mental health outcomes. Results from these trials suggest that mental health benefits can be observed among smokers quitting via quitline services regardless of treatment intensity, as quitting benefits can be observed even in the lower intensity interventions. Significantly higher cessation rates were observed in two of the four studies at different follow-up periods. The van der Meer et al. study[66] observed significantly higher cessation rates at both six- and 12-month follow-up assessments among participants receiving assistance from a quitline service that included a mood management component. Participants in the Rogers et al. 2016[3] study using a multi-session manual-based counselling protocol based on motivational interviewing and CBT with accompanying homework assignments identified a significantly higher 30-day abstinence rate for the intervention arm compared to control arm.

Analysis of an RCT within the Swedish quitline setting comparing proactive counselling (i.e. quitline offers a number of follow-up callbacks) and reactive counselling (i.e. where only incoming calls are attended) showed no evidence of effect between groups on quitting outcomes.[99] Secondary analysis of this data identified that perceived ability to handle stress and depressive mood was a significant predictor of both point-prevalence and continuous abstinence by 12-month follow-up.[86]

A study by Simonavicius et al. that was identified through the grey literature but did not meet the criteria as an included study, evaluated resources and training needs to support smokers with mental health problems via a survey of 717 smoking cessation practitioners across the UK.[129] More practitioners believed that smoking cessation helped smokers with mental health problems to feel better (37%) compared to those who believed smoking cessation would exacerbate mental health problems (17.2%). Just over half of practitioners reported that their service had a system to record mental health status (57.3%), 11.6% of services indicated that they had dedicated funding for people with mental health problems and over one-quarter of practitioners were (9.1%) or had (17.4%) staff members who were dedicated lead practitioners for mental health work. Less than one-fifth of practitioners reported that their service had a manual guiding support for smokers with mental health problems. More than two-thirds of practitioners (69.1%) reported asking clients about mental health very often or always, with practitioners significantly more likely to always ask clients about mental health problems if they had or were a lead support organisation for smoking cessation among clients with mental health issues ($p<0.001$). Practitioners were the most confident in supporting smokers with depression or anxiety to quit and least confident in support those who reported schizophrenia. In terms of medication support, practitioners were most confident recommending NRT, moderately confident with varenicline tartrate and e-cigarettes and least confident with bupropion hydrochloride, which notably is also an antidepressant drug. Knowledge about interactions between smoking cessation and blood levels and metabolism of psychiatric medications indicated a need for improved education and training among smoking cessation practitioners. When asked about blood levels of psychiatric medications, 48.3% of practitioners correctly indicated that smoking may decrease blood levels of some medications, 52.7% correctly responded that quitting smoking may increase blood levels and 33.4% knew that nicotine does not affect psychiatric medication metabolism.

Pregnant women

One study evaluating quitline interventions among pregnant women was identified for inclusion in this rapid review. The Bombard et al. 2013 study evaluated quit attempts by both pregnant and non-pregnant women.[77] By seven-month follow-up, 26.4% of pregnant women and 22.6% of non-pregnant women had reported quitting. After adjusting for non-responders and non-disclosers, the adjusted quit rate was approximately twice as high for pregnant (2.9%) and non-pregnant women (3.5%) who received counselling, compared to rates among those who received self-help material only.[77] The average frequency of counselling sessions for pregnant women was 2.3 occasions compared to 2.5 occasions among non-pregnant women.[77] Pregnant women were more likely to be alerted to a quitline by health professionals, while non-pregnant women were made aware of quitline services through mass media channels.

A study by Cummins et al.[130] that was not included in this review as it did not examine any of the key components required to underpin quitline services, did examine pregnant smokers' use of a Californian quitline plus self-help materials compared to self-help materials alone. This RCT identified an increased 30-day abstinence at the end of pregnancy (29.6% vs 20.1%; $p<0.001$), 90-day abstinence two months post-partum (22.1% vs 14.8%; $p<0.001$) and 180-day abstinence six months post-partum (14.4% vs 8.2%; $p<0.001$) among the intervention than the control group. Of pregnant women assigned to the counselling intervention arm, 71.2% received at least one session, with an average of 4.0 follow-up sessions. Only one-fifth of participants received counselling post-partum, with the average number of post-partum calls being 1.5.

Substance use disorders

Only one study examining the addition of an alcohol cessation component to regular quitline smoking cessation services was identified for inclusion in this rapid review. The Toll et al. 2015 study evaluated the addition of alcohol-focused counselling plus an alcohol reduction booklet to standard New York Smokers' quitline counselling, compared to smoking cessation counselling plus a smoking cessation booklet added to standard care.[104] The addition of alcohol-tailored advice resulted in a significantly higher rate of smoking abstinence at seven-month follow-up (13.5%) compared to the control group (10.3%; $p = 0.03$). When analyses were undertaken to control for treatment conditions, participants who did not report any heavy drinking were significantly more likely to quit smoking compared to those who reported any heavy drinking (OR = 1.87; 95% CI 1.29–2.71; $p<0.001$).

A study by Griffin et al. 2015 in the Bronx, New York, which was not eligible for inclusion in this review because participants were recruited from methadone treatment programs, evaluated the impact and uptake of quitline on opioid-dependent smokers also taking varenicline tartrate.[131] Of the 112 participants recruited into the study, all were offered a written referral to quitline, yet only 22% utilised the service. Those who chose not to undergo quitline counselling were more likely to report mobile phone service lapse and difficulty charging mobile phones. The main reasons for quitline refusal included scepticism of quitline efficacy, aversion to telephone communication, competing life demands (e.g. drug treatment, shelter) and problems with mobile phone service and calls.

