

Causes, impacts and possible mitigation of non-attendance of appointments within the National Health Service: a literature review

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Abstract

Purpose – Missed appointments within the National Health Service (NHS) are a drain on resources, associated with not only considerable time and cost implications, but also sub-optimal health outcomes. This literature review aims to explore non-attendance within the NHS in relation to causes, impacts and possible mitigation of negative effects of missed appointments.

Design/methodology/approach – MEDLINE, CINAHL Plus and PubMed were searched with a date range of 2016–2021. Databases were searched for peer-reviewed articles published in English addressing non-attendance of adults within the NHS. Studies were excluded if they were theoretical papers, dissertations or research concerning patients aged under 18. A total of 21 articles met the inclusion criteria and were selected for analysis.

Findings – The results indicate a significant association of non-attendance and poor health outcomes. Patients from a lower socioeconomic status, adults aged over 85 and those with multiple co-morbidities are more likely to miss appointments. The most commonly reported patient-centred reasons for failing to attend were forgetfulness, transportation difficulties, and family commitments. Practice-specific reasons were cited as inefficiencies of the appointment booking system, failure of traditional reminders and inconvenient timings. Interventions included text reminder services, the inclusion of costs within reminders and enhanced patient involvement with the booking process.

Originality/value – Non-attendance is complex, and to secure maximum attendance, targeted interventions are required by healthcare facilities to ensure patient needs are met. The adaption of scheduling systems and healthcare services can assist in reducing DNA rates.

Keywords Non-attendance, Healthcare, National health service, NHS, Did not attend, DNA, Missed appointment

Paper type Literature review

1. Introduction

Non-attendance within healthcare is a common phenomenon worldwide. The NHS report that more than 15 million general practice (GP) appointments, equating to 5%, are wasted each year to “did not attend” (DNA) appointments, at a cost of more than £216 million (NHS, 2019; Margham *et al.*, 2021), directly impacting on waiting times, quality of service and general overall patient satisfaction (Brewster *et al.*, 2020). On a global scale, even higher rates of up to 48.1% have been reported (Parsons *et al.*, 2021). The term DNA is used for patients who miss an appointment without giving enough notice for others to be invited (NHS, 2019). This occurrence is associated with significant costs, not only financial, but also in terms of wasted time and resources. With ever increasing patient expectations, and demand for services, it is vital that DNAs are explored to improve productivity and efficiency of the NHS, whilst concurrently working towards better patient outcomes, in line with the NHS Long Term Plan (NHS, 2021).

There are contrasting thoughts on the idea of DNAs, and whilst patients and administrative staff tend to find them frustrating, GPs find them useful for catching up



when they have fallen behind schedule (Martin *et al.*, 2005; Williamson *et al.*, 2017; Ramlucken and Sibiya, 2018). It is clear however, that DNAs are strongly associated with a significant reduction in productivity and effectiveness of services, a deterioration in therapeutic working relationships (Lee *et al.*, 2019), and increased pressure on emergency services (Ferro *et al.*, 2020). In addition, the administrative work burden associated with managing DNAs is increased, all reflecting a general misuse of resources (Wolthers, 2018). The impact of DNAs on poor health outcomes and amplification of health inequalities is also a common focus of research. DNAs are linked to vulnerable patients, who either continue to live with untreated conditions or subsequently present later, emphasising the inefficiency of non-attendance (Munasinghe *et al.*, 2020). These contributing factors lead to longer waiting times and lower patient satisfaction, which in turn deteriorates attendance behaviour (Bar-dayan, 2002; Bower *et al.*, 2003; Rutherford *et al.*, 2016).

Existing research shows that patients most likely to miss appointments are; under 21, over 85, with multiple co-morbidities, from areas of lower socioeconomic status or with mental health problems (Wolff *et al.*, 2019; Parsons *et al.*, 2021). There is inconsistent evidence regarding the impact of gender, and this lack of consistency across the evidence suggests gender does not influence attendance (Sims *et al.*, 2012; Guedes *et al.*, 2014; Ellis *et al.*, 2017; Mander *et al.*, 2018).

The aetiology of DNAs themselves is multi-factorial, and there is a consensus that the motivations behind missed appointments can be categorised into two groups: patient-centred reasons, and practice-specific reasons (Akter *et al.*, 2014). Amongst the most common patient-centred reasons reported are forgetfulness, transport, the weather, work or family commitments, substance misuse and alcohol dependency (Martin *et al.*, 2005; Ullah *et al.*, 2018).

Practice-specific reasons were generally cited as practical considerations of the appointment booking system and the healthcare service itself, notably issues with the failure of traditional reminders, no reminders, short notice appointments, a long lead time to an appointment and navigation of the booking system (Akter *et al.*, 2014). It was found that patients were more likely to DNA with a junior doctor, and also if their clinician of choice was not available, contributing to the belief that interpersonal continuity can build up trust and loyalty. These improved communications can strengthen a therapeutic relationship and produce a positive effect on attendance behaviours (McLean *et al.*, 2014).

Multiple interventions to reduce DNAs are suggested, with a general belief that there is no “one size fits all” approach, and instead a tailored method should be taken and applied with a scale and intensity proportionate to need (Campbell *et al.*, 2015). DNAs can be the outcome of many factors and can be difficult to quantify; this complexity should be considered when exploring suitable interventions, being mindful that changing one or two elements will still leave many others unaddressed (Horigan *et al.*, 2017; Ullah *et al.*, 2018). Recurring interventions shown to be undertaken by healthcare practices include online consultations (Morris *et al.*, 2017), walk-in clinics (Slive and Bobele, 2013), same day appointments (Murray and Tantau, 2000) and clinic overbooking (Parente *et al.*, 2018).

Appointment reminders are shown to be an efficient method of reducing DNAs (Masoud *et al.*, 2017). Technological advances in recent decades have changed communication methods, and this has been harnessed as the focus of multiple studies in which the effects of reminders and behaviour change intervention on DNAs have been researched (Schwebel and Larimer, 2018). Text reminders, specifically, are suggested as a successful tool in reducing DNAs (Rohman *et al.*, 2015), however, when used in isolation, they are shown to potentially disadvantage certain populations, such as the elderly and those of a lower socioeconomic status (McLean *et al.*, 2016). Reminders are of maximum value when using a variety of media, and when sent at varying frequencies (Opon *et al.*, 2020).

Another intervention of significance is the encouragement of patient involvement during the appointment booking process (MacDonald *et al.*, 2013). Simple changes such as asking the

patient to write down their own appointment, or getting them to repeat the appointment back, has been demonstrated to increase attendance (Margham *et al.*, 2021). Concepts such as Choose and Book also envelop this concept and empower patients to make their own appointments at a timing and location convenient to themselves, shown to reduce the proportion of referred patients who miss appointments (Dusheiko and Gravelle, 2015).

There is conflicting evidence on the imposing of financial penalties on patients who DNA. Whilst some patients support this idea, believing it would encourage them to attend (Martin *et al.*, 2005), healthcare professionals indicate a reluctance to enforce this policy, as the DNA could be a result of an administrative error, in which case the patient would be charged unfairly, or the thought that the collection of financial penalties could discourage patients of a lower socioeconomic status from attending (Sharma *et al.*, 2014).

