

# Midwives' recommendation of electronic cigarettes as a smoking cessation strategy in pregnancy

**E**lectronic cigarettes (e-cigarettes) were first introduced in China in 2004 (Dockrell et al, 2013); however, their use has only become widespread in recent years (Bareham et al, 2016). An e-cigarette is a device that delivers nicotine to the lungs in the form of a vapour and can also be referred to as vaping. The prevalence of electronic cigarettes is ever-increasing, with around 3.6 million electronic cigarette users, a rise from the 700 000 vapers in 2012 (Action on Smoking And Health, 2019). Euromonitor, a market research group, have predicted that the rapidly expanding e-cigarette market will have around 55 million users by 2021 (British Broadcasting Company, 2018). According to data published by the NHS, the prevalence of e-cigarette use among pregnant women is unknown; however, approximately 10.6% of pregnant woman smoke conventional cigarettes at the time of delivery (NHS, 2018).

## Background

The World Health Organization (2001) defines epidemiology as the study of the distribution of health-related events, including disease. There are few papers that discuss the epidemiology and incidence of electronic cigarette use in the United Kingdom (Beard et al, 2020). It is important to explore the success rates of smoking quit attempts in England. For example, it has been found that England has one of the lowest smoking rates in the world, and a high rate of successful quit attempts (Beard et al, 2020). In addition to this, it was found that the licensing of nicotine replacement therapies, such as e-cigarettes, for harm reduction purposes had a temporary positive impact on successful quit attempts (Beard et al, 2020). However, it has been stated that e-cigarettes are a 'public health crisis' (Walley et al, 2019), because of the increase in use amongst youth. It is claimed that the increase in use amongst young adults is the result of effective marketing and promotion of e-cigarettes.

In 2019, it was estimated that over 3.6 million adults in Great Britain were e-cigarette users, which is around 7% of the population (Action on Smoking And Health, 2019). Over half of these were ex-smokers, and the main

## Abstract

**Introduction** Electronic cigarettes have been described as a public health crisis. Approximately 10.6% of pregnant women smoke conventional cigarettes at the time of delivery, but the prevalence of e-cigarette use during pregnancy is unknown. **Objectives** To assess the extent of midwives' current knowledge and attitudes on electronic cigarettes as a smoking cessation strategy during pregnancy. **Methods** Electronic databases were searched. These were supplemented by manual searches, which were completed to include reports from Public Health England and the Royal College of Midwives. **Results** A total of 22 papers were identified, reviewed and are presented as a narrative literature review. Topics such as epidemiology, organisational stances, opinions of smoking cessation in pregnancy and opinions from stop smoking services were explored. There have been conflicting ideas regarding the use of electronic cigarettes in pregnancy and women who have recently given birth. **Conclusions** Whilst the current literature regarding electronic cigarettes as a smoking cessation strategy during pregnancy is well explored, there is no literature that investigates the attitudes of midwives and how this may affect their recommendation of e-cigarettes. The results of this study could serve as a point of reference for future clinical research, as well as clinical practice, by bringing to light the knowledge and attitudes midwives have regarding electronic cigarette use in pregnancy, and may be able to suggest some changes to improve the current practices.

## Keywords

smoking cessation | pregnancy | midwives | narrative review | electronic cigarettes

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**Table 1. Search terms and respective number of results**

Search terms	Results
'electronic cigarettes'	55 300
'electronic cigarettes' and 'smoking cessation'	6 950
'electronic cigarettes' and 'England'	3 600
'electronic cigarettes' and 'epidemiology'	2 880
'electronic cigarettes' and 'pregnancy'	1 870
'electronic cigarettes' and 'pregnancy' and 'smoking cessation'	1 290
'electronic cigarettes' and 'healthcare professionals'	618
'electronic cigarettes' and 'healthcare professionals' and 'pregnancy'	211
'electronic cigarettes' and 'midwives'	126

reason given for the use of e-cigarettes was to help them quit (31%). It was estimated, based on survey findings, that only 45% of the population agreed that e-cigarettes were less harmful than smoking, compared to 50% in 2018. Similarly, around a quarter of adults stated that they did not know how harmful e-cigarettes are compared to smoking (Action on Smoking And Health, 2019).