Young people

Utilisation and adherence to quitline services are reported to be lower among young people.[132, 133] Yet, this rapid review of evidence only identified one study that evaluated quitline services specifically designed for younger smokers. This Wisconsin-based RCT of 410 smokers[63] compared a quitline-based counselling intervention with up to four callbacks with self-help material mailed to the participant. No difference was observed for intention-to-treat seven-day point prevalence abstinence at one, three, or six months post-enrolment. Study retention was low with 48.3% responding by six-month follow-up. Other smoking

cessation strategies such as use of pharmacotherapy are also underutilised by young smokers[133] and younger participants are less adherent to follow-up counselling sessions as part of standard quitline protocols.[114] These results suggest that this demographic is difficult to engage and retain, and that targeted interventions relatable to young people are required. One RCT conducted among 50 high schools in Washington State, US[134,] proactively recruited 2,151 smokers providing them with CBT and personalised motivational interviewing by phone compared to no intervention. This study was not identified for inclusion in this review because counselling was not conducted with quitline counsellors or within a quitline setting. By six-month follow-up, 21.8% of intervention participants reported prolonged smoking abstinence compared to 17.7% of control participants ($p = 0.06$), with a significant benefit among intervention participants compared to control among daily smokers (10.5 vs 5.9% respectively; $p = 0.02$).

Relatable interventions that utilise smartphone technology may provide an avenue to increase uptake and successful outcomes for quitline services among youth.[135] The benefits of using this type of technology among youth is that it is synchronistic with their lifestyle choices, being affordable, personalised, not location dependent and age appropriate.[136] For example, text messaging services[137], smoking cessation applications (apps)[138] or use of social media networks such as Facebook[139], may provide unique opportunities to engage with this cohort, although more research is needed.

Review Question 2

Enablers of, or barriers to, delivery of effective service components identified in Question 1

Several enablers and barriers were identified within studies reporting information on key components. This data has been supplemented with grey literature that specifically focus on identifying enablers and barriers to optimal service provision, such as surveys among smoking cessation practitioners.

There are mixed reports about the use of NRT as an adjunct to quitline services. A 2010 study by Burns et al.[71] conducted with 1,710 smokers calling the Colorado quitline in the US investigated the impact of a protocol change to provision of NRT. Under the change, light to moderate smokers ($\leq$20 cigarettes per day) were only eligible for a four-week supply of NRT compared to the previous eight-week supply available to this group. Abstinence declined by nearly a quarter under the reduced NRT protocol (29.9% compared to 39.3%; $p<0.01$). Heavy smokers (>20 cigarettes per day) who were still eligible for the eight-week supply of NRT experienced no change in abstinence rates over the same period of time. However, the same author conducted an RCT of eight-week compared to four-week provision or NRT which identified no difference in continuous abstinence or seven-day point prevalence between groups.[56] A statistically significant difference was observed for individuals within the intervention arm who received the full eight-week provision of NRT compared to those who only requested the four-week supply, suggesting that it was more likely the continued engagement and perhaps a higher motivation among participants to quit smoking that resulted in the benefit, rather than the availability of an eight-week supply of NRT. Another study by Bullen et al.[12] identified that the use of NRT two-weeks before the target quit date had no additive effect on cessation outcomes.

An RCT investigating the use of interactive voice response technology to re-engage relapsed quitline smokers across two US states reported low self-efficacy and lack of interest in quitting as barriers to re-engaging in continued counselling as part of a new treatment cycle.[57] After delivering interactive voice response messages designed to target these barriers, 32% of smokers who reported low self-efficacy and 4.8% of those who initially identified a lack of interest re-engaged with the quitline service.

Several factors have been associated with non-adherence to quitline services among smokers. Yet an exploratory study among more than 20,000 quitline callers across 50 US states, Canada and several other countries by Burns et al. (2012) identified that all significant predictors pooled together explained less than 4% of the variance observed[132] This suggests that the characteristics of smokers who were non-adherent to quitline services explained very little about their retention in the service. Characteristics where a significant difference was observed included:

- Male callers were more likely to receive more than three, four and five quitline calls compared to female callers
- Black callers were less likely to remain in quitline counselling compared to Latino, white or other demographics;
- Younger callers had lower adherence to quitline compared to older callers
- Individuals who did not complete high school and those who completed additional study beyond high school had better outcomes than those who completed high school but had no further education beyond that
- People with insurance were more adherent to counselling than those without insurance
- Smokers without children at home had greater compliance with counselling compared to those with children at home
- Individuals smoking more than 20 cigarettes per day were more likely to remain in quitline programs compared to those smoking 20 or less cigarettes per day
- Individuals who lived with a tobacco user were less adherent to counselling compared to those who were not regularly exposed to a tobacco smoker in the home
- Smokers who had a failed quit attempt in the past were more likely to be adherent to counselling compared to those who had not attempted to quit smoking before
- The most significant characteristic that determined compliance with the full quitline program of five calls was the provision of NRT. Smokers who received NRT were more likely to be adherent to the counselling program compared to those who did not receive NRT.

The study authors suggested that a framework be proposed for directing research toward reducing quitline service non-adherence.

A study of training 'peer referrers' to quitline by DeLaughter et al.[80] identified several barriers to engaging successful quitters to provide their peers with written referrals to the service. One barrier was the time-point at which successful quitters were contacted to become 'peer referrers.' They felt that recruiting smokers at the beginning of quitting, with counsellor help (actively-quitting smokers), would be better than waiting until six-month cessation. Another issue was with the written referral forms, which were considered overwhelming to the peer referrers, with a text message-based referral processes suggested.

A study by Carlin-Menter et al. involving 1,923 participants examined reasons for quitline callers refusing a counselling callback, with 43% of responders at three-month follow-up acknowledging that they had not accepted the callback.[18] The primary reasons cited were: too busy (39%); thought the calls would not be helpful (30%); and not ready to quit (14%). Of the 57% of responders who did accept the call, 89% said that the callback was helpful in assisting their efforts to quit smoking.

Additional relevant data from studies not meeting criteria for inclusion in the rapid review

Additional enablers and barriers were identified from alternative sources of evidence that weren't included in studies identified for this rapid review.