NHS healthcare services across the United Kingdom vary vastly, but an understanding of the commonalities relating to missed appointments between all aspects of NHS healthcare could identify determinants of DNAs that could be addressed universally. To knowledge there is no existing literature review on non-attendance that encompasses all medical specialities across the NHS, and in light of this gap in research knowledge, a generalised approach to DNAs within the NHS was the focus of this review. The research questions are:

- (1) Why do patients fail to attend medical appointments within the NHS?
- (2) What is the impact of DNA appointments in healthcare on patients and service provision?
- (3) What can be done to reduce DNA appointments in healthcare?

The preparation and reporting of this literature review was aligned with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines. This review aims to discuss DNAs within healthcare and assess the evidence for commonalities and the detection of emerging patterns. This knowledge and understanding will be of great value to healthcare providers; an understanding of attendance behaviours will enable appropriate strategies to be implemented into routine practice, with the aim of mitigating any negative effects of DNAs.

2. Search strategy

A comprehensive literature search was conducted using several databases, including MEDLINE, CINAHL Plus and PubMed. Google Scholar was used for the inclusion of grey literature, necessary to negate publication bias (Yasin *et al.*, 2020). Titles, abstracts and reference lists were examined to identify any additional relevant studies. The PEO framework was used, and search terms generated were specifically selected to examine the phenomenon of DNAs within the NHS. The following keywords were used: did not attend, DNA, missed appointment, non-attendance, healthcare, cause, reason, impact and effect. To ensure that the search results were not limited, synonyms of “non-attendance” and “healthcare” were also used as keywords. Each database search was recorded to ensure the strategy remained explicit, aiding in reproducibility (Craven and Levay, 2011).

2.1 Inclusion and exclusion criteria

The review was limited to peer-reviewed articles with an abstract and full text available, published in English with a focus of missed appointments in healthcare, between 2016–2021 to ensure relevance to the most recent theories and best practices. There were no limitations on medical diagnosis or NHS facility accessed, as DNAs impact significantly on all NHS providers (NHS, 2021). As a single-payer healthcare system, the NHS differs from alternative

healthcare approaches worldwide (Petrou *et al.*, 2018), and for this reason research conducted outside of the United Kingdom (UK) was excluded. Also excluded were patients aged under 18, due to the consideration they do not DNA, but “were not brought” (Powell and Appleton, 2012), theoretical papers, dissertations and editorials. Article selection has the potential for bias, but the inclusion and exclusion criteria helped reduce this and provided consistency in selection (Winchester and Salji, 2016).

Initially, criteria were developed that would address the research problem comprising the following items: (1) The study must deal with DNAs within the UK’s NHS; (2) The occurrence of DNAs must be analysed and not simply reported as a problem, to allow the consideration of extraneous variables; (3) The quality of the research is to be assessed as satisfactory and provide robust and ethical evidence that can be used to inform policy (Hickson, 2013). The titles and abstracts that did not provide information on the above criteria were excluded from further analysis. Those meeting the criteria were read for full text screening.

2.2 Study selection and data extraction

The steps taken in the literature search and review process are shown in Figure 1. PubMed was selected as a primary source of material due to its currency of literature and its status as the most frequently used database within the biomedical field (Falagas *et al.*, 2008). Boolean operators and truncations were used to generate a focused search and narrow the returned results, a process key in addressing research bias (Aveyard, 2019). A search of (“missed appointment*” OR “did not attend” OR “unattended appointment”) AND (“healthcare” OR “NHS”), with a limitation of MEDLINE citations only, produced 269 articles for review. An

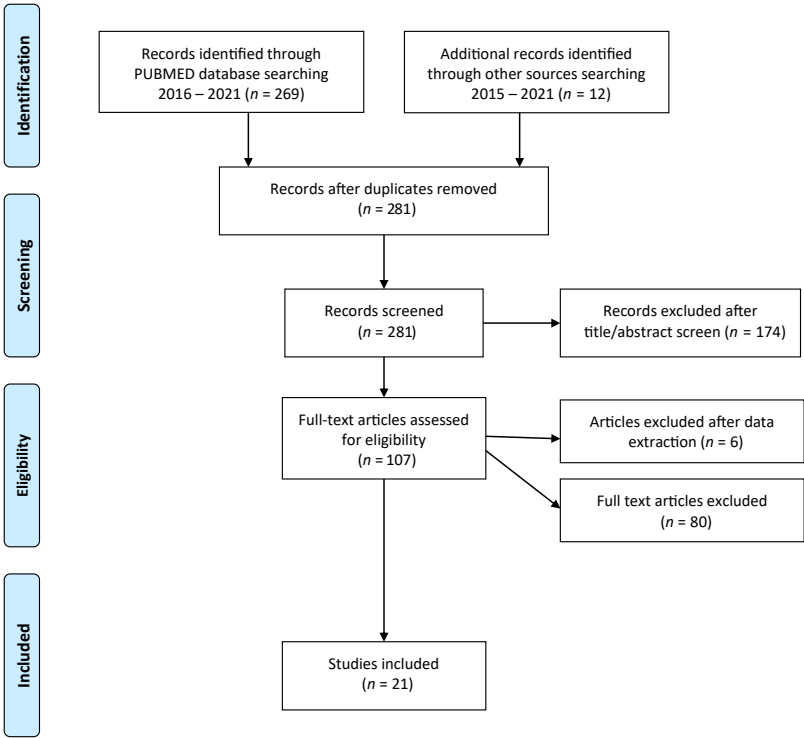


Figure 1. PRISMA flowchart of primary study selection

additional 12 relevant articles were generated from a review of the reference lists. These 281 articles were screened for duplicates and eligibility based on their title and abstract. The remaining 107 articles were assessed for inclusion criteria using complete text screening. A total of 21 articles were retained (available on request).

2.3 Classification of data and outcome

The studies were included on their relevance to the research problem of DNAs within the NHS. The first stage in the evaluation of selected studies was a scan to pre-analyse and identify general themes, allowing commonalities to be recognised (Hickson, 2013). The second stage involved a complex exploration of the studies with the aim of examining the key themes in depth. The final stage was an interpretation of the results. It is this systematic approach that leads to a greater awareness of how factors interact, and allows new conclusions to be drawn (Aveyard, 2019).

3. Findings

Existing literature identified gaps in knowledge regarding aspects of DNAs within specific healthcare services. This review explores these findings from a wider perspective and examines what is known about DNAs in the NHS, with the aim of providing insight as to why DNAs occur and why particular interventions impact patient sub-groups with differing success.

Analysis of the literature identified three recurring themes: the impact of DNAs; why DNAs occur; and how the consequences of DNAs can be mitigated to reduce their impact on patients and healthcare services. In the section that follows, these themes are explored. Table 1 provides an overview of the characteristics of these selected studies, and identifies the general findings of each, study designs and sampling strategies.

A thematic analysis of the literature was considered appropriate for this study, allowing for a more natural and less fragmented flow when critically analysing the existing research, enabling identification, analysis and reporting of patterns in an organised manner.

3.1 What is the impact of “did not attend” appointments in healthcare on patients and service provision?

The impact of DNAs in healthcare was discussed within the literature, however received a significantly reduced exploration when compared to the other two themes, suggesting there may be more to discover on this subject in future research.

DNAs have been a constant source of contention within the NHS for many years and have considerable time and cost implications. Their negative connotations for the healthcare industry impact heavily on patients and service provision. Within this review numerous adverse outcomes were associated with DNAs, including hospital penalties, increased waiting times (Jefferson *et al.*, 2019; Sheridan *et al.*, 2019) and the resultant increased pressure felt by emergency services (Ellis *et al.*, 2017). However, the main factor to emerge was with regards to the poor health outcomes experienced by patients, and the following section explores this consequence in greater detail.