## Methods

For this narrative review, Google Scholar and the electronic databases Scopus and Web of Science were searched. Manual searches also occurred for specific reports published by organisations such as Public Health England (PHE) and the Royal College of Midwives (RCM). To ensure that no relevant papers were missed, relevant databases, periodic publication dissemination by the UK Electronic Cigarettes Research Forum and search terms were used (Table 1).

An iterative approach was taken when searching databases (Boulanger, 2017), which is where the content or methodology of the search is adapted and refined after repeated analysis. Iterative analysis is more appropriate than only searching the literature once, as it ensures the search is up-to-date because of the continual addition of publications.

The search was mostly limited to papers published in 2016 or later; however, some earlier papers were included. Many of the papers were published in 2020.

A total of 50 papers were chosen from these searches. The title and abstract of each paper were read, and the most suitable papers were listed. A summary sentence was extracted from each paper, to further reduce the list to the most relevant papers. An activity was completed in which 10 relevant papers were taken and a summary of each was written in around 50 words (Table 2). Overall, 22 papers were used when writing the review. Reports

from manual searches were included, such as PHE reports and the RCM position statement.

It was important that the chosen papers could be grouped together with results or themes so that similarities and differences could be identified between the papers. The papers in this review include both quantitative and qualitative methods.

## Results and discussion

### Organisational stances

Several relevant professional bodies advocate vaping as an alternative to conventional smoking because there is no 'safe level' of smoking during pregnancy (National Centre for Smoking Cessation and Training, 2019). The National Centre for Smoking Cessation and Training also state that if a pregnant woman chooses to use an e-cigarette to replace conventional smoking, she should not be discouraged from doing so by her midwife, as it is safer for an expectant mother than continuing to smoke. This raises the ethical question of whether they should be used for smoking cessation in pregnancy, as whilst they are not 100% safe, they are still safer than conventional cigarettes. Whilst some argue there remains a lack of evidence surrounding the effects of long-term use in pregnancy (Li et al, 2019), the NHS also take a similar stance in supporting electronic cigarette use in pregnant women as they state that current evidence indicates that e-cigarettes are much less risky than conventional cigarettes. Those advocating e-cigarette use in pregnancy appear to be of the opinion that whilst the vapour contains some of the harmful chemicals found in cigarette smoke, they are present at much lower levels than in conventional cigarettes, and whilst not completely risk free, the levels are significantly less harmful to a pregnant woman and her baby than smoking tobacco (NHS, 2019a). Also, if a pregnant woman reports that she has stopped using conventional cigarettes completely and has started using an e-cigarette, she should be congratulated in doing so (NHS 2019a; RCM, 2019).

Similarly, both the National Institute for Health and Care Excellence (NICE) and the NHS have published guidelines on smoking cessation interventions in England. NICE suggest that an e-cigarette starter pack within the stop smoking services would increase their attractiveness as a cessation strategy and may also increase their efficacy (NICE, 2018). These starter packs would include an e-cigarette device that would enable an individual to begin to use an e-cigarette as a smoking cessation strategy, in the hopes that they could continue this use by themselves. Overall, they highlight the duty of healthcare professionals to introduce smokers to e-cigarettes as a quit attempt, despite the unknown long-term risks. The NHS plan highlights the strategies they are implementing to tackle nationwide issues