An evaluation of barriers and enablers to the adoption of 21 recommended quitline best practices was conducted by the US NAQC through annual surveys in 2016 and 2017, as well as telephone calls.[140] The report provides an overview of 21 recommended best practices, adoption rate for each and the enablers and barriers to reported uptake by state quitlines across the US (see Appendix 2). The following eight best practices were adopted by 90% or more of state quitlines:

1. Provide at least one FDA-approved cessation medication at no cost
2. Provide a minimum of a 2-week supply of cessation medications to eligible quitline participants
3. Put protocols in place so all quitline participants receive information on cessation medications
4. Offer proactive (quitline initiated follow-up) telephone counselling
5. Offer tailored intake protocol for pregnant and postpartum women
6. Promote cessation services and medications
7. Implement NAQC guidance on reaching priority populations and reengaging smokers
8. Adopt questions on electronic nicotine delivery systems (ENDS).

Follow-up phone conversations were conducted to evaluate common facilitators and barriers to adopting the 21 recommended best practices. Facilitators and barriers aligned with each other—for example, the cost of implementing the recommendation due to budget cuts in recent years was identified as a barrier, but there was an aligning facilitator reported in that there was minimal cost to implementing state quitline services and therefore sufficient budget was available. Key barriers and facilitators include:

- Cost of implementing/state quitline budget
- Priorities of the state quitline
- Technical capacity or capability of the state quitline's service provider.

Among 10 best practice recommendations with low levels of adoption (less than 30% of state quitlines), the state quitline budget appeared to be the primary barrier to adoption, with insufficient resources available. Examples of such recommendations included provision of cessation medications, eReferrals and other technology-based practices. Additional reasons for non-adoption of best practice recommendations included the lack of technical capacity by the service provider and that the recommended best practice did not align with priorities of the individual state quitline. Nuances were observed between different state quitlines, meaning that some services would only adopt part of the recommendation or would implement a modified version of the recommendation.

A 2016 report also by the US NAQC aimed to investigate current gaps in smoking cessation coverage for state employees, develop state-specific plans to address these gaps, and then promote comprehensive evidence-based cessation services.[141] Enablers to service provision included: education of insurers and employers on the cost-benefit of tobacco cessation programs; support at the highest levels of government and state health departments; the publicisation of employee health program successes; awards programs to incentivise employers to increase coverage and receive recognition; and the building of relationships between insurance agencies and cessation service providers. For example, education of key political figures in North Carolina resulted in a state partnership with the tobacco program, increasing the quitline offering to include multiple telephone counselling calls, text services, a quit kit, 12 weeks of free NRT, as well as combination therapy and outcome evaluation. Smaller strategies such as the faxing of recommendations from the quitline to the participant's physician, and insurers liaising directly with quitlines as opposed to negotiating contracts through the state health department were also discussed. The main barrier identified

was the lack of clarity surrounding fiscal responsibility for these services—for example, insurers were less likely to purchase quitline services when the state provides free services to all callers. Some states have reduced quitline eligibility to serve only high-risk populations, which has prompted employers to purchase quitline services for their members, although this solution raises budget concerns.

A survey of 175 smokers who had previously used quitline services conducted by Tzelepis et al.[43] identified that more than 60% of smokers believed that their chances of quitting would have increased had they used the same quitline advisor for each call.

An audit by Brose, McEwen and West in 2012[95] evaluating 46,237 one-to-one treatment episodes in the UK identified similar results to the Burns et al. 2012 study from the US and Canada.[132] The UK study also identified that age, gender, employment status, occupational grade, currently being in prison and exemption from prescription charges (as a surrogate measure for lower socio-economic status) were independently associated with the success of quit attempts.

In 2014 Brose et al. evaluated whether services that had greater utilisation of NCSCT training, using 16 competencies known to be associated with successful short-term smoking abstinence[100, 101], would show greater improvement in quitting success rates.[116] Data from 146 services between 2008 and 2013 determined that practitioners who completed the face-to-face skills training had better smoking cessation treatment outcomes among clients compared to those who underwent online training. However, provision of any training compared to no training also increased quitting success rates ($p = 0.01$).

A survey of stop-smoking practitioners also reported by Brose et al. in 2015 suggested that ensuring practitioners had access to treatment manuals within their service, promoting manual use and training practitioners to completely apply manuals (i.e. implement the treatment manual in its entirety) was likely to contribute to higher success rates in clinical practice.[142] Successful smoking abstinence rates among clients of smoking cessation practitioners (840 practitioners reporting on manual use and 713 on training) were higher among those who had a manual (54.0% compared to 48.0%; $p = 0.013$), used a manual ($p = 0.009$), perceived manuals as being more useful ($p = 0.034$) and had completed training ($p = 0.002$). Success rates were higher among specialist practitioners compared to non-specialist practitioners ($p<0.001$).

The type of practitioner who delivered the treatment was also identified as a barrier/enabler, with another study among the same group of authors led by Hiscock determining that smoking cessation specialists were more likely to have clients successfully quit smoking compared to other practitioners such as nursing staff or general practitioners.[143] Authors reported that affluent smokers were more likely to quit than disadvantaged smokers, however, the classification of disadvantaged smokers was those eligible for free prescriptions compared to those who paid for prescriptions. Importantly, the fact that smokers had to pay for prescriptions could mean they were more motivated to quit rather than affluence being the primary factor leading to the successful quitting outcome. There is an economic principle of 'loss aversion' where an individual experiences more dissatisfaction from the loss of a certain dollar amount than satisfaction from gaining a certain dollar amount[144,] meaning those who are financially committed to a quit attempt are more likely to succeed in that activity. This is supported in this study, as authors report that respondents who paid for prescriptions were more likely to quit. One-to-one smoking cessation therapy was received among 80% of service clients, however, open group forms of behavioural therapy were more successful (OR 1.26; 95% CI 1.12–1.41). The exception was among the most disadvantaged clients such as the long-term unemployed or prisoners.

