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TITLE PAGE

Primary care healthcare professionals' knowledge, attitudes and practices towards promoting the reduction of children's secondhand smoke exposure: a mixed-methods review and synthesis.

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ABSTRACT

Introduction

Secondhand smoke exposure (SHSe) leads to increased mortality and morbidity. Primary care healthcare professionals (HCPs) are well-placed to support patients to reduce SHSe. This paper explores HCPs': (i) knowledge around SHSe; (ii) current practices to promote SHSe reduction; (iii) beliefs and experiences regarding delivering interventions to reduce SHSe; and (iv) identified factors that influence the delivery of SHSe-related interventions.

Methods

Six electronic databases were searched for relevant literature published January 1980 - February 2016. 17 quantitative and 3 qualitative studies were included in this mixed-methods **review**. Data synthesis followed the method outlined by the Joanna Briggs Institute. This segregated approach involved independent syntheses of the quantitative and qualitative data followed by an overall mixed-methods synthesis.

Results

Primary care HCPs had a basic understanding of the risks associated with SHSe but required training to help them **intervene. It was more common for HCPs to ask about SHSe or provide advice than to act to facilitate SHSe reduction.** SHSe was viewed as an issue of high importance and considered relevant to the role of the primary care HCPs. However, barriers such as the priority given to the issue and the desire to protect the professional relationship with patients, prevented HCPs from intervening around SHSe.

Conclusions

Primary care HCPs require training, guidance and support to enable them to intervene and support patients to effectively reduce SHSe.

IMPLICATIONS

This review used rigorous methods to explore the current, global literature **on** how children's exposure to secondhand smoke is being addressed in primary care settings. The review findings highlight healthcare professionals' need for further training and support, which would enable them to better translate their knowledge of the risks associated with secondhand smoke exposure into actual clinical practices. The review identified a lack of practical action taken to address secondhand smoke exposure, even once it has been identified **as an issue**.

INTRODUCTION

Globally, 40% of children are regularly exposed to secondhand smoke (SHS)¹. There is no safe level of secondhand smoke exposure (SHSe)², thus protective measures are needed. Smoking cessation and prevention strategies are often used to reduce SHSe^{3,4} and when unfeasible, harm reduction strategies (**e.g.** smoke-free environments) are encouraged^{4,5}. Smoke-free regulations are typically restricted to work-places, vehicles or public spaces; thus, home environments remain a source of SHSe⁵. Efforts have been made to encourage smoke-free homes (**SFHs**). Creating a **SFH** offers a solution to reduce the harms caused by SHSe for non-smokers living with **smokers**⁶⁻⁸. Interventions to promote a **SFH** might involve the use of counselling, phone support, self-help materials, nicotine replacement therapy, biochemical feedback, tobacco smoke air pollution feedback, and/or air cleaners⁶. However, SHSe levels and the associated risks are not reduced by efforts which allow continued home smoking behaviours, e.g. opening home windows⁵.

Childhood SHSe can cause an increased risk of sudden unexpected death syndrome in infants⁹, bacterial meningitis infections¹⁰, lower respiratory tract infections¹¹, asthma¹², and middle ear **disease**¹³. Non-smoking adults who are exposed to SHSe have an increased risk of: coronary heart disease¹⁴; lung cancer diagnosis¹⁵; exacerbation of chronic respiratory conditions and symptoms¹⁵; and stroke¹⁶. The health consequences of SHSe in the home will likely necessitate non-smokers to present to healthcare professionals (HCPs) or health-related workers in the primary care sector (e.g. general practitioners (**GPs**), paediatricians, and nurses). HCPs may therefore be well-placed to counsel patients and their families on SHSe reduction¹⁷, indeed, **GPs** are parents' most trusted information source regarding children's **health**¹⁸. **HCPs** have **reported that** a lack of SHS-related training is a barrier to

intervening¹⁷. Thus, an effective, free, online training programme has been developed to support HCPs to deliver very brief advice (**VBA**) (Ask, Advise, Act) around **SHSe**^{17,19}.

Despite being ideally placed to counsel patients on SHSe reductions, it is currently unclear how primary care HCPs address the issue of SHSe in practice. A systematic review and meta-analysis has shown the effectiveness of interventions in reducing SHSe in home environments⁶. However, the factors which would determine whether such interventions are delivered to patients in primary care settings are not well understood. **We aimed** to review the current evidence base to ascertain HCPs' knowledge, practices, beliefs and the factors which influence their practices around SHSe.

METHODS

The **protocol** was prospectively registered on PROSPERO (CRD42016039675). The review is reported against PRISMA²⁰ and ENTREQ²¹ guidelines and follows Joanna Briggs Institute (JBI) methods²², encompassing Sandelowski's segregated approach^{22,23} for the synthesis of quantitative and qualitative data, followed by a Bayesian approach^{22,24} for the mixed-methods data synthesis.