**Table 2. Ten most relevant papers**

Title and author(s)	Summary of main points
Views on and experiences of electronic cigarettes: a qualitative study of women who are pregnant or have recently given birth <i>Bowker et al (2018)</i>	Vapes viewed positively by pregnant women. Seen as less harmful than smoking. Perceived social stigma means that some feel uncomfortable using vapes in public, especially during pregnancy. Concerns about safety and nicotine dependence. Midwives should provide pregnant women with up-to-date info and advice, and consider influence of social stigma
Attitudes to E-cigarettes and cessation support for pregnant women from English stop smoking services: A mixed methods study <i>Cooper et al (2019)</i>	Overall, 8.3% of stop smoking services were likely/very likely to advise the use of e-cigarettes in pregnancy; 56.9% were unlikely/very unlikely to advise using them. Interviewees were positive about the potential of e-cigarettes for cessation in pregnancy. Concerns about perceived lack of evidence for safety were expressed
Smoking and quit attempts during pregnancy and postpartum: a longitudinal UK cohort <i>Cooper et al (2017)</i>	A total of 850 pregnant women who were current smokers or had smoked self-reported their smoking behavior, quit attempts and quitting intentions. Intention to quit fell as the pregnancy progressed. Within 3 months of giving birth, one third of women who achieved abstinence during early pregnancy had returned to smoking
Impact of maternal e-cigarette vapor exposure on renal health in the offspring <i>Li et al (2019)</i>	Maternal exposure to nicotine-containing and nicotine-free vapour differentially altered inflammatory markers, suggesting nicotine is not solely responsible for harmful effects on a developing fetus. The impact of e-cigarettes on an offspring's health outcomes would not be fully elucidated by human epidemiological studies for at least 50 years
Survey of smoking cessation services and pregnant women's views on use of electronic cigarettes in pregnancy <i>Mann and Faflik (2018)</i>	Overall, 69% reported they advise pregnant women that e-cigarette use during pregnancy is a personal choice; 28% of pregnant women considered using e-cigarettes, 76% were unsure of the potential harms compared to smoking, and 62% were unsure if women should have the choice to use electronic cigarettes during pregnancy
Vaping in England: an evidence update February 2019 <i>Public Health England (2019)</i>	Stand by statement that vaping is 95% less harmful than smoking. Report that English stop smoking services have small proportion of quit attempts using a vape. Combining e-cigarette use and stop smoking services support should be a recommended option available to all current smokers. Midwives should receive education/training on using a vape in quit attempts
Impact of electronic cigarette aerosols on pregnancy and early development <i>Orzabal and Ramadoss (2019)</i>	Nicotine can permanently alter the intrauterine environment, and could compromise the physiological development of major fetal organ systems. Report outlines potential harm that exposure to e-cigarette aerosols during early life may have on offspring development. Pregnant women should not be advised to use e-cigarettes or any tobacco product during pregnancy
Perceived threats, benefits and barriers of e-cigarette use during pregnancy. A qualitative analysis of risk perception within existing threads in online discussion forums. <i>Schilling et al (2019)</i>	Subthemes were severe nicotine related health risks, potential health risks of additional ingredients, relative risks and lack of knowledge and research studies. Perceived benefits were possibility and facilitation of smoking cessation, harm reduction and financial benefits. Perceived barriers were lack of satisfaction and social stigma
Flavored electronic cigarette use, preferences, and perceptions in pregnant mothers: A correspondence analysis approach <i>Stroud et al, 2018</i>	Pregnant women may be vulnerable to the appeal of flavourings because of alterations in taste and cravings. Lack of differences in harm perceptions across flavours may relate to public health and education campaigns regarding dangers of tobacco use during pregnancy. E-cigarettes were perceived as less harmful than conventional cigarettes
Is it safe to vape? Analyzing online forums discussing e-cigarette use during pregnancy <i>Wigginton et al (2017)</i>	Analysis of discussion forum threads discussing use in pregnancy. Three distinctive ways in the debates; quitting nicotine cold turkey is unsafe, vaping is the lesser of two evils, vaping is not worth the risk. Need to educate and support women about harm reduction options

such as obesity and smoking (NHS, 2019b). Within this plan, they state that all hospital admissions should be offered NHS-funded tobacco treatment services, to contribute to a smoke-free hospital environment. The plan will also be adapted for pregnant women, to ensure a smoke-free pregnancy, which includes focused sessions and treatments for both the pregnant woman and their partner, to contribute to a smoke-free home.