There is a general agreement within the literature that DNAs impact on patient health and treatment outcomes, of which both are considered avoidable costs (Eades and Alexander, 2019; Poll *et al.*, 2017; Sheridan *et al.*, 2019; Kiruparan *et al.*, 2020; Firth *et al.*, 2020).

Using a large, cohort sample that was representative of the general population, Sheridan *et al.* (2019) identified a significant association between DNAs and an increased rate of early mortality. This finding from Sheridan *et al.* (2019) is similar to those reported by McQueenie *et al.* (2019), whereby the incidence of early mortality was also shown to be associated with a

Table 1.
Characteristics of the
studies included within
the literature review

Author (year)	Region	NHS setting	Study design	Participants, <i>n</i>	Sampling strategy	Theme	General findings/ Conclusion
Aggarwal <i>et al.</i> (2016)	UK	NHS in entirety	Viewpoint	n/a	n/a	Intervention	Behavioural strategies suggested to influence attendance
Allgood <i>et al.</i> (2017)	UK	Breast cancer screening	RCT, online questionnaire	26,054	Women invited for screening who did not attend the first offered appointment	Intervention	The policy of second appointments with a fixed time and date were shown to be effective in increasing attendance
Anyaegbu (2021)	London, UK	Community Mental Health Depot clinic	Retrospective and prospective study	76	Patients of the Community Mental Health Depot clinic	Intervention	SMS reminders recommended as successful in reducing DNAs
Campbell- Richards (2016)	London, UK	Diabetes clinic	Focus groups, semi-structured interviews	9 (focus groups) 10 (interviews)	Identified by clinicians over a 3-week period	Causes	Indicates a link between DNAs and areas with high ethnic diversity and economic deprivation
Dusheiko and Gravelle (2015)	UK	GP practices	Retrospective study	7,700 English GP surgeries	DNAs assessed	Intervention	Patient involvement in the appointment booking process assists in the reduction of DNAs
Eades and Alexander (2019)	Scotland, UK	Diabetes clinic	Cross sectional design, mixed methods	10 (semi- structured interviews) 34 (questionnaires)	Patients who had missed 3 or more appointments in the previous 24 months	Cause	The importance of psychological variables in predicting DNAs
Ellis <i>et al.</i> (2017)	Scotland, UK	General Practice	Retrospective cohort analysis	550,083	Cohort	Causes	Existing strategies of managing DNAs within practices should be updated to reflect the complexities of missed appointments

(continued)

Author (year)	Region	NHS setting	Study design	Participants, <i>n</i>	Sampling strategy	Theme	General findings/ Conclusion
Firth <i>et al.</i> (2020)	UK	Health Psychology Services	Retrospective cohort	1,387	Cohort	Causes	Predictors of non-attendance suggested to include age, symptom severity, appointment time and therapist effect
Fitzmaurice <i>et al.</i> (2015)	Birmingham, UK	Pain Management Department	Retrospective study	3,591 appointments	Pain management appointment slots	Cause	Age and gender, and appointment characteristics identified as reasons patients DNA. Patient-centred approach, with educational classes and reminder messages recommended
Hallsworth <i>et al.</i> (2015)	London, UK	Outpatient appointments (rheumatology, ophthalmology, gastroenterology, neurology or cardiology)	RCT	Trial One – 10,111 participants Trial Two – 9,848 participants	Outpatients with a mobile number and an appointment	Intervention	Tailored SMS messages recommended in reducing DNAs
Jefferson <i>et al.</i> (2019)	North of England, UK	Cancer services	Interviews, thematic framework analysis	24 patients 21 GPs	Opportunistic sampling from consenting Gp patients	Causes	System flaws, patient expectations and ineffective communication were all noted as being of significance in the occurrence of DNAs

(continued)

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Author (year)	Region	NHS setting	Study design	Participants, <i>n</i>	Sampling strategy	Theme	General findings/ Conclusion
Kiruparan <i>et al.</i> (2020)	North-West of England, UK	Breast clinics	Retrospective and prospective study	3,600 appointments (cycle 1) 1782 appointments (cycle 2)	DNAs assessed	Intervention	SMS reminders reduced DNAs. It was noted that technology can inadvertently isolate patient groups such as the elderly and this should be considered
MacLellan <i>et al.</i> (2015)	London, UK	Tuberculosis clinic	Multi method approach; interviews, questionnaires	30 (questionnaires) 8 (interviews)	Adults with appointments booked	Cause	This study found three key categories behind DNAs, awareness, hospital factors and leadership
Margham <i>et al.</i> (2021)	London, UK	General Practice	QI program	189, 915 booked appointments (EQUIP practices) 43, 977 booked appointments (non-EQUIP practices)	DNAs assessed	Intervention	Study concluded that to reduce DNAs, the appropriateness of the appointment system to the patient base is key, and recommended the forward booking of appointments to 1 day
McQueenie <i>et al.</i> (2019)	Scotland, UK	General Practice	Retrospective cohort	824,374	Cohort	Impact	DNAs are a marker for all-cause mortality, especially in those with mental health conditions

(continued)

Author (year)	Region	NHS setting	Study design	Participants, <i>n</i>	Sampling strategy	Theme	General findings/ Conclusion
Morris <i>et al.</i> (2017)	London, UK	Diabetes	Mixed methods, interviews, questionnaires, focus groups	632 webcam scheduled consultations	All patients who had a webcam consultation booked	Intervention	Webcam consultations recommended as a positive intervention when interspersed with face-to-face appointments in existing structure
Poll <i>et al.</i> (2017)	North of England, UK	Hepatitis C Outreach Clinic	Purposive sampling	28	Purposive sampling from patients who had DNA'd at least one appointment and not re-booked and attended	Causes	It was suggested that DNAs are complex, and interventions such as reminders could possibly fail if the intricate matters are not considered
Sheridan <i>et al.</i> (2019)	Leeds, UK	Cancer services	Cohort	109,433	Cohort	Causes/ Impact	DNAs largely predicted by patient factors. Poorer health outcomes reported for those who DNA
Tan <i>et al.</i> (2017)	London, UK	Musculoskeletal Physiotherapy	Retrospective and prospective study	Not given	All patients with an appointment booked	Intervention	Modification of booking system resulted in reduced number of DNAs
Tomkins <i>et al.</i> (2018)	Bolton, UK	Integrated HIV, Sexual and Reproductive Health Services	Retrospective and prospective study	3,224 (Pre-intervention) ³ , 061 (Post intervention)	All patients with an appointment booked	Intervention	SMS reminders recommended After intervention, DNA rates fell, and cancellation rates rose
Williamson <i>et al.</i> (2017)	Scotland, UK	General Practice	Retrospective cohort analysis	909, 073	Cohort	Causes	SMS reminders recommended Explored the concept that low engagement could be viewed as health harming behaviour, and also the contribution to inverse care law

Table 1.

lower socioeconomic status, which in turn was found to be a predictor of DNAs in patients with multiple long-term conditions; resulting in these patients being at a significantly higher risk of all-cause mortality.