Similarly, the same team conducted an online survey among 573 specialist practitioners and 466 community practitioners[145], identifying that smokers of specialist practitioners (63.6%) had better four-week carbon monoxide certified abstinence rates compared to community practitioners (50.4%; $p<0.001$). This is

not surprising as for nurses and general practitioners, smoking cessation is a small part of their job as seen in the Hiscock et al.[143] study. However, specialist practitioners focus on smoking cessation as their primary role. Six modifiable variables were identified that showed a positive association in quitting outcomes among specialist practitioners above that of the non-modifiable variables such as age and gender, that accounted for 14.3% and 35.7% of variance in the total effect. These enablers resulting in higher efficacy in quitting outcomes included: a greater proportion of clients using the 'abrupt' quit model; a longer duration for the first counselling session; always providing advice on stop smoking medication options; greater number of days spent training; greater number of sessions observed by a specialist practitioner to improve compliance with guidelines before starting work, and; a larger number of sessions having been observed in practice with feedback received as part of a continual improvement process. Combination NRT was the most common medication recommended (26.4% among all practitioners), however, community practitioners were significantly more likely to recommend varenicline tartrate compared with specialist practitioners (19.3% compared with 11.9% respectively; $p = 0.001$), while specialist practitioners (44.9%) were significantly more likely not to recommend any specific medication compared to community practitioners (21.1%; $p < 0.001$). Specialist practitioners also reported that they were more likely to use behavioural change techniques with all clients and they had a greater total number of behavioural change techniques used with all clients compared to community practitioners.

Another 2012 study by the same team, led by McDermott[146], investigated self-reported practices, attitudes and level of training among smoking cessation practitioners through surveys conducted among 484 smoking cessation services. However, this investigation only provided a snapshot of current practice, rather than identification of specific barriers and enablers to optimal service delivery. Of note, just under half (43%) of services reported always using the abrupt quit model (i.e. they encouraged smokers to continue smoking as much as they want until the quit date and then stop abruptly at that point), the majority (53%) encouraged abrupt cessation but allowed smokers to cut down gradually until the quit date, while a minority (4%) encouraged smokers to cut down gradually before stopping.

Limitations

This rapid review of evidence includes several limitations. In particular, this is a rapid review of evidence rather than a comprehensive and systematic review of all available evidence. Therefore, there is potential for relevant studies to have been missed in the narrative synthesis of evidence. Furthermore, as both individual studies and systematic reviews have been included, there is potential for double counting of individual studies which may have also been included within a systematic review. Therefore, results should not be considered as a cumulative effect without first checking individual study details.

The quality of data varies substantially within the different levels of evidence as per the NHMRC evidence grading tool used to guide potentially included studies. Generalisability of findings is also limited with inclusion of evidence from across a broad cross section of populations from different countries, socio-economic backgrounds, ages, gender, smoking history etc. These issues have been described in more detail in section VI under the 'Quality assessment of evidence' for each review question.

Of particular note, a paucity of evidence was identified for many outcomes. Although some outcomes, such as 'Behavioural change techniques and adherence to these' may include many studies identified as included and relevant, the data provided within these individual studies that make up the body of evidence related to each specific outcome is often limited.

On a general note, there is an important methodological issue that some studies do not consider, being that analyses should be separated out for people smoking at the first call versus those who have already

quit as smoking status is a major predictor of later abstinence. This factor should be considered when interpreting and comparing study findings.

8 Recommendations

Inconsistent data was identified in this rapid review for most key components to underpin Quitline™ services. Certainly, this rapid review did not identify any strong evidence to deviate from the current Victorian Quitline™ protocol consisting of two pre-quitting quitline initiated follow-up calls plus four post quitting calls (based on recommendations in the seminal paper by Zhu and Pierce[21]), underpinned by CBT using trained counsellors. Based on the available evidence, authors of this review recommend that state/territory and federal policy makers as well as senior managers of Quitlines™ consider implementing the following as a national set of minimum standards:

- A generic approach to counselling with a standardised core protocol can be considered for the majority of tobacco users, as extensive tailoring of services based on characteristics of individual participants contacting the Quitline™ do not appear to be associated with successful quitting; However, there may be some merit in considering a tailored approach for certain populations of Quitline™ callers, to provide services based on user characteristics. For example, young callers, pregnant women, CALD populations, Indigenous populations and those with mental health conditions
- Providing a two-week starter pack of free NRT to eligible Quitline™ callers is likely to increase smoking cessation outcomes
- All counsellors should be trained health professionals
- Counselling sessions should be monitored intermittently to measure compliance with best practice protocols, enabling identification of additional training requirements
- Face-to-face booster training should be provided to counsellors to supplement online training and easy access to treatment manuals provided within each service where possible, to reinforce compliance with best-practice guidelines
- The most commonly used behavioural approach is CBT, however, ACT and MI have also shown benefits in smoking cessation outcomes; therefore, consultation with an organisation such as the Australian Psychological Society could be made for advice on the best approach or combination of approaches, including the optimal number of sessions for the specific technique/s taken
- In the situation where a service needs to be scaled down due to limited resources, the focus should be on providing counselling to clients who initiate the first quitline contact, or to those known to be highly motivated to make a quit attempt, rather than quitline counsellors making the initial call to smokers who are less motivated to quit.

The above recommendations should not be considered in isolation, but rather considered as a package approach to increase the likelihood of successful increases in smoking abstinence among Quitline™ callers. The review authors strongly suggest that key stakeholders help to build the evidence base lacking for several key components including: the ideal number and duration of contacts; the addition of ACT and/or MI as an adjunct to CBT; ideal hours of quitline operation; and minimum counselling competencies required. This can be achieved by considering the following:

- It is likely that data are available within various Quitline™ services, however, publication of the results is required to enable consolidation of evidence and translation into standard practice
- To evaluate effectiveness and impact of different counselling protocols, for example frequency and duration of Quitline™ contacts, randomised controlled trials should be embedded into Quitline™

services; resource support should be provided to undertake a methodologically rigorous evaluation, with a plan of how to translate results into treatment protocols at conclusion of the evaluation period, with ongoing monitoring to confirm greater efficacy from the change has occurred.

When considering any change to standard practice, there needs to be an evaluation using methodologically rigorous techniques to quantify the impact alongside implementation. Considering the paucity of data available to address many of the key components to Quitline™ services, resources should be invested into supporting research activities directly within Quitline™.