Both the RCM and the Royal College of Physicians (RCP) have released position statements regarding electronic cigarettes. The RCM statement emphasises that e-cigarettes contain toxins, but at a much lower level than toxins in tobacco smoke (RCM, 2019). In addition to this, the RCM state that there is no reason to believe that using an e-cigarette has adverse effects on breastfeeding, and whilst nicotine from vaping can cross the placenta, e-cigarettes do not contain as many toxic ingredients as conventional cigarettes do. Thus, e-cigarettes carry a smaller risk of harm to the health of the fetus. In fact, the RCP (2018) have estimated that e-cigarettes carry, at most, 5% of the risk of conventional tobacco. Overall, the position is that e-cigarette use should continue if it is helping a pregnant woman quit smoking and stay smoke-free. Despite this, the RCM believes that there is strong reasoning for testing the efficacy and safety of e-cigarettes as a stop-smoking treatment for pregnant women. The RCP position statement is particularly notable, as they released their first report on tobacco in 1962, wherein they alerted the public to the dangers of smoking (RCP, 1962). Their position statement concludes that despite not being completely risk free, vaping is still far less harmful than smoking tobacco, so should be favoured over conventional cigarettes (RCP, 2016).

### Smoking cessation

E-cigarettes are particularly popular amongst young people, and there has been a slow increase in e-cigarette users that have never smoked conventional cigarettes (Action on Smoking And Health, 2019).

Studies that have investigated the role e-cigarettes have on smoking cessation have concluded that dual use is the most common activity; wherein a conventional cigarette smoker also vapes (Kasza et al, 2017). This could indicate that e-cigarettes may in fact be more popular as a complement to cigarette smoking rather than an effective alternative (Doyle et al, 2015).

Some research focuses on the change in smoking habits over time. Findings from a survey show that almost 14% of those who vape had attempted to quit e-cigarettes, whereas more than 50% of smokers had attempted to quit smoking (Jankowski et al, 2019), which is a similar conclusion to that of another study (Jackson et al, 2020). The rate of quit attempts was lower amongst dual users of e-cigarettes compared with other nicotine

replacement therapies such as nicotine patches; however in comparison with conventional cigarette smoking, quit attempt rates were higher (Jackson et al, 2020). This could reflect that people do not consider e-cigarettes as a smoking cessation tool, as they are reluctant to attempt to quit smoking when using vapes. On balance, it appears that users find e-cigarettes to be a safer alternative, hence the lower smoking rate in comparison with conventional cigarettes. However, some research suggests that participants felt nicotine patches were a more effective method (Jankowski et al, 2020).

There is conflicting evidence regarding the efficacy of e-cigarettes as a smoking cessation tool, when compared to nicotine patches. Several studies indicate that nicotine patches are a more effective method of smoking cessation (Walker et al, 2020; Jankowski et al, 2020; Jackson et al, 2020), whereas some research suggests the opposite (Hajek et al, 2019), finding that e-cigarettes were a more effective smoking cessation method than patches as they were more effective in alleviating withdrawal symptoms.

An emerging focus point in research explores the effectiveness of combining nicotine patches with e-cigarette use for smoking cessation (Walker et al, 2020; Hajek et al, 2019). One randomised study compared groups of participants allocated to receive either patches, patches and a nicotine e-cigarette, or patches and a nicotine-free e-cigarette (Walker et al, 2020). Overall, the researchers concluded that the best combination for smoking cessation were nicotine patches alongside a nicotine e-cigarette, as this group had a modest improvement in smoking cessation with 6 months smoking abstinence, suggesting that the combined use of e-cigarettes and nicotine patches as a smoking cessation method is worthy of further exploration.

However, it could be argued that whilst e-cigarettes as a smoking cessation tool promote harm reduction, they could also be used as a gateway to conventional cigarette smoking. Tobacco control assessed this and found evidence for the latter (Liu et al, 2020). Amongst those that regularly used e-cigarettes, the number that either started or re-started smoking conventional cigarettes when using e-cigarettes significantly exceeded those that quit smoking when using e-cigarettes. Therefore, it can be deduced that a higher proportion of the population are either turning to (or returning to) smoking conventional cigarettes because of the introduction of e-cigarettes into their lifestyle (Wang et al, 2020).