These studies are indicative of DNAs in areas of a lower socioeconomic status as having a detrimental effect on patient health, emphasising unmet health needs and socioeconomic health inequalities (McQueenie *et al.*, 2019). Social deprivation is only one of the many factors that contribute to DNAs, and the resulting amplification of vulnerability, poor health outcomes and health inequalities also become evident when considering instances of multiple DNAs (Ellis *et al.*, 2017; Williamson *et al.*, 2017; Margham *et al.*, 2021).

Having discussed the negative connotations of DNAs with regards to provision of healthcare services and patient health outcomes, it is now necessary to gain a comprehensive understanding of why people miss appointments, so that healthcare facilities can adapt services as required.

3.2 Why do patients fail to attend medical appointments within the NHS?

One common explanation for DNAs is cited as forgetfulness (Fitzmaurice *et al.*, 2015; Hallsworth *et al.*, 2015; MacLellan *et al.*, 2015; Aggarwal *et al.*, 2016; Campbell-Richards, 2016; Poll *et al.*, 2017; Tan *et al.*, 2017; Eades and Alexander, 2019; Kiruparan *et al.*, 2020; Anyaegbu, 2021). However, DNAs are considered a multi-factual issue, and not necessarily to be taken at face value. Although patients often give the reason for their DNA as “forgetfulness” for example, in a qualitative study by Poll *et al.* (2017), this is considered a “prima-facie” reason that has a deeper complexity.

This suggestion that DNAs are a complex factor is widely supported within the literature, and reasoned judgements have been made that various aspects of the healthcare setting are significantly associated with attendance behaviours (Fitzmaurice *et al.*, 2015; MacLellan *et al.*, 2015; Tan *et al.*, 2017; Jefferson *et al.*, 2019; Margham *et al.*, 2021). Jefferson *et al.* (2019) identifies several key factors, such as system flaws and doctor-patient communication, as core complications of practice factors in their qualitative study.

Another commonly encountered system flaw that can lead to DNAs was recognised as the failure of traditional methods of appointment reminders (MacLellan *et al.*, 2015; Poll *et al.*, 2017; Allgood *et al.*, 2017; Jefferson *et al.*, 2019; Kiruparan *et al.*, 2020; Anyaegbu, 2021). MacLellan *et al.* (2015) emphasised that whilst most attendees in their research had received invitation letters, those who missed appointments had not, concluding that reminders had been influential in encouraging attendance. The failure of reminders in this study was shown to be linked to several factors: the age of the patient, the method of reminder, a patient’s vulnerability status and subsequent access to appropriate means of traditional reminders. These findings from MacLellan *et al.* (2015) share similarities with the research conducted by McQueenie *et al.* (2019), and suggest that without the consideration of local economy, inappropriate interventions could be applied that would prove unsuccessful, with the implication becoming apparent that an untailored service can indirectly result in discrimination and fail to offer an adequate service to a population (Anyaegbu, 2021).

The timing and date of the appointment were also discussed as having an impact on attendance, with some contrasting results being reported, of which will be discussed later in this review (Fitzmaurice *et al.*, 2015; Firth *et al.*, 2020; Kiruparan *et al.*, 2020). Fitzmaurice *et al.* (2015) also suggest the month of the appointment could influence attendance, however, the data collection period in this study does not enable a true representation of the full year and is therefore a limitation to the findings. Appointment delays are recognised as another explanation for DNAs, specifically appointment delays of 2–3 days (Ellis *et al.*, 2017; Margham *et al.*, 2021).

However, practice flaws cannot be used to explain all DNAs; patient characteristics and behaviours also significantly impact on attendance. One of the major influences on a patient’s

likelihood to attend an appointment is linked to a patient's socioeconomic status, as previously discussed (Campbell-Richards, 2016; Ellis *et al.*, 2017; Allgood *et al.*, 2017; McQueenie *et al.*, 2019).

A large, retrospective cohort study by Williamson *et al.* (2017) similarly supports this claim, and has comparative findings with Ellis *et al.* (2017) and McQueenie *et al.* (2019), strongly indicating that DNAs in areas of lower socioeconomic status could contribute to inverse care law. It is proposed that incidents of serial DNAs could be utilised as a predictor of non-attendance, and that with an understanding of this health harming behaviour, health inequalities can be tackled at service delivery level.

Campbell-Richards (2016) concurs with these findings and suggests this was a result of vulnerable subsets of populations having difficulty in maintaining contact with healthcare services. This itself appears to suggest that whilst a patient's individual socioeconomic status does have significant association with DNAs, the root cause is essentially a practice-centred reason with existing services proving ineffective for the patient base; demonstrating the intricacy of non-attendance (Poll *et al.*, 2017; McQueenie *et al.*, 2019).

Observations of other patient-centred reasons for DNAs are recognised as a patient's age (Fitzmaurice *et al.*, 2015; Ellis *et al.*, 2017; Firth *et al.*, 2020) and a patient's individual circumstances and priorities, or a "chaotic lifestyle", as noted by several researchers as an explanation for health usage behaviours (Williamson *et al.*, 2017; Eades and Alexander, 2019; Jefferson *et al.*, 2019; Anyaegbu, 2021). This suggested chaotic lifestyle can provide barriers to treatment in many forms, such as transportation, deprivation, and co-morbidities, and if the "cost" of the appointment is believed to be greater than the benefit of attendance, DNAs are more likely to occur (Jefferson *et al.*, 2019).

This "cost" of the appointment can also be linked to a patient's perception of their illness and the associated level of importance attached to the appointment (MacLellan *et al.*, 2015; Campbell-Richards, 2016; Dusheiko and Gravelle, 2015; Eades and Alexander, 2019). Campbell-Richards (2016) presented a reasoned argument that patients who defer decision making to family members also resulted in increased non-attendance due to priorities of the family members having to be measured against the needs of the dependent.

Having discussed why patients may DNA and the impact this can have, the next section will establish how a consolidation of knowledge gathered within this review can be used to base informed policy changes, and implement appropriate interventions to assist in the reduction of DNAs. A wide range of such interventions were identified within the literature.

3.3 What can be done to reduce "did not attend" appointments in healthcare?

The use of appointment reminders are a common theme within this review, with the suggestion that they have the potential to significantly improve attendance (Fitzmaurice *et al.*, 2015; Hallsworth *et al.*, 2015; MacLellan *et al.*, 2015; Aggarwal *et al.*, 2016; Morris *et al.*, 2017; Allgood *et al.*, 2017; Tan *et al.*, 2017; Tomkins *et al.*, 2018; Jefferson *et al.*, 2019; Kiruparan *et al.*, 2020; Anyaegbu, 2021; Margham *et al.*, 2021).

Short message service (SMS) reminders in particular are a recurring recommendation throughout, with strong evidence that they are an effective method of enhancing attendance levels (Hallsworth *et al.*, 2015; MacLellan *et al.*, 2015; Tan *et al.*, 2017; Tomkins *et al.*, 2018; Kiruparan *et al.*, 2020; Anyaegbu, 2021). However, research collected by Kiruparan *et al.* (2020) in a large retrospective and prospective study, indicates a shortcoming of this intervention, and suggests that older generations can be disadvantaged as a result of this method. Taking into consideration that people aged over 85 are more likely to DNA, and discussion in the previous section regarding the failure of traditional reminders by MacLellan *et al.* (2015), the importance of the provision of a tailored service becomes evident once more. The results reported by Kiruparan *et al.* (2020) are similar to those from Anyaegbu (2021), and reasonable conclusions are drawn from both studies that SMS reminders may be beneficial to

target specifically younger patients, and alternative methods should be sought for an older patient base. Being mindful of this potential discrimination, [Kiruparan et al. \(2020\)](#) implemented the use of several different methods of reminders to work concurrently, and this resulted in a significantly reduced DNA rate.