9 Appendices

Appendix 1: Search strategies

Search strategy and results for database

Cochrane database search (29/10/2018)
Search: smoking cessation counselling
41 records imported

PubMed search (29/10/2018)
((Telephone OR phone OR quitline OR helpline OR hotline)) AND (smoking cessation OR quit)
1,373 records, 7 duplicates removed, 1,366 records imported

PsychInfo search (29/10/2018)
((Telephone OR phone OR quitline OR helpline OR hotline)) AND (smoking cessation OR quit)
775 records, 453 duplicates removed, 322 records imported

Embase search (29/10/2018)
#1 AND 'human'/de AND (2009:py OR 2010:py OR 2011:py OR 2012:py OR 2013:py OR 2014:py OR 2015:py OR 2016:py OR 2017:py OR 2018:py) AND [embase]/lim NOT ([embase]/lim AND [medline]/lim)
#1: ('telephone'/exp OR telephone OR phone OR quitline OR helpline OR 'hotline'/exp OR hotline) AND ('smoking cessation'/exp OR 'smoking cessation' OR (('smoking'/exp OR smoking) AND ('cessation'/exp OR cessation)) OR quit)
814 records, 35 duplicates removed, 779 records imported
Total number of records identified: 3003
Duplicates removed: 495

Literature search total records after duplicates removed n = 2,508

Search strategy and results for grey literature

Identified directly from the Cancer Council Victoria: Nine references

Reference lists of included studies: One reference

World Health Organisation website search: Two references

US Department of Health and Human Services website search: One reference

North American Quitline Consortium (NAQC): 10 references

Cancer Council Victoria website: Two references

Australian Institute of Health and Welfare website: One reference

Department of Health website: One reference

Royal Australian College of General Physicians: One reference

Appendix 2

North American Quitline Consortium (NAQC) checklist

The NAQC produced a checklist for reviewing quitline services and activities, published in July 2017.[106] This checklist comprised of nine categories is a supplement to the *"Quitline services: Current Practice and Evidence Base"* guide.[107] The checklist includes a summary of the evidence, current status of each service among quitlines and recommendations and questions for consideration.

Intake – Field Tested Best Practice

Findings from the evidence:

- There is no evidence that intake helps tobacco users quit. Intake is a practical necessity and field-tested best practice.

Current status among quitlines (FY16):

- 100% of quitlines have implemented this practice.

Details on the recommendations and questions for consideration are available on pages 12-14.

RECOMMENDATIONS	YES	NO	NOTES
Employ cost-efficient means to register new participants, while ensuring data accuracy and user satisfaction with the process.			
To the extent possible, make efforts to reduce the length and burden of intake by eliminating unnecessary questions and streamlining eligibility criteria.			
QUESTIONS FOR CONSIDERATION	**YES**	**NO**	**NOTES**
Have you evaluated the intake process to ensure that it does not hinder delivery of quitline services?			
Does your quitline collect the standard Minimal Data Set (MDS) questions during intake?			
Does your quitline have protocols for making intake less resource intensive, especially during high call volume periods?			
Does your quitline comply with best practices for "call centers", such as: ▪ Answering a high percentage of incoming calls received during business hours. ▪ Returning voice mail message calls promptly. ▪ Ensuring a high proportion of caller's complete intake. ▪ Ensuring a high proportion of participants complete intake and opt for and receive evidence-based service. ▪ Having high rates of satisfaction from participants across all types of intake. ▪ Delivering services soon after intake.			

Self-Help Materials – Field Tested Best Practice

Findings from the evidence:

- As a stand-alone intervention (i.e., when self-help materials are offered without counseling or medications), printed self-help materials can improve quit outcomes, though the effect just barely reaches statistical significance.
- Self-help materials confer no measurable benefit as an adjunct to personal contact (e.g., counseling) or NRT.
- Tailored self-help materials can improve quit outcomes, but the effect may be due to personal contact in which data used to tailor the materials are gathered, as opposed to the materials themselves.
- There is little evidence that providing self-help materials to quitline participants improves quit outcomes.

Current status among quitlines (FY16):

- 98% of quitlines offer mailed self-help materials
- 83% of quitlines offer recorded self-help messages
- 92% of quitline offer web-based self-help tools

Details on the recommendations and questions for consideration are available on pages 14-18.

RECOMMENDATIONS	YES	NO	NOTES
If sending printed, self-help materials to participants produces meaningful program benefits, provide concise, professionally produced materials that are culturally and linguistically appropriate and that meet health literacy standards.			
Consider replacing printed materials with web-based or other technological interventions designed specifically for those media, with input from e-health and health literacy experts and from members of the target audience.			
To the extent possible, reserve program funds for other quitline services that have stronger evidence.			
QUESTIONS FOR CONSIDERATION	**YES**	**NO**	**NOTES**
Have you evaluated your quitline's self-help materials using developmental or process questions?			
Have you assessed factors related to the cost of producing and disseminating self-help materials?			
Have you assessed various means for producing, warehousing and disseminating self-help materials (including electronic means) to ensure timely and efficient fulfillment?			

Telephone Counseling – Research Validated Best Practice

Findings from the evidence:

- Proactive, multisession telephone counseling is effective for smokers who call quitlines, the population which represents the largest category of quitline users.
- Telephone counseling is also effective for smokers who do not call quitlines themselves, such as patients who are referred by a health care provider (e.g. eReferral) rather than calling on their own.
- Telephone counseling is efficacious either by itself or as an adjunct to other treatments such as face-to-face counseling or NRT.
- Low-intensity telephone counseling does not have a measurable impact on quit outcomes; unless proven otherwise, a single call protocol—in the absence of other evidence-based treatments such as NRT—should be assumed to produce no significant effect on outcomes.

Current status among quitlines (FY16):

- 100% of quitlines offer it.

Details on the recommendations and questions for consideration are available on pages 18-25.

RECOMMENDATIONS	YES	NO	NOTES
Offer multisession, proactive telephone counseling as a standard quitline service, as it has the strongest evidence of any common quitline practice.			
If reverting to a single-call protocol becomes necessary during times of heavy demand, supplement the counseling with another evidence-based service such as free NRT.			
Exercise caution when comparing the quit rates of two or more quitlines, as results may only be comparable if the populations treated, types of services provided, quality assurance procedures, and evaluation methods are similar.			
QUESTIONS FOR CONSIDERATION	**YES**	**NO**	**NOTES**
Is the counseling protocol used by your quitline research validated or evidenced-based?			
Does the telephone counseling protocol used reflect the best available evidence?			
Are services evaluated using process questions to ensure fidelity to the protocol?			
Is a case management system used? If yes, what type and why?			