Data sources and study selection

We systematically searched Medline, CINAHL, PsychInfo, EMBASE, Web of Science, and HMIC. Our pre-specified search tool (Supplementary Table 1) was adapted from the PICO tool (population, intervention, comparison, outcome)²⁵, and a qualitative review tool, SPICE (setting, perspective, intervention, comparison, evaluation)²⁶. The terms were structured around the key concepts of 'Primary Health Care', 'Physicians', 'Tobacco Smoke Pollution', and 'Health Knowledge, Attitudes and Practice'. Searches were limited to articles published in the English language from **January** 1980 (to best reflect changes in understanding of and

clinical practice around tobacco control) until February 2016. The reference lists of included studies were hand-searched (JK). Title/abstracts/full texts were independently double screened (JK and LLJ/AF/JK) with discrepancies resolved by a third reviewer.

Studies were included if they were a primary research article **that** concerned reducing SHSe for non-smoking people of any age **with** their data collected from primary care settings (or international **equivalents**). **Non-primary** research **and** articles solely concerning the provision of smoking cessation interventions to smokers (with no mention of SHSe in the title/abstract) were **excluded**. Also excluded were articles which presented included and excluded **mixed data types** (e.g. data collected in a mixture of primary and secondary care settings), and articles which focussed on student healthcare professionals.

Data extraction

Data were extracted using a pro-forma (JK). A random sample of the quantitative studies (36%) and all qualitative studies were cross-checked (LLJ/AF/KJ). We extracted information on: study details, design, participant information, analysis methods, additional information, and results.

Assessment of study quality

Quantitative studies

There is no agreed tool to assess the quality of cross-sectional, descriptive studies²⁷. **We adapted a tool developed** for descriptive studies²⁸ by combining the original author's quality assessment questions²⁸ with our own, **tailored to the included studies**. We removed questions which scored studies by their relevance to the review objectives²⁸ as these measures did not reflect study quality. Categories of quality were assigned: strong (quality assessment score > 67%), moderate (34% - 66%) or weak (< 33%)²⁸.

Qualitative studies

We used a modified Critical Appraisal Skills **Programme** Qualitative Checklist to assess methodological rigour and reporting²⁹ of the qualitative studies and did not categorise studies by reporting quality.

Data synthesis and analysis

Quantitative synthesis

Extracted quantitative results were organised into tables **aligned with** the review objectives. The results were then grouped into inductively identified sub-themes (Supplementary Table 2). Due to the descriptive and non-standardised nature of the extracted data, statistical methods of analysis were deemed inappropriate and the results **therefore** presented narratively.

Qualitative synthesis

The results and discussions of each qualitative paper were independently coded by two reviewers (JK/LLJ). Inductive, line-by-line coding developed two independent initial codebooks. These codebooks were reviewed to develop a final set of codes which were then **applied** to all extracted qualitative data. This application of inductively developed codes led to the generation of core analytic themes and sub-themes³⁰. Themes were re-evaluated and the relationships across the themes examined to achieve a comprehensive data synthesis.

Mixed-methods synthesis

In the final stage of the segregated design for **our** mixed-methods **synthesis**, we integrated the individual quantitative and qualitative syntheses against each of the review objectives following the method outlined by the JBI^{22,23}. The themes interpreted within the narrative

presentation of the quantitative results were meta-aggregated with the qualitative results^{22,24}. We collectively analysed the results of the separate data analyses using an inductive approach^{23,31}, and overall conclusions were drawn. An overview of the complementary or confirmatory/refutative nature of the two datasets is reported²².

RESULTS

Description of included studies

Seventeen quantitative³²⁻⁴⁸ and **three** qualitative⁴⁹⁻⁵¹ studies were included (Figure 1). Fifteen studies were cross sectional surveys³²⁻⁴⁸, including 5287 participants; one study also collected data from electronic healthcare records³². Two studies collected data solely from medical records^{41,42}. Of the **three** qualitative studies, **one** used focus groups⁴⁹ and **two** involved individual interviews^{50,51}. Across all studies, **eight** were conducted in the **US**^{32,34,35,39,40,42,44,49}, **three** in Sweden^{36,41,50}, **two** in Turkey^{38,41} and the UK^{48,51}, and **one** in Portugal³³, the Netherlands³⁷, Italy⁴³, Canada⁴⁵ and Saudi Arabia⁴⁶ (Supplementary Table 3).

Quality Assessment

Quantitative studies

Fourteen studies were of moderate-quality, one of high-quality³⁴ and two of low-quality^{33,45} (Supplementary Table 3 and Supplementary Table 4). Typically, studies clearly defined their target populations. However, non-probability sampling was often used and generalisations were confined to sample populations. Only one study used a validated measurement tool⁴⁶, although all justified their chosen tool's reliability. Most studies provided estimates of the random variability in the data for the main outcomes and considered study limitations.