One other strategy implemented by [Kiruparan et al. \(2020\)](#) involved engaging the patients in the appointment making process, and in doing so addressed known triggers of DNAs such as poor communication, short notification and inconvenient timings. This element is key to reducing DNAs as it ensures the needs of the population are fully understood and a fit-for-purpose service can be provided ([Hallsworth et al., 2015](#)).

However, this idea of a tailored service is just that, it is “tailored”. Research presented by [Allgood et al. \(2017\)](#) is a good example of a facility going against the above recommendation of integrating patients into the booking process, and in contrast the strategy in this research was the provision of pre-arranged, timed appointments, disregarding patient preferences. This was found a more effective method of increasing participation within their own patient base and emphasises that there is no “one size fits all” approach to addressing DNAs. Instead, a thorough understanding of these complexities is required to ensure healthcare providers have the knowledge to make appropriate arrangements and meet the needs of their patients.

[Eades and Alexander \(2019\)](#) propose that these complexities of DNAs can be rationalised by the theory of planned behaviour and the Self-Regulation Model, determining how these psychological variables can be used to predict, and therefore address, non-attendance. It was ascertained that patients often intended to attend the appointment, but key factors, such as a low perceived value of the appointment emerged as barriers to their attendance, similarly recognised as areas of significance by [Campbell-Richards \(2016\)](#) and [Dusheiko and Gravelle \(2015\)](#). Despite a low response rate experienced within the research conducted by [Eades and Alexander \(2019\)](#), potentially impacting on the reliability and trustworthiness of the results, this understanding of the application of psychological variables in predicting DNAs is supported by other research ([Hallsworth et al., 2015](#); [Aggarwal et al., 2016](#)). In a large, randomised control trial, [Hallsworth et al. \(2015\)](#) found that even a small reduction in the effort required by a patient to perform an action can have a significant impact on behaviour, and it was demonstrated that the simple inclusion of a contact number for cancellations in reminders could influence a patient’s intention to attend. [Hallsworth et al. \(2015\)](#) also demonstrated the value of correcting perceptions of “the social norm” and that the wording of the reminder was crucial in triggering conscious thought, leading to situationally induced empathy and an increase in pro-social behaviour.

With the themes surrounding DNAs in the literature now identified, an in-depth critical analysis follows.

4. Discussion

The research question for this review enquired as to why patients DNA appointments within the NHS, the impact these DNAs have on healthcare, and how this situation can be effectively managed. These considerations were found to be closely linked, and interestingly, could be seen to occur as a result of each other in some situations, for example, whilst system flaws ([Margham et al., 2021](#)), relationships ([Jefferson et al., 2019](#)) and appointment delays ([Ellis et al., 2017](#)) were all shown to be individual factors associated with DNAs, associations could also be made between these individual considerations. By way of illustration, a patient may DNA because of a negative experience within the practice, which in turn deteriorates the relationship between patient and practice. This DNA results in fewer appointments being available, which in turn aggravates other patients, increasing the likelihood of non-attendance.

It is in situations such as this, that a comprehensive understanding of DNAs is necessary by all healthcare providers to ensure underlying factors are addressed appropriately as a team, and suitable interventions implemented to mitigate the effect of DNAs.

Whilst age was found to be strongly associated with attendance behaviour in those aged under 21 and those aged over 85, it was less clearly defined for those in between these ages (Fitzmaurice *et al.*, 2015; Poll *et al.*, 2017; Ellis *et al.*, 2017; McQueenie *et al.*, 2019; Sheridan *et al.*, 2019; Firth *et al.*, 2020; Kiruparan *et al.*, 2020). Whilst Firth *et al.* (2020) present data that supports a rise in attendance of 4.1% for every 10-year increase in patient age, additional evidence of association of age on attendance for patients aged between 21 and 85 is generally lacking, and this may prove to be an area of research in the future. Notwithstanding this, the literature is certainly consistent regarding the aforementioned significant association of age in those under 21 and over 85, and this occurrence could potentially reflect home or work commitments, and also clinic factors, acting as barriers to attendance (Fitzmaurice *et al.*, 2015; Ellis *et al.*, 2017; Jefferson *et al.*, 2019; Sheridan *et al.*, 2019; Firth *et al.*, 2020). This once again ties in with the research from Kiruparan *et al.* (2020) in which the limitations of SMS reminders to an elderly generation were discussed, and barriers to care experienced by the elderly will be examined in more detail further in this review.

The association of gender regarding attendance behaviour was found to be inconsistent, and the reasons behind the observed disparities were not explored in depth. Whilst several studies suggested that men were more likely to DNA (Fitzmaurice *et al.*, 2015; Ellis *et al.*, 2017; Sheridan *et al.*, 2019), Eades and Alexander (2019) reported higher levels of DNAs by female patients, and the remainder summarised that gender was found to be insignificant (Firth *et al.*, 2020; Kiruparan *et al.*, 2020). This inconclusive evidence suggests that gender has minimal influence on DNAs and therefore limits the extent to which it can be addressed in order to reduce missed appointments.

Throughout the review there was consistent evidence that a lower socioeconomic status was a predictor of DNAs, suggesting that patients from a deprived population face challenges to healthcare services that others do not, such as the ineffectiveness of traditional reminders, less predictable, chaotic lifestyles and patient/provider communication (Campbell-Richards, 2016; Williamson *et al.*, 2017; Allgood *et al.*, 2017; Ellis *et al.*, 2017; Jefferson *et al.*, 2019; McQueenie *et al.*, 2019; Sheridan *et al.*, 2019).

Whilst a lower socioeconomic status is considered to be detrimental to patient health and significantly associated with poor health outcomes and higher levels of DNAs, Ellis *et al.* (2017) suggest that practices in deprived areas may already have adapted services, as they cope with DNAs better than practices in affluent areas. Modified services such as the availability of same day appointments and outreach clinics, similarly suggested by both MacLellan *et al.* (2015) and Williamson *et al.* (2017) were cited as being effective in mitigating the effects of DNAs in areas of deprivation. This once again highlights the necessity of healthcare facilities to tailor their services in response to the needs and circumstances of their patients, so that missed appointments become less frequent and health outcomes are optimised.

Healthcare services are alluded to as a major influence on the matter of attendance, with one of these main factors cited as service location and transportation difficulties; if a service is difficult to reach, either in terms of insufficient transport provision, lack of parking or a long distance from the patient population, an increase in DNAs is likely (Fitzmaurice *et al.*, 2015; MacLellan *et al.*, 2015; Campbell-Richards, 2016; Morris *et al.*, 2017; Poll *et al.*, 2017; Ellis *et al.*, 2017; Eades and Alexander, 2019; Jefferson *et al.*, 2019).