Interactive Voice Response (IVR) – Promising Practice

Findings from the evidence:

- IVR may not be effective as an adjunct to other high-intensity treatments.
- IVR can increase re-engagement by quitline participants.
- IVR can be an effective tool for recruiting smokers identified in the electronic health record (EHR).
- The efficacy of IVR may depend on how well it encourages participants to access other evidence-based treatments.

Current status among quitlines (FY16):

- 76% of quitlines use it to triage calls.
- 2% of quitlines use it to provide services
- 68% of quitlines use it in other ways (i.e., reengagement, referrals and confirmation of receipt of NRT)

Details on the recommendations and questions for consideration are available on pages 25-28.

RECOMMENDATIONS	YES	NO	NOTES
Consider uses of IVR beyond the basic triaging of incoming calls, such as asking intake and evaluation questions, recruiting new participants, re-engaging previous participants, promoting or supplementing the use of other quitline services, or helping tobacco users quit.			
Carefully evaluate any innovative use of IVR for its effects on program costs, use of other services, and participant satisfaction, and disseminate the findings.			
QUESTIONS FOR CONSIDERATION	**YES**	**NO**	**NOTES**
Do services available include IVR?			
Does your evaluation focus on narrowly defined process questions based on your actual uses of IVR?			
If IVR is not available, are plans in the works to incorporate these services to gather data, recruit or re-engage participants, promote or supplement the use of other quitline services, or help tobacco users quit?			

Text Messaging – Promising Practice

Findings from the evidence:

- Text messaging programs can be effective with smokers recruited online, through traditional advertising, or in health care settings.
- Text messaging can be effective either by itself or as an adjunct to in-person counseling.
- It is unknown whether text messaging is effective with quitline users, or in combination with other quitline services.

Current status of quitlines (FY16):

- 68% of quitlines offer text messaging, including:
  - 16% that offer one-way messages
  - 32% an interactive program
  - 20% both

Details on the recommendations and questions for consideration are available on pages 28-33.

RECOMMENDATIONS	YES	NO	NOTES
If a text messaging program is offered, ensure that it is closely based on interventions proven effective. Such interventions generally feature content scheduled around a quit date, frequent messages, extended duration, and basic interactivity and tailoring.			
Design and promote the text messaging program as a stand-alone service to attract tobacco users who may be less inclined to use traditional quitline services such as telephone counseling.			
For participants who are willing to use other quitline services, provide links from the text messaging program to telephone counseling and NRT.			
QUESTIONS FOR CONSIDERATION	**YES**	**NO**	**NOTES**
Is the content distributed via text messaging on par with other research-validated programs?			
Does the service utilize the four features common among programs proven effective? (*see page 31*)			
Are the services being offered currently serving a similar population as our quitline (*e.g. recruited online*)?			
Do the evaluation questions solicit direct feedback from users as well as process questions and reach questions?			

Mobile Apps – Insufficient Research Evidence

Findings from the evidence:

- There is no evidence to date that mobile apps help tobacco users quit.

Current status of quitlines (FY16):

- Extent of adoption unclear; the two largest service providers offer them.

Details on the recommendations and questions for consideration are available on pages 34-36.

RECOMMENDATIONS	YES	NO	NOTES
Monitor the scientific literature for emerging evidence of the efficacy of mobile apps for tobacco cessation.			
If offering a mobile app, take steps to ensure that it adheres to the USPHS clinical practice guideline for tobacco dependence treatment, makes sophisticated use of smartphone technology, has features important to providers and smokers, and is highly rated by users.			
QUESTIONS FOR CONSIDERATION	**YES**	**NO**	**NOTES**
How does the app rate against established scales/coding schema and against best practices documents for behavior change apps?			
Does evaluation include actual usage data and user feedback?			
If the services include a mobile app platform other than QuitGuide or quitSTART, is it highly rated by users?			

Web-based Services – Promising Practice

Findings from the evidence:

- Web interventions may be effective for adult smokers and young adult smokers, but it is unknown if they are effective with adolescents.
- Web interventions are probably not more effective than counseling.
- Web interventions may not be effective as an adjunct to counseling.

Current status for quitlines (FY16):

- 98% offer websites with basic info
- 92% self-help
- 66% chat rooms
- 76% email
- 58% online counseling

Details on the recommendations and questions for consideration are available on pages 36-43.

RECOMMENDATIONS	YES	NO	NOTES
If web-based services are offered, ensure that they are closely based on interventions proven effective in randomized, controlled trials. In general, such interventions are multimodal, intensive with respect to the frequency of messages, interactive, and tailored. Continue to monitor the scientific literature for emerging evidence of the efficacy of web-based interventions for tobacco cessation.			
QUESTIONS FOR CONSIDERATION	**YES**	**NO**	**NOTES**
Do evaluation questions reflect the aim of the web-based service (i.e., to promote the quitline or to help tobacco users quit)?			
Have quit rates been obtained using a controlled study with random assignment?			
Is an explanation offered regarding how the proposed web-based services are evidence-based?			
Do the web-based services attract users less likely to use phone counseling services?			
Do web-based services extend program resources?			
Do web-based services enable users to move seamlessly between services?			
Do web-based services demonstrate "added value" for the program?			