Qualitative studies

Two studies contributed significantly to the qualitative synthesis^{50,51}, while the other only contributed one data item⁴⁹. All studies clearly outlined their aims and used appropriate methodologies. However, clarity was lacking around ethics and research reflexivity. One study used only one researcher for data analysis⁵⁰. (Supplementary Table 5).

Synthesis of quantitative findings

(i) Knowledge around SHSe

Training: Portuguese and Swedish HCPs (34-60%) reported receiving some form of tobacco-related training^{33,36}. The training content was unclear; no study identified education specific to SHS^{33,36}. **Sixty three** percent of US HCPs enrolled on a postgraduate course on paediatric environmental toxicology reported they would like to learn about tobacco-related illnesses as part of this course, which indicated a need for specific SHS-related training⁴⁰.

Risks and harm reduction: Despite a lack of training, 91% of HCPs from Saudi Arabia understood that SHSe is ‘always harmful’⁴⁶. HCPs from Portugal, Turkey, Italy and UK had a good understanding of the specific health consequences of SHSe^{33,38,43,47,48}. Over 80% of these HCPs agreed that cancer, chronic or acute respiratory diseases, and heart disease are consequences of SHSe^{33,38,43,47,48}. Over 60% of HCPs were aware of the SHS-related increased risk of neonatal death^{38,47,48}. A Portuguese study identified greater variation in HCPs’ knowledge around SHS harm reduction methods³³. Whilst over 90% agreed that workplace smoking-bans could reduce SHS-related harms, 32-40% incorrectly believed ventilation/filtration systems could be used to eliminate SHS³³.

(ii) Current practices to promote SHSe reduction

A range of practice types were **discussed, all** could be grouped into the commonly recommended intervention types¹⁷ of asking about SHSe, providing advice on the topic of SHSe and acting to support patients to reduce SHSe for themselves or others (according to their own smoking status).

Ask: Three US studies collated HCPs’ self-reported practices on asking about SHSe and all concerned identifying SHSe in children where the parent(s) were smoker(s)^{32,35,44};

approximately half reported asking about SHSe^{32,35}. However, electronic database records used in studies from Sweden and the **US** indicated that actual 'ask'-ing practices occur less often than implied by self-reported data^{32,36,42}. Roughly one-third of patients' records evidenced screening for SHSe^{32,36,42}, **with higher rates (58%) for children with asthma**⁴¹. In Swedish practices where HCPs were expected to document parental smoking habits in children's health records, **reported** documentation decreased in frequency as the child became older: 98% 'always' made this record for children aged 0-4 weeks, falling to 31% at age 4 years³⁶. No specific strategies were identified to aid asking about SHSe for patients whose families were from hard-to-reach groups, although translators were reportedly sometimes **employed in Sweden**³⁶. Exploration of the use of organisational systems to encourage HCPs in the **US** to ask about SHSe highlighted a lack of prompts for documenting SHSe and no standardised method of identifying children at risk of SHSe in their medical records⁴².

Advise: **US** and Dutch HCPs (85-100%) reportedly discussed parental smoking or smoking around children with some patients^{37,40}. In another **US** study, 95% of HCPs reported encouraging parents to protect children from SHSe, 86% advocated smoke-free cars and homes, and 77% reported encouraging non-smokers to avoid SHSe³⁹.

Act: HCPs' actions around SHSe were evidenced in two **US** studies^{32,44}. 11% of positive screens for childhood SHSe resulted in HCPs providing parental smoking cessation counselling³². Most HCPs never offered nicotine replacement therapy (89%) or cessation medications (94%) to parents who were smokers³². Only 28% of smoking parents were reportedly referred to a cessation programme³². In other cases, parents were referred to another member of the healthcare team **for** cessation support⁴⁴.

(iii) Beliefs and experiences regarding delivering interventions to reduce SHSe

Responsibility and roles: Over 95% of primary care HCPs in Portugal and Turkey agreed they have a responsibility to explain SHSe-associated risks³³ and to ‘routinely advise patients to avoid smoking around their children’^{38,47}. Only **12%** of British HCPs felt they should not advise parents’ partners around smoking cessation when they were present in consultations⁴⁸. American HCPs agreed that paediatricians should: screen for SHSe (89%), provide counselling (86%), and make appropriate referrals (81%)³². However, less than 15% agreed it would be appropriate for paediatricians to offer nicotine replacement or cessation medications to smoking parents³². In a Dutch study, fewer youth healthcare workers (77%) than family physicians (83%) felt it was their responsibility to address childhood SHSe³⁷.

Self-efficacy: Primary care HCPs from Canada⁴⁵ and the US³⁴ generally expressed confidence in explaining the health risks of SHSe³⁴, having sufficient knowledge to counsel around SHSe⁴⁵ and smoking cessation³⁴, and to effectively counsel patients around smoking cessation in response to SHSe concerns³⁴.