Another problem with the promotion of e-cigarettes as a smoking cessation strategy is the prevalence of e-cigarette, or vaping, product use-associated lung injury (Stanbrook and Drazen, 2020). It was found that lung injury is mainly a concern in people who are already suffering with chronic disease, such as chronic obstructive pulmonary disease or cardiovascular



disease. Patients who died from e-cigarette or vaping product use associated lung injury were nine times as likely to have chronic obstructive pulmonary disease and five times as likely to have cardiovascular disease than those who survived. It has recently emerged that vitamin E acetate was the main contributor to this type of lung injury, which is used in vapes as a thickening agent (Blount et al, 2020). The unknown effects of the mixture of different chemicals in e-cigarette vapour is harmful and can contribute to pulmonary toxicity. The conclusion is that e-cigarettes need to have strict regulation on manufacture and quality control to prevent another lung injury outbreak because of the vast use of e-cigarettes and the use of unregulated chemicals in the manufacturing process (Chand et al, 2020).

E-cigarettes are currently governed by general product safety regulations, which means the products can be put on the market without prior testing (PHE, 2016). Although e-cigarettes are not licensed medicines, they are regulated by Tobacco and Related Product Regulations 2016 (PHE, 2019). Currently, there are manufacturing standards that highlight the maximum tank capacity, container capacity and nicotine strength allowed. The Medicines and Health Regulations Authority must be notified prior to a product going on the market. At present, the manufacturing standards for e-cigarette ingredients are limited to no colourings, caffeine or taurine (PHE, 2016).

When looking at how vapour affects the kidneys, it has been suggested that there is an association between maternal smoking during pregnancy and the presence of proteinuria in their offspring at 3-years-old (Li et al, 2019). The report states that nicotine is considered a major contributor to kidney disease because of its ability to accumulate in the kidneys and secrete through glomeruli. They also found an association between maternal smoking during pregnancy and the presence of proteinuria in 3-year-old offspring, which is indicative of impaired kidney function. Many toxins in conventional cigarette smoke can pass the blood-placenta barrier and have a direct effect on foetal organs, including the kidneys (Li et al, 2019). Interestingly, research has also found that material exposure to vapour, both nicotine containing and non-nicotine containing, were associated with differentially altered inflammatory markers. This indicates that nicotine in e-cigarettes is not the only sole responsibility for the harmful effects on the developing fetus (Li et al, 2019).

A similar study published in 2019 explored the impact of e-cigarette aerosols on early development (Orzabal and Ramadoss, 2019). It was found that whilst no effects on early human development are currently understood, the effects of nicotine can permanently alter the intrauterine environment, which could compromise the physiological

development of major fetal organ systems. The researchers concluded that pregnant women should not be advised to use e-cigarettes, or any tobacco product, during their pregnancy, and that byproducts can pose a threat to non-users, such as newborn babies, through second-hand exposure (Orzabal and Ramadoss, 2019).

### **Smoking cessation in pregnancy**

Based on the available evidence, PHE (2019) have released an evidence update regarding e-cigarettes, stating that vaping is 95% less harmful than smoking conventional cigarettes. PHE (2019) have also confirmed that e-cigarette use in young people has been gradually increasing in recent years, and just over a third of all current smokers in the UK have never tried an e-cigarette. They conclude that combining e-cigarette use and stop smoking service support should be a recommended option available to all current smokers, including those who are pregnant. PHE also state that all health professionals, including midwives, should receive education and training on using an e-cigarette in quit attempts.

However, there is some evidence that health professionals working in smoking cessation services are reluctant to advise e-cigarette use in pregnancy because of a perceived lack of evidence (Cooper et al, 2019; Mann and Fafik, 2018). The NMC express that midwives should always practise in line with the best available evidence, and that any advice given must be evidence-based, which may explain why some may feel a reluctance to advise in the perceived absence of evidence (NMC, 2020), though it should be noted that many of the professionals within these studies were not midwives and as such were likely to be registered with other professional bodies.