Medications – Research Validated Best Practice (for FDA-approved Medications)

Findings from the evidence:

- NRT, combination NRT, bupropion, nortryptyline, varenicline, and cytisine are all effective.
- No form of NRT is more effective than another, except that sprays and inhalers are slightly more effective than gum.
- Combination NRT is more effective than single formulation NRT, and nearly as effective as varenicline.
- Neither bupropion nor nortriptyline is effective as an adjunct to NRT.
- Varenicline is more effective than either single formulation NRT or bupropion.
- Despite earlier concerns about varenicline and bupropion possibly triggering adverse neuropsychiatric events, they have been proven to be safe, including for individuals with psychiatric disorders.
- Medication in combination with counseling significantly improves outcomes, relative to a control of usual care or minimal intervention.
- Behavioral support significantly improves long-term rates of abstinence over medication alone.
- The effect of telephone counseling is not subsumed by the effect of medication.
- NRT is effective as an adjunct to telephone counseling, and combination NRT is more effective in this context than single formulation NRT, but the optimal duration of NRT provision for quitline participants is unknown.

Current status for quitlines (FY16):

- 96% provide nicotine patches
- 82% nicotine gum
- 62% nicotine lozenges
- 8% varenicline
- 8% bupropion
- 2% nicotine inhalers
- 2% nicotine nasal spray
- 48% had adopted the recommendation to offer combination therapy

Details on the recommendations and questions for consideration are available on pages 43-48.

RECOMMENDATIONS	YES	NO	NOTES
Offer at least a 2-week starter kit of single-form OTC NRT to all quitline participants for whom NRT is indicated.			
If the budget allows, offer combination NRT or varenicline instead of single-form NRT, as they have the strongest documented effect on quit outcomes.			
If the budget allows, offer at least 6-8 weeks of medication, as longer courses may be more effective than shorter ones.			
Offer telephone counseling to all participants provided medications, but do not require it.			

QUESTIONS FOR CONSIDERATION	YES	NO	NOTES
Are proven and effective medications provided for a period of at least 2 weeks by a variety of means (*voucher, pharmacy benefits manager, mail*)?			
Does the evaluation of services include NAQC's recommended quit rate calculation as well as a process evaluation? *(see http://tinyurl.com/yakd4qqq for how to calculate quit rate)*			
Is NRT offered to all quitline participants for whom NRT is indicated?			

Referral – Research Validated Best Practice

Findings from the evidence:

- Interventions that incorporate referral to a quitline can significantly improve long-term quit outcomes.

Current status for quitlines (FY16):

- 100% accept fax referrals
- 85% email or online referrals
- 38% eReferrals

Details on the recommendations and questions for consideration are available on pages 43-48.

RECOMMENDATIONS	YES	NO	NOTES
Offer a range of direct and indirect referral options to allow providers in various settings to refer tobacco users to the quitline, and make patient materials freely available to encourage provider participation.			
Develop the capacity to accept eReferrals from a range of certified EHR's and to return automated, patient-specific reports.			
QUESTIONS FOR CONSIDERATION	**YES**	**NO**	**NOTES**
Are a variety of direct and indirect referral options offered to allow providers in various settings to refer tobacco users to the quitline, and make patient materials freely available to encourage provider participation?			
Do the services include capacity for bi-directional eReferrals from a broad range of EHR vendors?			
Is a process evaluation conducted that includes gaining feedback from referring organizations?			

Source: North American Quitline Consortium. Checklist for Reviewing Quitline Services and Activities. July 2017. Available from: https://cdn.ymaws.com/www.naquitline.org/resource/resmgr/reports_2010/CessationWorks_Checklist.pdf

Appendix 3

Excluded but relevant studies describing referral pathways to the service

Source and NHMRC evidence level	Referral pathway evaluated
Adsit 2014 Level IV	A closed-loop electronic health records (EHRs) referral system linking patients visiting healthcare clinics with a state tobacco quitline
Baskerville 2015 Level IV	Canadian tobacco package warning labels with a quitline toll-free phone number focusing on treatment reach and reach equity in selected vulnerable groups
Bernstein 2009 Level IV	Brief educational/administrative intervention (1-hour lecture) for emergency physicians on the health effects of smoking and strategies to counsel patients with cards promotion a national smokers quitline
Bernstein 2009 Level IV	Training and technical assistance provided to healthcare clinical sites to promote use of a faxed referral to state quitlines
Bernstein 2016 Level II	A motivational interview, along with 6 weeks of nicotine patches and gum, a referral faxed to the quitline, a booster call, and a Quitline brochure
Boykan 2016 Level IV	Smoking caregivers of paediatric patients referred to the New York State Smokers quitline through a standardised template built into the electronic health record
Brown 2013 Level IV	Various policies including excise taxes, workplace and public smoking bans and a Peter Jennings television-based program warning of the health risks of smoking
Brown 2017 Level IV	Individuals undergoing substance use disorder treatment services recruited during a hospital admission into the Tablet Intervention to Motivate Engagement with Tobacco quitline study
Cantrell 2009 Level IV	Implementation of a fax referral system paired with a chart stamp prompting providers to identify smoking patients, provide advice to quit and refer interested smokers to a state-based fax quitline
Carson 2014 Level II	Adult patients of South Australian hospitals were randomised to the state quitline in both intervention and control groups
Cheung 2018 Level II	Referral to a community counselling service that offers a quitline, a text-based program, and a Web-based program
Clayforth 2014 Level III	Non-television advertising media to encourage young male smokers to respond to a cessation-related call to action
Conde 2013 Level IV	E-tobacco protocol to increase referrals by health professionals to the state quitline; offering counselling and NRT to clinician-referred patients
Cummins 2016 Level III	A hospital-quitline partnership utilising nicotine patches and proactive telephone counselling or a combination of the two to help patients maintain smoking cessation after discharge
Drehmer 2016 Level II	Proactive enrolment of parents to quitlines by paediatric clinics, when compared with a suggestion by paediatric clinicians
Fenech 2012 Level II	Outpatients with chronic hepatitis C received a referral to the quitline by the nurse practitioner
Fu 2011 Level II	Utilisation of the Veterans Health Administration patient recording system to identify current smokers and proactively reach out with invitations to seek treatment with a