Importance of addressing SHSe: Swedish HCPs regarded counselling parents around SHSe to be of high importance irrespective of parental smoking status³⁶.

(iv) Identified factors that influence the delivery of SHSe-related interventions

Patient medical history (e.g. asthma), HCP experience and training, and length of HCP-patient relationship were the most common factors which increased the likelihood of SHSe-related interventions being delivered by primary care HCPs^{32,36,37,39}. These studies and others from the UK and US identified the main barriers as: lack of time, lack of self-efficacy, lack of outcome expectancy, physician characteristics (e.g. older age), physician’s perception of their role, and language barriers^{32,35–37,39,44,48}. Facilitators and barriers are presented in Table 1.

Synthesis of qualitative findings

Summary of findings

Six core analytic themes were inductively interpreted: knowledge, practices, attitudes, practice-facilitators, practice-barriers, and future training and practices. Fourteen sub-themes were interpreted within these core analytic themes (Table 2).

Within the themes it became apparent that HCPs need support and guidance around the topic of SHSe. HCPs requested information on the effects of SHSe and available harm reduction strategies. They sought guidance around how to discuss the issue with parents and expressed the need for a culture change among HCPs which would advocate and support health promotion activities with a multi-disciplinary approach. It was felt that the provision of guidance would increase HCPs' confidence to address SHSe⁴⁹⁻⁵¹. The lack of identified facilitators to SHSe-related practices in comparison to the described barriers further indicates HCPs' need for support.

Knowledge

A sample of British HCPs (health visitors and **GPs**) reported receiving limited training to develop their SHSe-related knowledge. A multi-professional approach to knowledge acquisition and sharing was seen to be desirable⁵¹ to increase parental awareness of the issue and improve HCPs' practical skills in addressing **SHSe**.⁵¹

Practices

A lack of systems to encourage and support HCPs to ask about SHSe was highlighted⁴⁹. However, in one study involving nurses who may visit patients in their homes, HCPs reported always asking about SHSe during the first home visit and almost always in cases where the child was ill with a cold, obstructive or atopic complaint⁵⁰. Other **initiators** of SHSe-

discussions were the smell of smoke or meeting parents who were actively smoking⁵⁰. SHSe was sometimes discussed in parent groups⁵⁰. Overall, HCPs were limited in the SHSe-related advice they **provided**. The most common intervention approach was to provide parents with advice and information on SHSe⁵⁰. Other strategies involved confirming positive behaviours and delivering value-based messages, such as emphasising the smell-related benefits of not smoking⁵⁰. The choice of language used to communicate these messages varied and was dependent on the HCP's attitude⁵⁰. Most HCPs were unsure of the effectiveness of their strategies and **were unsatisfied** with their approach⁵⁰.

Attitudes

HCPs adopted three main attitudes towards addressing SHSe: passive, advisory and judgemental⁵⁰. Passive HCPs were “cautious”, “tactful” and “evasive”⁵⁰. HCPs who took an advisory approach were keen not to criticise parents, respected the parents' integrity and gave direct information and advice around SHSe⁵⁰. Judgemental HCPs were “irritated” by the parents' smoking behaviours and did not understand the parents' situations⁵⁰. HCP attitudes often reflected their own smoking/cessation experiences⁵⁰.

Practice-facilitators

The only mention of a facilitator to SHSe- discussions was HCPs understanding the parents' situations based on their own smoking experiences⁵⁰.

Practice-barriers

HCPs' were concerned that discussing SHSe might jeopardise their professional relationship with parents of their patients, as parents might react **negatively**^{50,51} and become **defensive**⁵⁰. SHSe was viewed as a sensitive topic as it was “not morally acceptable” to smoke around children with a negative impact on the health of a third-party, a child⁵⁰. HCPs also expressed

practical constraints such as existing workload and lack of time with the issue of SHSe sometimes seen to be of a lower priority than other issues⁵¹. In addition, there was an “inbuilt cynicism” about the perceived effectiveness of SHSe-related interventions⁵¹. A culture change was needed to modify HCPs’ view of the curative model of healthcare to encompass health promotion and risk reduction⁵¹. Barriers were reported as: low motivation, HCPs’ attitudes to smoking^{50,51}, and lack of commitment to the issue⁵¹. Additionally, HCPs perceived that parents may lack the motivation to change their smoking behaviours and attend intervention sessions⁵¹. Furthermore, parents’ existing social problems were a barrier to discussions⁵⁰.

Future training and practices

HCPs requested future training to be delivered in an “informal” and “interactive” manner, to accommodate time restraints with modes of training that could be taken home (e.g. video-based)⁵¹. Antenatal sessions were suggested as an opportunity to discuss SHSe and multidisciplinary approaches recommended⁵¹. To address time barriers, delivery by health visitors and/or nurses were suggested as were verbal or written communications about SHSe for parents⁵¹.