What stands out in the research is the recurring suggestion that the elderly generation are especially affected by these transportation issues, which is interesting, as the literature identifies patients aged over 85 account for a large proportion of DNAs, suggesting that inadequate transportation can have direct consequences on attendance behaviour of the elderly (Poll *et al.*, 2017; Ellis *et al.*, 2017; McQueenie *et al.*, 2019; Sheridan *et al.*, 2019). This finding, in conjunction with the suggestion that technological barriers faced by elderly patients, such as SMS reminders and navigation of appointment booking systems, can

potentially result in an unmet service need (Jefferson *et al.*, 2019; Kiruparan *et al.*, 2020; Anyaegbu, 2021). There is evidence that these factors, along with unsuitable timings of appointments, possibly experienced due to difficulty of access in patients with probable co-morbidities associated with old age, reflect theoretical discrimination that service providers should consider (Jefferson *et al.*, 2019; McQueenie *et al.*, 2019).

Characteristics of the appointment booking system are also revealed as a contributing factor of DNAs, namely the booking of the appointment, patient involvement and the lead time (Fitzmaurice *et al.*, 2015; MacLellan *et al.*, 2015; Poll *et al.*, 2017; Williamson *et al.*, 2017; Allgood *et al.*, 2017; Dusheiko and Gravelle, 2015; Ellis *et al.*, 2017; Tan *et al.*, 2017; Eades and Alexander, 2019; Jefferson *et al.*, 2019; McQueenie *et al.*, 2019; Kiruparan *et al.*, 2020; Anyaegbu, 2021; Margham *et al.*, 2021).

The effect of the day and timing of the appointment found notable differences. Firth *et al.* (2020) observed that attendance was reflected by a “U”-shaped curve throughout the day, with most DNAs occurring around midday, whilst Fitzmaurice *et al.* (2015) found timing of the appointment had no impact on attendance, but the day of the week did, with Tuesday’s seeing the highest number of DNAs. Kiruparan *et al.* (2020) reported yet more inconsistencies, with Mondays producing the most DNAs, and evening clinics proving to have the highest attendance rates. If consistent evidence is identified in future research between the day and time of an appointment and non-attendance, this could assist in significantly reducing DNAs by alteration of appointment scheduling, and provide insight as to the benefit of out-of-hours clinics, however this review does not provide sufficient evidence to support this claim.

Reduced patient involvement is identified as another factor associated with DNAs, and several of the review articles shared key features of improving communication and encouragement of patients in making their own appointments, both of which were found to be major determinants of non-attendance (Tan *et al.*, 2017; Jefferson *et al.*, 2019; Firth *et al.*, 2020; Kiruparan *et al.*, 2020). In doing this, underlying causes of non-attendance, such as poor communication, short notification and inconvenient timings were negated. Kiruparan *et al.* (2020) identified that whilst lack of patient involvement is indeed one factor that increases the risk of DNAs, there is evidence to suggest the addition of a reminder service, in conjunction with patient involvement, is best practice.

The value of appointment reminders in reducing DNAs is a heavily discussed topic within this review (Fitzmaurice *et al.*, 2015; Hallsworth *et al.*, 2015; MacLellan *et al.*, 2015; Allgood *et al.*, 2017; Tan *et al.*, 2017; Jefferson *et al.*, 2019; Tomkins *et al.*, 2018; Kiruparan *et al.*, 2020; Anyaegbu, 2021; Margham *et al.*, 2021). There is a general consensus that reminders are of relatively low financial cost and effective at successfully improving attendance rates, and in particular SMS reminders. In all five studies that implemented the use of SMS reminders as an intervention, significant improvement in outcome was noted, and it was suggested that these reminders should be continued (Hallsworth *et al.*, 2015; Tan *et al.*, 2017; Tomkins *et al.*, 2018; Kiruparan *et al.*, 2020; Anyaegbu, 2021).

However, as previously noted, if the needs of the patient base are not taken into account, the benefits of SMS reminders can be conflicted, and indirectly fail to offer a service to certain populations (Kiruparan *et al.*, 2020; Anyaegbu, 2021) and once more the importance of a tailored service can be seen to be reiterated (Hallsworth *et al.*, 2015; Williamson *et al.*, 2017; Allgood *et al.*, 2017; Eades and Alexander, 2019; Jefferson *et al.*, 2019). Acknowledging this, two of these five studies researching the benefits of SMS reminders, used multiple reminders, in varying forms, and the authors strongly recommended this approach in increasing attendance due to the improvement seen (Tan *et al.*, 2017; Kiruparan *et al.*, 2020).

Continuing this theme of tailored reminders, Hallsworth *et al.* (2015) explores the importance of the wording contained within these reminders, believing that the improvement of healthcare systems performance is not solely dependent on technology. This study focuses on the concept of correcting perceptions of the “social norm” and is successful in illustrating

how tailored messages can result in changed behaviour. In particular, a significant drop in DNAs is seen to occur when specific costs are annotated in the reminder. Due to the shielding of direct healthcare costs within the NHS, Aggarwal *et al.* (2016) believe that there is strength to this suggestion that behavioural theories and financial cost can be combined and used to boost attendance. However, rather than the use of psychological variables to change patient attendance behaviour, this theoretical study by Aggarwal *et al.* (2016) considered the placement of actual financial penalties on patients who DNA, and the researchers ultimately concluded that the avoidance of this tactic would be more culturally acceptable within the NHS.

This section has examined the phenomenon of non-attendance and indicates that DNAs can be a major risk marker for poor health outcomes, and that for these patients, healthcare services may be ineffective. It is the recognition of this, and the modification of existing services that will ultimately enable the reduction of missed appointments.

5. Conclusion

There are many reasons for DNAs, and in the main most patients will re-attend without ill effect, however those that do not, face potential consequences of amplified health inequalities and poor health outcomes (Eades and Alexander, 2019; Poll *et al.*, 2017; McQueenie *et al.*, 2019; Sheridan *et al.*, 2019; Kiruparan *et al.*, 2020; Firth *et al.*, 2020).

DNAs have been shown to be linked to barriers to care and ineffective appointment booking systems (Fitzmaurice *et al.*, 2015; MacLellan *et al.*, 2015; Poll *et al.*, 2017; Williamson *et al.*, 2017; Allgood *et al.*, 2017; Dusheiko and Gravelle, 2015; Ellis *et al.*, 2017; Tan *et al.*, 2017; Eades and Alexander, 2019; Jefferson *et al.*, 2019; McQueenie *et al.*, 2019; Kiruparan *et al.*, 2020; Anyaegbu, 2021; Margham *et al.*, 2021). Gender was considered as a factor in DNAs, however no true significance was found to support this (Firth *et al.*, 2020; Kiruparan *et al.*, 2020). There was also a lack of consistency in the research to suggest that the timing of the appointment was significant, except for in those aged over 85. Age, however, was shown to have an association with DNAs, with more appointments being missed by those aged under 21 and those aged over 85 (Fitzmaurice *et al.*, 2015; Ellis *et al.*, 2017; Jefferson *et al.*, 2019; Sheridan *et al.*, 2019; Firth *et al.*, 2020). This was shown to be linked to lifestyle choices, technological barriers and a suggestion of inappropriate appointment timings faced by these populations. This is an area that could be researched further with the effect of out of hours or weekend clinics on non-attendance in those aged under 21, or over 85, with the aim of overcoming home and work commitments that act as barriers to care to these patients.

There was also shown to be a link between lower socioeconomic status and DNAs (Campbell-Richards, 2016; Ellis *et al.*, 2017; Allgood *et al.*, 2017; McQueenie *et al.*, 2019). DNAs in this population were shown in part to be due to barriers to care, and systematic changes in the service provision could assist in reducing these barriers and improving attendance, such as improving transport to the healthcare service, improving patient/clinician communication, and the use of alternative methods of reminders.