Source and NHMRC evidence level	Referral pathway evaluated
	choice of services
Gordon 2010 Level III	The Ask, Advise, Refer model—promoting a brief office-based intervention plus referral to a tobacco quitline
Greenwood 2012 Level IV	Incorporation of a workflow in the electronic health record (EHR) to empower medical assistants to become tobacco-cessation promotors and increase referral to quitline
Griffin 2015 Level IV	Patients in methadone treatment programs who were enrolled in a clinical trial were offered referral to a free, proactive quitline
Grossman 2014 Level IV	Patients received minimal counselling in the hospital emergency department, but were encouraged post-visit quitline contact for high quality telephone counselling
Haghpanahan 2017 Level IV	Scottish mass media TV campaigns to increase calls to the national Smokeline
Hammal 2015 Level IV	A kiosk in the foyer of two hospitals, staffed by volunteers trained in smoking cessation techniques to enhance quitline reach
Hudmon 2018 Level II	Academic detailing—on-site training—or mailed quitline materials to engage pharmacy personnel in referring patients to the tobacco quitline
Kaufman 2010 Level IV	Analysis of NHS data to understand current awareness of quitlines among the smoking population, and increase quitline use
Kennedy 2013 Level IV	A social media campaign— "*One Tiny Reason to Quit*" —to improve utilisation of quitline services by pregnant African American women
Kmietowicz 2014 Level IV	Plain tobacco packaging legislation
Kobinsky 2010 Level IV	Clinic-based Fax to Quit (FTQ) provider referral
Leuthard 2015 Level IV	Health system changes within hospitals and clinics including the identification of tobacco-using patients, and faxing a referral to the Oklahoma Tobacco Helpline
Macaller 2011 Level IV	Educational interventions—including presentations, smoking cessation materials, and a print media campaign—for diabetes educators to promote referrals to the state's tobacco quitline
Martin 2017 Level IV	Examination of the barriers and facilitators among health professionals to providing referrals to quitline for Aboriginal and Torres Strait Islander clients
Mathew 2015 Level III	A brief telephone referral to the smoker's state Quitline by research staff, including a discussion of past quit attempts, review of motivation to quit, benefits of quitlines, and state-specific quitline details
Mathew 2010 Level IV	A small-scale educational and promotional campaign to increase health care providers' awareness and utilisation of a state tobacco cessation quitline fax referral service
Mowls 2017 Level IV	Fax referral to the state quitline by health practitioners in hospitals and clinics
Mussulman 2018 Level II	Warm handoff (on-the-spot enrolment and counselling by hospital staff) versus fax referral to the state quitline for smoking cessation among hospitalised smokers living with HIV/AIDS
Nash 2015 Level IV	Self-selection into an integrated phone/web tobacco cessation program, or a stand-alone web program offered by state quitlines
Neri 2016 Level IV	No referral – smokers contacted web-based or telephone quitline on their own initiative

Source and NHMRC evidence level	Referral pathway evaluated
Nonnemaker 2013 Level IV	Television antismoking advertisements for state quitline
Parks 2016 Level IV	Television advertisement with financial incentives for calling the state quitline
Patten 2011 Level II	An intervention including telephone counselling and education for non-smokers interested in helping a smoker to promote smoker utilisation of the state quitline
Peterson 2009 Level III	A proactive, personalised telephone-based motivational counselling intervention for adolescents
Ratner 2013 Level IV	Simplification of the existing quitline referral process in a University medical clinic
Richter 2016 Level II	Warm handoff—staff immediately called the quitline from patient bedside for enrolment and counselling—or referred to the quitline via fax on the day of hospital discharge
Russo 2018 Level III	Provider-referral strategy based in paediatric and dental clinics vs a targeted media campaign to promote self-referral to quitline
Sewali 2016 Level II	Motivational interviewing counselling or mailed promotional materials to promote the state quitline
Shah 2010 Level IV	Usual hospital care combined with pre- and post-visit expired carbon dioxide measurement
Sharifi 2014 Level IV	Brief clinician training, as well as electronic health record modification to include screening prompts, decision support, educational materials and a simplified referral process to the state quitline
Sheffer 2012 Level II	Increased academic detailing in clinics—on-site training, technical assistance, and performance feedback—to boost utilisation of a fax referral quit program
Sheffer 2010 Level IV	Policy, programmatic and communication initiatives, including free NRT and a media campaign to increase use of the state quitline
Song 2014 Level IV	Provider-referral vs self-referral to quitline
Stoltzfus 2011 Level IV	Script-based proactive approach to quitline fax referral (offering referral to all smokers) versus script-based reactive approach (assessing smokers' level of readiness to quit)
Sumner 2016 Level II	Workplace smoking-cessation campaigns offering a discounted health insurance rate in a hospital system and affiliated medical school
Szklo 2010 Level IV	Large positive-content or negative-content antismoking posters in subway stations to increase calls to quitline
Tzelepis 2009 Level II	Proactive telephone counselling or self-help materials to explore acceptability of active telephone recruitment to quitlines
Vidrine 2011 Level IV	Proactive telephone counselling delivered via state quitlines
Vidrine 2010 Level IV	Partnerships between quitlines and health care systems to increase dissemination and implementation of existing 'best practices' for tobacco cessation
Vidrine 2013 Level III	The names and telephone numbers of smokers attending family practice clinics who agreed to be contacted were sent electronically to the quitline daily, and patients were proactively called by the quitline
Wahl 2015 Level IV	Academic detailing and training of pharmacy personnel to improve counselling practices and increase referrals to the tobacco quitline

Source and NHMRC evidence level	Referral pathway evaluated
Warner 2012 Level IV	QuitWorks system which links healthcare organisations, providers, and patients to the state's tobacco cessation quitline and provides feedback reporting
Warner 2011 Level II	A brief clinician-delivered intervention to facilitate quitline use
Warner 2016 Level II	Intervention group received a brief quitline facilitation intervention with either a warm handoff or faxed referral to a quitline
Weaver 2015 Level II	Smoking cancer survivors recruited directly from the Community Clinical Oncology Program to quitline telephone counselling
Wilson 2010 Level IV	Quitline number advertised on cigarette packaging
Young 2014 Level IV	Quitline number advertised on cigarette packaging - tobacco plain packaging compared with cigarette package graphic health warnings
Zhang 2015 Level IV	Federally funded national tobacco education campaign, Tips From Former Smokers (Tips)

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