Mixed-methods synthesis of all results

All quantitative and qualitative data confirmed and complemented each other, except data on HCPs’ self-reported confidence to counsel around SHSe.

(i) Knowledge around SHSe

HCPs receive little training around SHSe. Where training is provided, it is part of wider tobacco control or cessation training and not specific to SHS. Although HCPs demonstrated a basic level of understanding of SHSe, they expressed a need for more information on

practical strategies (guidance/methods) to help them to support parents in effectively reducing SHSe.

(ii) Current practices to promote SHSe reduction

All data on HCPs' 'Ask'-ing practices concerned children's SHSe. The number of HCPs who reported asking about SHSe varied. However, when a child's illness led to a consultation with the HCP, rates of asking about SHSe increased. Higher asking rates were also observed in earlier consultations: when the patient was aged 0-4 weeks or during the first home visit. HCPs reported a lack of systems to encourage and support them to ask about SHSe. Often, HCPs' attitudes determined if and how they asked about SHSe.

Although most HCPs reported advising on parental smoking habits, there were many who avoided this or used indirect methods; they would question parents on capability to change smoking behaviours, rather than providing direct information. Most commonly, HCPs offered parents simple advice and information to encourage protective actions and advocate smoke-free environments. The approach and language adopted when advising was influenced by HCPs' attitudes around promoting SHSe reduction.

Very little action was taken to follow-up on advice provided **by** prescribing nicotine replacement or cessation medications **or** referring parents to cessation services. Moreover, all actions focussed on smoking cessation and we found no data around advocating harm reduction strategy actions.

(iii) Beliefs and experiences regarding delivering interventions to reduce SHSe

Both syntheses confirmed that HCPs believe it is important to reduce children's SHSe. However, SHSe was not always the highest priority to be addressed by the HCP. These findings coincide with the observed higher rates of SHSe discussion when a child presents

with a SHSe-related illness when the issue perhaps becomes a higher priority. This hypothesis would be supported by HCPs' approach to healthcare with the curative model, **thus** instigating discussions when SHSe was a potential cause of illness. **Our review** found that HCPs believe it is their role to explain the risks of SHSe and to 'routinely' advise parents on the issue, but few **felt** that it was a paediatrician's role to offer nicotine replacement/cessation medications to smoking parents (i.e. to act) **as the parent is not their patient**. This viewpoint concurred with the findings in the quantitative synthesis where HCPs reportedly 'Ask' and 'Advise' much more than they 'Act' on the issue. However, they did feel that paediatricians should 'Ask' and 'Advise' around SHSe as was observed in the practice-related results. Additionally, HCPs felt paediatricians should make referrals, contrary to data on actual practice. These findings were complemented by the qualitative synthesis which identified three main attitudes that influenced HCPs' practices: passive, advisory or judgemental. Based on their experiences, HCPs **were** unsure of the effectiveness of their practices around SHSe, although those with a judgemental attitude reported no effectiveness in their approach.

The qualitative synthesis highlighted HCPs' limitations in discussing SHSe in practice. This contradicts the quantitative data where HCPs reported having confidence and sufficient knowledge to explain the risks and provide counselling. When the quantitative and qualitative results around 'practices' and 'knowledge' are combined, it appeared that HCPs had a basic understanding of the health effects of SHSe and could **advise** parents of these effects.

However, they did not know how best to ask about or to encourage and support the reduction of SHSe.

(iv) Identified factors that influence the delivery of SHSe-related interventions

We found limited data on the facilitators to delivering SHSe-interventions. SHSe was more likely to be discussed when children presented with a potentially SHS-related illness.

Additionally, HCPs' understanding of parents' situations as a smoker, HCPs with more experience and training, and patients with SHSe-related/high risk medical diagnoses or who had known the HCP for a long time, facilitated actions to reduce **SHSe**.

Barriers to SHSe-interventions included: HCPs' perception that SHSe is a sensitive issue for parents, **expectation of a negative reaction and** lack of motivation to engage with **interventions**. Furthermore, HCPs felt parents may be experiencing other social problems or SHSe may be a lower priority **than** other issues. Additional barriers included HCPs' perception of their role, own smoking experiences, attitudes towards SHSe-reduction, and their view on health promotion activities. Similarly, HCPs' perceptions of a lack of effectiveness of SHSe-interventions and the effect of their authoritative position acted as barriers to intervention. HCPs were also concerned about protecting their relationship with parents, which prevented them from intervening. Practical issues such as a lack of time, language barriers, workload and a lack of supportive systems were also identified.