Preference and perceptions of flavoured e-cigarettes have been explored using a correspondence analysis approach (Stroud et al, 2019). The results found that because of alterations in taste, cravings and nausea during pregnancy, pregnant women may be vulnerable to the appeal of e-cigarette flavourings. The researchers completed a study exploring the use and preferences of e-cigarettes and found that 69% of users used menthol or mint flavours, as this closely mimicked the taste of menthol cigarettes. There was a lack of differences in harm perceptions across flavours, and this may relate to public health and education campaigns regarding the dangers of tobacco use during pregnancy (Stroud et al, 2019). Overall, the researchers concluded that pregnant women in the study perceived e-cigarettes as less harmful than conventional cigarettes.

### **Stop smoking services**

In one mixed-methods study exploring the use of e-cigarettes as a cessation strategy for pregnant women

### Key points

- There is no present literature that investigates the attitudes of midwives and how this may affect recommendation of e-cigarettes.
- Existing research suggests that current recommendations are not translated into practice.
- It is essential to assess current midwifery attitudes and practice.
- Future work will explore how knowledge and attitudes held by a midwife may influence the likelihood of recommending electronic cigarettes in pregnancy.

in stop smoking services in England, which surveyed managers of smoking cessation services about cessation support for pregnant women, it was found that only 2.2% of pregnant clients who had engaged with smoking cessation services were using e-cigarettes (Cooper et al, 2019). The low proportion of pregnant women using e-cigarettes within this study suggests that stop smoking services were not actively recommending e-cigarettes as a smoking cessation strategy. Only 8.3% of stop smoking services were 'likely' or 'very likely' to advise the use of e-cigarettes in pregnancy, whereas 56.9% of stop smoking services were 'unlikely' or 'very unlikely' to advise using them. The opinions of smoking cessation services are important, as they are usually responsible for providing services to pregnant women regarding smoking cessation. These findings are particularly significant because PHE recommends that stop smoking services should advise the use of e-cigarettes, including in pregnant women. In a similar study, it was established that 60% of stop smoking services reported that they did not have a specific policy on the type of e-cigarette advice they give to pregnant women using their services (Mann and Faflik, 2018). Almost 70% of stop smoking services reported that they advise pregnant women that the use of e-cigarettes during pregnancy is a personal choice, which suggests that they adopt a neutral stance, as opposed to following guidance to promote the practice of vaping over conventional smoking. In the same study, women completed a self-report questionnaire, which found that 28% of pregnant women had considered using e-cigarettes during pregnancy as a smoking cessation strategy, more than three quarters of pregnant women were unsure of the potential harms in comparison to conventional smoking, and 62% were unsure if women should even have the choice to use e-cigarettes during gestation. The researchers state that the main limitation to this study was the small number of services that responded to the survey compared to the overall number of stop smoking services in England. They also state that there is some self-selection bias in this study. These limitations show that further research is needed into the practices surrounding smoking cessation advice given to pregnant women.

### Women's opinions and behaviours in relation to electronic cigarette use in pregnancy

There are conflicting opinions, presented within the literature regarding e-cigarette use in pregnancy and women who have recently given birth. For example, in an analysis of online discussion forums, it transpired that whilst the majority of opinions concluded that e-cigarettes contained fewer toxicants than cigarettes, there was little knowledge regarding long-term safety of use during pregnancy (Wigginton et al, 2017). Also, the paper concluded that as a result of the lack of knowledge, it would be safer for a pregnant woman not to vape (Wigginton et al, 2017).