This literature review has identified strong, consistent evidence to support the use of reminders in a healthcare setting (Fitzmaurice *et al.*, 2015; Hallsworth *et al.*, 2015; MacLellan *et al.*, 2015; Aggarwal *et al.*, 2016; Morris *et al.*, 2017; Allgood *et al.*, 2017; Tan *et al.*, 2017; Tomkins *et al.*, 2018; Jefferson *et al.*, 2019; Kiruparan *et al.*, 2020; Anyaegbu, 2021; Margham *et al.*, 2021). Patient reminders were shown to significantly reduce DNAs, in particular SMS reminders were recommended. Multiple reminders were shown to be best practice, resulting in better outcomes, proving more effective than single reminders. This leads to the suggestion that all healthcare practices should send patients multiple reminders prior to appointments, using several different methods, such as a telephone confirmation followed by a text reminder. Further research could be conducted in this area with the aim of considering

alternative reminder systems for those at higher risk of missing appointments, such as those in lower socioeconomic populations and the older generation.

The wording in reminders, in line with the theory of planned behaviour was considered instrumental in improving DNA rates, as was the inclusion of appointment costs that patients are otherwise unaware of due to the nature of the NHS system (Hallsworth *et al.*, 2015).

Patient involvement in the appointment booking process was also suggested as a positive approach to adopt when booking appointments (Tan *et al.*, 2017; Jefferson *et al.*, 2019; Kiruparan *et al.*, 2020). This practice ensures common factors of DNAs are considered, including inconvenient timings, short notification, patient forgetfulness and poor communication.

The findings within this literature review are useful to all healthcare providers alike. Knowledge on how DNAs impact on patients and service provision is instrumental in developing an improved and quality service. It is this understanding that provides the means of implementing interventions that could mitigate the otherwise negative effects of non-attendance. The suggestions put forward in this review could be used to support change proposals in current practice.

5.1 Strengths and limitations

This review's strength lies in its breadth, as it covers all healthcare facilities within the NHS, and all study designs, providing a comprehensive overview of existing literature. However, it is recognised that there are some limitations to the review, incidentally, closely linked to the strengths already mentioned. Firstly, the comparison of data across all spectrums of the NHS, yielded from the literature search, proved problematic due to the vast differences in primary and secondary healthcare systems, and motivations behind attendance. Secondly, the inclusion of different study designs also proved difficult to directly compare research findings, as patient groups studied, sample size, intervention and outcome measures differed, and so data synthesis was limited to a narrative method.

5.2 Recommendations for future research

This review has been helpful in identifying areas in need of further investigation, one such area being the use of single and multiple reminders. Additional information is required to identify how these can be used for maximum effectiveness. It also became apparent that the decision taken to focus on all NHS healthcare services was too diverse, and more relevant findings would have been produced if a specific service had been the focus of the review, such as community mental health facilities. More uniform methods should be applied in future studies to provide greater validity and maximise generalisability. Nevertheless, it does show that interventions such as text reminders can be implemented successfully in a variety of healthcare settings.

The findings of this review have highlighted the complexity of non-attendance and established that DNAs are not a random occurrence. A comprehensive knowledge of the patient base should be considered essential, and used to predict non-attendance in individuals, enabling the identification of appropriate interventions. It is this continual development of the patient care delivery model that is essential to ensuring a suitable healthcare service is available for all; resulting in positive changes in attendance behaviour, with better outcomes for both the patient and the healthcare facility.

References

- Aggarwal, A., Davies, J. and Sullivan, R. (2016), "Nudge' and the epidemic of missed appointments", *Journal of Health Organization and Management*, Vol. 30 No. 4, pp. 558-564, doi: [10.1108/JHOM-04-2015-0061](https://doi.org/10.1108/JHOM-04-2015-0061).

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- Akter, S., Doran, F., Avila, C. and Nancarrow, S. (2014), "A qualitative study of staff perspectives of patient non-attendance in a regional primary healthcare setting", *Australasian Medical Journal*, Vol. 7 No. 5, pp. 218-226.
- Allgood, P., Maroni, R., Hudson, S., Offman, J., Turnbull, A., Peacock, L., Steel, J., Kirby, G., Ingram, C., Somers, J., Fuller, C., Threlfall, A., Gabe, R., Maxwell, A., Patnick, J. and Duffy, S. (2017), "Effect of second timed appointments for non-attenders of breast cancer screening in England: a randomised controlled trial", *The Lancet Oncology*, Vol. 18 No. 7, pp. 972-980, doi: [10.1016/S1470-2045\(17\)30340-6](https://doi.org/10.1016/S1470-2045(17)30340-6).
- Anyagbu, C. (2021), "SMS reminders: reducing DNA at a community mental health depot clinic", *Journal of Community Nursing*, Vol. 35 No. 1, pp. 50-55.
- Aveyard, H. (2019), *Doing a Literature Review in Health and Social Care: A Practical Guide*, Open University Press, London.
- Bar-dayan, Y. (2002), "Waiting time is a major predictor of patient satisfaction in a primary military clinic", *Military Medicine*, Vol. 167 No. 10, pp. 842-845, doi: [10.1093/milmed/167.10.842](https://doi.org/10.1093/milmed/167.10.842).
- Bower, P., Roland, M., Campbell, J. and Mead, N. (2003), "Setting standards based on patient's views on access and continuity: secondary analysis of data from the general practice assessment survey", *British Medical Journal*, Vol. 326 No. 7383, pp. 258-260, doi: [10.1136/bmj.326.7383.258](https://doi.org/10.1136/bmj.326.7383.258).
- Brewster, S., Bartholomew, J., Holt, R. and Price, H. (2020), "Non-attendance at diabetes outpatient appointments: a systematic review", *Diabetic Medicine*, Vol. 37 No. 9, pp. 1427-1442, doi: [10.1111/dme.14241](https://doi.org/10.1111/dme.14241).
- Campbell, K., Millard, A., McCartney, G. and McCullough, S. (2015), "Who is least likely to attend? An analysis of outpatient appointment 'did not attend' (DNA) data in Scotland", available at: http://www.healthscotland.scot/media/1131/5317_dna-analysis_national.pdf (accessed 20 June 2021).
- Campbell-Richards, D. (2016), "Exploring diabetes non-attendance: an Inner London perspective", *Journal of Diabetes Nursing*, Vol. 20 No. 2, pp. 73-78.
- Craven, J. and Levay, P. (2011), "Recording database searches for systematic reviews - what is the value of adding a narrative to peer-review checklists? A case study of NICE interventional procedures guidance", *Evidence Based Library and Information Practice*, Vol. 6 No. 4, pp. 72-87.
- Dusheiko, M. and Gravelle, H. (2015), "Choosing and booking – and attending? Impact of an electronic booking system on outpatient referrals and non-attendances", *Health Economics*, Vol. 27 No. 2, pp. 357-371, doi: [10.1002/hec.3552](https://doi.org/10.1002/hec.3552).
- Eades, C. and Alexander, H. (2019), "A mixed-methods exploration of non-attendance at diabetes appointments using peer researchers", *Health Expectations*, Vol. 22 No. 6, pp. 1260-1271, doi: [10.1111/hex.12959](https://doi.org/10.1111/hex.12959).
- Ellis, D., McQueenie, R., McConnachie, A., Wilson, P. and Williamson, A. (2017), "Demographic and practice factors predicting repeated non-attendance in primary care: a national retrospective cohort analysis", *The Lancet Public Health*, Vol. 2 No. 12, pp. e551-e559, doi: [10.1016/S2468-2667\(17\)30217-7](https://doi.org/10.1016/S2468-2667(17)30217-7).
- Falagas, M., Pitsouni, E., Malietzis, G. and Pappas, G. (2008), "Comparison of PubMed, scopus, web of science, and google scholar: strengths and weaknesses", *The FASEB Journal*, Vol. 22 No. 2, pp. 338-342, doi: [10.1096/fj.07-9492LSF](https://doi.org/10.1096/fj.07-9492LSF).
- Ferro, D., Brailsford, S., Bravo, C. and Smith, H. (2020), "Improving healthcare access management by predicting patient no-show behaviour", *Decision Support Systems*, Vol. 138 No. 2020, 113398, doi: [10.1016/j.dss.2020.113398](https://doi.org/10.1016/j.dss.2020.113398).
- Firth, N., Bone, C. and Holt, R. (2020), "Health psychology attendance: a multilevel analysis of patient-level predictors and therapist effects", *Society for Health Psychology*, Vol. 39 No. 11, pp. 945-955, doi: [10.1037/hea0001021](https://doi.org/10.1037/hea0001021).
- Fitzmaurice, B., Rogan, A., Wong, T., Akhtar, S. and Rayen, A. (2015), "Why do patients miss and cancel their chronic pain management appointments?", *The Internet Journal of Anaesthesiology*, Vol. 34 No. 1, pp. e1-e7, available at: <https://ispub.com/doi/10.5580/IJA.31275>.