DISCUSSION

Principal findings

Primary care HCPs acknowledge SHSe as an issue of high importance and relevance for their role but they require guidance and support to enable them to intervene and support patients to effectively reduce SHSe. Practices involving asking about SHSe or providing advice were more commonly reported and documented than practices involving actions to facilitate SHSe reduction. Barriers such as level of priority given to the issue and the desire to protect the

professional relationship with smoking parents prevented HCPs from intervening around SHSe. Furthermore, a lack of time and associated contingencies, such as lack of training and reimbursement for service provision, hindered the delivery of SHSe-related practices.

Comparison with other studies

HCPs lack training around SHSe¹⁷ and consequently an SHS-VBA intervention was developed¹⁷. The results from our review corroborate these findings and support the potential for the application of VBA. The findings of the VBA study also highlighted that HCPs more frequently “ask” than “**act**”¹⁷.

Most included studies promoted smoking cessation to effect SHSe reduction. No studies mentioned HCPs advising on harm reduction strategies which can also increase the likelihood of cessation⁵², or offering behavioural counselling which has been demonstrated to effectively reduce children’s SHSe^{53,54}. All included studies with data on HCPs’ practices concerned children’s SHSe and interventions with parents. No evidence was identified around HCPs’ actions to benefit non-smoking **adults**. Both review datasets identified that SHSe is addressed more often when a child presents with a SHSe-related **complaint, which is similar to smoking cessation** where physicians are more likely to intervene with smokers who have related-medical diagnoses⁵⁵.

The review findings show HCPs perceive SHSe as a sensitive topic and that parents may lack motivation to engage in SHSe-interventions. However, existing literature demonstrates that children’s medical diagnoses can motivate parents to change their smoking behaviours and suggests tailoring interventions to parents of unwell children⁵⁶. The recommendation or prescription of cessation medications and parental enrolment onto quitlines is considered acceptable for most parents during their child(ren)’s consultation with a **children’s HCP**^{57,58}. Although some parents may prefer not knowing the effects of SHSe due to increased guilt⁵.

Our review highlighted a lack of supportive systems for SHSe-related practices. **With regards to smoking**, the use of incentivised targets to promote documentation of practices on electronic health records increased documentation levels, particularly for patients with chronic diseases⁵⁹. **Additionally**, the use of electronic health records **potentially encourages** HCPs to ask, advise and act on the issue as well as offering referral support and performance indicators for the delivery of **smoking cessation practices**. These benefits of using electronic health records may be applicable to SHSe-related practices in primary care settings⁶⁰.

Strengths and weaknesses of this study

As far as the authors are aware this is the first mixed-methods review and synthesis to explore **this issue**. We have used rigorous, accepted methods²²⁻²⁴ and have followed reporting guidelines^{20,21}. The included studies were wide in scope and presented the global data on this topic post-1980. **However, the data were** heterogeneous, from different countries, healthcare systems and time periods. Furthermore, no data were available from low/middle-income countries limiting the applicability in these settings. **This large period in time has witnessed a number of changes in relation to tobacco control, potentially influencing the findings of included studies**. As knowledge of the harms attributed to smoking and SHSe have become more widely known, changes have been made in legislations globally, accompanied by changing prevalence profiles of smoking behaviours and thus SHS prevalence rates^{61,62}. **An** English study has however evidenced a continued need to protect children from SHSe post-legislative restrictions and tobacco control policies⁶³. **We** identified little qualitative evidence, which subsequently limited our exploration of the contextual factors, experiences and beliefs. **Further limitations include the omission of grey literature and the exclusion of papers not available in the** English language. **During** the initial screening stage, papers concerning smoking cessation interventions that did not refer to SHS in the abstract, were excluded. Some relevant data may have been reported in the **full** text. Due to the limited

timeframe and resources it was not feasible to include these papers for full-text screening, **thereby risking the exclusion of some articles, such as those focussed on the delivery of cessation counselling to maternal smokers. Interventions** which were delivered by **primary care HCPs in schools and community settings (e.g. children's centres)** would also have been excluded from this review. **These exclusions offer scope for** future research **with potential to** compare findings with those of this review. Despite these limitations, the authors are confident that the key literature in this field have been included and synthesised.

Recommendations for additional future research

Further research **should** explore the potential for addressing SHSe in primary care settings. Research incorporating the perspectives of both HCPs and patients would be beneficial given HCPs' concerns regarding the impact of interventions on their professional relationship with patients, as highlighted by this review. Moreover, future research should explore HCPs' views around improving access to and uptake of training activities given the identified discrepancy between HCPs' self-reported confidence and HCPs' request for further support. **Currently**, existing evidence on reported practices pertains to children's SHSe. However, there may also be other vulnerable groups whom might benefit from reduced SHSe.