In a study that explored smoking and quit attempts during pregnancy and postpartum, it was found that 50% of women reported attempting to quit across all three trimesters (Cooper et al, 2017). All of the pregnant women involved were current smokers or had smoked previously. It also emerged that the intention to quit fell as the pregnancy progressed, and within 3 months of giving birth, one third of women who had previously achieved abstinence during early pregnancy had returned to conventional smoking (Cooper et al, 2017). The study concluded most smokers seemed less likely to continue to make quit attempts after giving birth, and many women who quit during early pregnancy returned to smoking. The main limitation highlighted in this study is that data were self-reported and so cannot be validated. Similarly, BMC Pregnancy and Childbirth published a qualitative study of women who were pregnant or who had recently given birth (Bowker et al, 2018). Unlike the first study, where a proportion of women returned to conventional smoking, in this paper, most participants believed that there was a harm reduction when using e-cigarettes during pregnancy in comparison to smoking, and so would prefer to use e-cigarettes than return to smoking. Despite this, many expressed a need for more safety information as well as further studies on the toxins and carcinogens in e-cigarettes and how these specifically affect mother and fetus. Moreover, perceived social stigma associated with vaping during pregnancy and feeling uncomfortable vaping in public were amongst the main reasons for these pregnant women not to use e-cigarettes while pregnant. This social predicament is an indicator of the complexity of the multifaceted problem of quitting smoking during pregnancy. Pregnant women are unsure about the use of e-cigarettes in pregnancy and want more information regarding this topic, but it can be argued that midwives and professionals working in smoking cessation services do not have the knowledge to provide this information. Many women are reporting that they do not understand the risks of using e-cigarettes during pregnancy and many smoking cessation services confirm that they do not have enough evidence on which to base

their practice (Bowker et al, 2018). As there were only 123 participants in this study, it cannot be said that the results are representative of a wider population, because of the sample characteristics, hence they are not transferable.

In a similar vein, in a qualitative analysis on online discussion forums of perceived threats, barriers and benefits of e-cigarette use during pregnancy, a number of perceived benefits and barriers were identified (Schilling et al, 2019). The 'threat' subthemes pinpointed were severe nicotine-related health risks, relative risks, potential health risks of ingredients, and lack of knowledge and research studies. The 'beneficial' subthemes pinpointed were the possibility and facilitation of smoking cessation, financial benefits, and possibility of harm reduction. The 'barrier' subthemes were social stigma and lack of nicotine satisfaction. Overall, the perception of e-cigarette use during pregnancy varied according to the perception of relative risks compared to conventional cigarettes (Schilling et al, 2019). A number of limitations were identified, including the lack of information of the participants because posts were anonymous. Therefore, the statements made could not be validated and so the study is not seen as representative.

## Conclusions

To conclude, whilst the current literature regarding e-cigarettes as a smoking cessation strategy during pregnancy is well explored, especially surrounding the effects on fetal health and opinions of pregnant women, there is no present literature that investigates the attitudes of midwives and how this may affect their recommendation of e-cigarettes. This is an area of interest, as existing research suggests that current recommendations are not translated into practice by smoking cessation services, who are specialists within the area of practice. Therefore, it is essential to assess current midwifery attitudes and practice to identify if and how perceptions around vaping in pregnancy affect advice given to pregnant smokers and whether this is consistent with current professional recommendations on the subject.

Further study conducted by the authors aims to explore how the knowledge and attitudes held by midwives influence the likelihood of recommending e-cigarettes in pregnancy and investigates the factors that would influence midwives' recommendation of e-cigarettes as a smoking cessation strategy in pregnancy. It is important to identify the knowledge and attitudes held by this group of professionals in relation to vaping, and the influence that this has on their practice, as midwives are in regular direct contact with pregnant women who choose to smoke or vape, and as such may significantly impact upon the informed decisions made by pregnant women in relation to smoking cessation practices during pregnancy.

There is a clear gap for this research, which will potentially add more depth to the current literature on e-cigarettes as a smoking cessation strategy in pregnancy. The results of this study could serve as a point of reference for future clinical research as well as clinical practice by bringing to light the knowledge and attitudes midwives have regarding e-cigarette use in pregnancy, and thus may be able to suggest some changes to improve current practices. **BJM**

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