Conclusions

We have identified a clear deficit in practical action in relation to supporting smokers to reduce SHSe **and** identified barriers to the implementation of existing SHSe-related practices. This review highlights a need to explore and develop supportive intervention packages for primary care HCPs' to use to support patients to reduce SHSe. To achieve this, HCPs' knowledge, beliefs and the factors that influence their SHSe-related practices should be explored in greater depth to build on the existing limited evidence-base **and** fill the gaps in knowledge identified by this review. Future research should aim to provide policymakers

with pragmatic options to guide improved implementation of SHSe-related practices in primary care. However, it should be noted that the role of those involved in promoting these practices may vary according to country and respective healthcare systems. Further research should be country-specific **to facilitate** the development of feasible supportive packages to suit individual tobacco control climates, healthcare systems and public health priorities.

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LIST OF ADDITIONAL MATERIALS

Table 1. A summary of the facilitators and barriers to primary care healthcare professionals' secondhand smoke-related practices as identified in the quantitative literature.

Table 2. Core themes and related sub-themes interpreted from the qualitative data and presented with illustrative quotes.

Figure 1. PRISMA flow diagram outlining inclusion process.

Supplementary Table 1. Medline search strategy.

Supplementary Table 2. An outline of which of the included quantitative studies contained data relating to each of the review objectives and the inductively identified sub-themes.

Supplementary Table 3. Summary of characteristics of all included studies.

Supplementary Table 4. Assessment of quantitative study quality.

Supplementary Table 5. Assessment of qualitative study quality.

Completed PRISMA checklist.

Completed ENTREQ checklist.

TABLES

Table 1. A summary of the facilitators and barriers to primary care healthcare professionals' secondhand smoke-related practices as identified in the quantitative literature.

	Facilitator	Barrier
(i)Knowledge	HCPs with long professional experience were more likely to have received training in tobacco prevention than those with shorter experience ³⁶	N/A
(ii)Practice - Ask	<p>Patient characteristics (namely, age and language preference). In a US study, older age patients were more likely to be asked about SHSe as were those who preferred Spanish to English³²</p> <p>Patient medical history including one or more high-risk diagnoses increased likelihood of asking about SHSe³²</p> <p>Swedish HCPs with long professional experience are more likely to ask about SHSe than those with shorter experience³⁶</p> <p>Tobacco prevention trained HCPs were more likely to ask about SHSe than non-trained HCPs (at 4-year check only)³⁶</p>	<p>Patients who are fathers, immigrant families and socially vulnerable families³⁶</p> <p>Lack of: time, training and self-efficacy, finances, and experience³⁶</p> <p>Poor response from parents³⁶</p> <p>Cost of cessation resources and facilities to parents³⁶</p> <p>No smoking cessation expert available³⁶</p> <p>No priority of issue by management³⁶</p> <p>SHS considered to be a delicate subject³⁶</p> <p>HCP's own smoking behaviours³⁶</p> <p>Culture/ language barriers. Haitian Creole speakers were less likely to be asked about SHSe in the US than English speakers^{32,36}</p>
(ii)Practice - Advise	<p>Patients who are known for a longer time to family physicians are more likely to receive advice about SHSe than patients known for a longer time to youth healthcare physicians³⁷</p> <p>When a child presented with otitis media symptoms for youth healthcare physicians³⁷</p> <p>When children present with asthmatic complaints or an increased risk of respiratory diseases³⁷</p> <p>HCP's characteristics - women with ≤ 5 years of practising and who saw more than 151 patients per week were more likely to provide advice. Similarly, HCPs who were Hispanic, Asian or from another ethnic/racial group were more likely to provide advice than Caucasian HCPs. Additionally, internists and pediatricians were more likely to provide SHSe-related advice than family/general practitioners and obstetricians/gynaecologists³⁹</p>	<p>Lack of: self-efficacy³⁵, time^{35,37}, familiarity³⁵, agreement³⁵, equipment and space³⁵, education³⁵, support staff³⁵, and reimbursement³⁵</p> <p>Type of HCP³⁹</p> <p>HCP's characteristics (namely, older or US born)⁴⁴</p>
(ii)Practice – Act	HCP's characteristics – HCPs aged 36-45years, classified as other race/ethnicity who were family/general practitioners with teaching privileges or who worker in clinics with ≥ 11 physicians were more likely to refer smokers to cessation programmes ³⁹	<p>Lack of: familiarity³⁵, agreement³⁵, equipment and space³⁵, education³⁵, support staff³⁵, reimbursement^{35,44}, self-efficacy³⁵, skills⁴⁴, and time^{44,48}.</p> <p>Lack of or negative outcome expectancy^{35,44,48}</p> <p>Perceived interference with physician's role and belief that an intervention would be uncomfortable⁴⁴</p> <p>HCP's characteristics (namely, physicians in private practice, or physicians who graduate from US medical schools)⁴⁴</p>

HCP(s): Healthcare Professional(s); N/A: Not Applicable; SHS: secondhand smoke; SHSe: secondhand smoke exposure; US/US: United States of America

Table 2. Core themes and related sub-themes interpreted from the qualitative data and presented with illustrative quotes.

Theme	Sub-theme	Illustrative quotes (study authors' interpretations are presented in <i>italics</i> and "plain font in speech marks" present primary data quotes from study participants)
Knowledge	HCPs' knowledge base	<i>...it was taken for granted that they would know about the dangers of ETS (environmental tobacco smoke)</i> ⁵¹ <i>The majority of health professionals received little training and it was limited in its impact</i> ⁵¹
	HCPs' view on impact of SHSe knowledge	<i>...valued the knowledge gained and recognised how sharing information with parents increased awareness</i> ⁵¹ <i>...recognised the transferable nature and applicability of the skills to other health education messages</i> ⁵¹
Practices	When do HCPs ask about SHSe?	<i>All [...] during the first home visit and almost all on occasions when the children were ill.</i> ⁵⁰ <i>When the nurse noticed the smell of smoke</i> ⁵⁰ <i>In parent groups</i> ⁵⁰ <i>If they met parents who were smoking</i> ⁵⁰ <i>We asked [...] if there was a systematic method for documenting and monitoring parental smoking, but we found that no office had such a system</i> ⁴⁹
	Types of SHSe-related advice given by HCPs	<i>A limited repertoire of behaviours: mainly providing information and exhorting parents to change behaviour</i> ⁵⁰ <i>The commonest approach was to inform parents about the consequences of smoking for the health of the child</i> ⁵⁰ <i>To exhort parents not to smoke in the vicinity of children. "You are not allowed to smoke at home!" or "If you're going to smoke, at least do it outdoors"</i> ⁵⁰ <i>A third approach was fright</i> ⁵⁰ <i>To confirm positive behaviour</i> ⁵⁰ <i>Asking parents[...] "I ask her if it's possible for her to go outside and smoke"</i> ⁵⁰ <i>Very often the messages contained values[...] "It would be good if you quit, because it smells terrible"</i> ⁵⁰ <i>...none [...] stated that they were satisfied, or thought that their approach to the issue of smoking was good or positive</i> ⁵⁰
Attitudes	Passive	<i>...very keen not to trample on the parents' feelings [...] do not wish to criticize the parents, nor to be 'police', wagging their fingers and moralizing. They respect the integrity of the parents [...] Smoking is discussed is there is a direct reason for doing so, but not otherwise</i> ⁵⁰
	Advisory	<i>... keen not to criticize [...] active, advising the parents on what they should do and guiding the conversation with the help of their own knowledge</i> ⁵⁰
	Judgemental	<i>...very critical of parents who smoked and who tended to moralize about the parents' behaviour</i> ⁵⁰
Facilitator	Not applicable	<i>Personal experience of having given up smoking can lead to increased understanding of the difficulties confronting the parents</i> ⁵⁰
Barriers	HCPs' own characteristics and beliefs about themselves	<i>Their involvement might have negative results because of their professional status</i> ⁵¹ <i>They perceived their role as curative rather than as an instigator of harm limitation</i> ⁵¹ <i>...the attitude, motivation and commitment of other health professionals</i> ⁵¹ <i>"there's nothing I can do if they don't want my help"</i> ⁵¹ <i>...nurses felt lost and sought a methodology for broaching the subject of smoking with parents of small children</i> ⁵⁰ <i>...personal experience of smoking can also lead nurses to be more judgemental, which is more likely to exacerbate discussions with parents</i> ⁵⁰

	HCPs' perception of parents who smoke	<i>A lack of motivation and commitment by the parents[...] Getting parents to attend clinics [...] and tackling individuals with little motivation to make any kind of behaviour change would be a major problem</i> ⁵¹ <i>"You feel a certain resistance... you're trespassing on their private lives, on their integrity, to some degree. You're telling them in no uncertain terms that they are to blame for everything..."</i> ⁵⁰
	HCPs' desire to protect their professional relationship with the parents of their patients	<i>Several nurses point out the importance of keeping good relationships with the parents</i> ⁵¹
	Pragmatic issues	<i>Time limitations and workload were the main barriers. Compared to other demands this type of intervention would be considered low priority</i> ⁵¹ <i>Strategies to actively reduce child exposure are not considered practical for some families due to various social and environmental factors</i> ⁵¹
	Nature of the issue of SHSe	<i>...smoking close to small children is not morally acceptable in our society. It is especially sensitive because a third party is affected</i> ⁵⁰
Future training and practices	Training	<i>Informal and interactive via group settings. Alternatively, given time restraints, information could be effectively presented using videos or CDs</i> ⁵¹ <i>Time out of the workplace to attend training would also be beneficial</i> ⁵¹
	Practices	<i>...given time constraints, verbal communication or written information was most apt. Others believed videos or the incorporation of information and discussion into postnatal support groups the most effective means of communication</i> ⁵¹

CDs: Compact Discs; ETS: Environmental Tobacco Smoke; HCPs: Healthcare Professionals; SHSe: secondhand smoke exposure

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