- Guedes, R., Leite, I. and Baptista, A. (2014), "Dermatology missed appointments: an analysis of outpatient non-attendance in a general hospital's population", *International Journal of Dermatology*, Vol. 53 No. 1, pp. 39-42, doi: [10.1111/j.1365-4632.2012.05710.x](https://doi.org/10.1111/j.1365-4632.2012.05710.x).
- Hallsworth, M., Berry, D., Sanders, M., Sallis, A., King, D., Vlaev, I. and Darzi, A. (2015), "Stating appointment costs in SMS reminders reduces missed hospital appointments: findings from two randomised controlled trials", *PLoS One*, Vol. 10 No. 9, pp. e1-e14, doi: [10.1371/journal.pone.0137306](https://doi.org/10.1371/journal.pone.0137306).
- Hickson, M. (2013), *Research Handbook for Healthcare Professionals*, John Wiley & Sons, Hoboken.
- Horigan, G., Davies, M., Findlay-White, F., Chaney, D. and Coates, V. (2017), "Reasons why patients referred to diabetes education programmes choose not to attend: a systematic review", *Diabetic Medicine*, Vol. 34 No. 1, pp. 14-26, doi: [10.1111/dme.13120](https://doi.org/10.1111/dme.13120).
- Jefferson, L., Atkin, K., Sheridan, R., Oliver, S., Macleod, U., Hall, G., Forbes, S., Green, T., Allgar, V. and Knapp, P. (2019), "Non-attendance at urgent referral appointments for suspected cancer: a qualitative study to gain understanding from patients and GPs", *British Journal of General Practice*, Vol. 69 No. 689, pp. e850-e859, doi: [10.3399/bjgp19X706625](https://doi.org/10.3399/bjgp19X706625).
- Kiruparan, P., Kiruparan, N. and Debnath, D. (2020), "Impact of pre-appointment contact and short message service alerts in reducing 'Did Not Attend' (DNA) rate on rapid access new patient breast clinics: a DGH perspective", *BMC Health Services Research*, Vol. 20 No. 1, pp. 757-765, doi: [10.1186/s12913-020-05627-2](https://doi.org/10.1186/s12913-020-05627-2).
- Lee, R., Samsudin, M., Thirumoorthy, T., Low, L. and Kwan, Y. (2019), "Factors affecting follow-up non-attendance in patients with type 2 mellitus and hypertension: a systematic review", *Singapore Medical Journal*, Vol. 60 No. 5, pp. 216-223, doi: [10.11622/smedj.2019042](https://doi.org/10.11622/smedj.2019042).
- MacDonald, K., Bryce, C. and Graber, M. (2013), "The patient is in: patient involvement strategies for diagnostic error mitigation", *BMJ Quality and Safety*, Vol. 22, Suppl2, pp. 33-39, doi: [10.1136/bmjqs-2012-001623](https://doi.org/10.1136/bmjqs-2012-001623).
- MacLellan, J., Wallace, K., Vacchelli, E., Roe, J., Davidson, R., Abubakar, I. and Southern, J. (2015), "A multi-perspective service evaluation exploring tuberculosis contact screening attendance among adults at a North London hospital", *Journal of Public Health*, Vol. 38 No. 3, pp. 362-367, doi: [10.1093/pubmed/fdv129](https://doi.org/10.1093/pubmed/fdv129).
- Mander, G., Reynolds, L., Cook, A. and Kwan, M. (2018), "Factors associated with appointment non-attendance at a medical imaging department in regional Australia: a retrospective cohort analysis", *Journal of Medical Radiation Sciences*, Vol. 65 No. 3, pp. 192-199, doi: [10.1002/jmrs.284](https://doi.org/10.1002/jmrs.284).
- Margham, T., Williams, C., Steadman, J. and Hull, S. (2021), "Reducing missed appointments in general practice: evaluation of a quality improvement programme in East London", *British Journal of General Practice*, Vol. 71 No. 702, pp. e31-e38, doi: [10.3399/bjgp20X713909](https://doi.org/10.3399/bjgp20X713909).
- Martin, C., Perfect, T. and Mantle, G. (2005), "Non-attendance in primary care: the views of patients and practices on its causes, impact and solutions", *Family Practice*, Vol. 22 No. 6, pp. 638-643, doi: [10.1093/fampra/ctmi076](https://doi.org/10.1093/fampra/ctmi076).
- Masoud, T., Shah, A., Jooman, S. and Shah, A. (2017), "Reducing DNA rates and increasing positive contacts in an outpatient chronic fatigue service", *BMJ Quality Improvement Reports*, Vol. 6 No. 1, pp. e1-e5, doi: [10.1136/bmjquality.u212876.w5262](https://doi.org/10.1136/bmjquality.u212876.w5262).
- McLean, S., Gee, M., Booth, A., Salway, S., Nancarrow, S., Cobb, M. and Bhanbhro, S. (2014), "Targeting the use of reminders and notifications for uptake by populations (TURNUP): a systematic review and evidence synthesis", *NIHR Journals Library*, Vol. 2 No. 34, pp. 1-184, doi: [10.3310/hsdr02340](https://doi.org/10.3310/hsdr02340).
- McLean, S., Booth, A., Gee, M., Salway, S., Cobb, M., Bhanbhro, S. and Nancarrow, S. (2016), "Appointment reminder systems are effective but not optimal: results of a systematic review and evidence synthesis employing realist principles", *Patient Prefer and Adherence*, Vol. 2016 No. 10, doi: [10.2147/PPA.S93046](https://doi.org/10.2147/PPA.S93046).

-
- McQueenie, R., Ellis, D.A., McConnachie, A., Wilson, P. and Williamson, A. (2019), "Morbidity, mortality and missed appointments in healthcare: a national retrospective data linkage study", *BMC Medicine*, Vol. 17 No. 1, pp. 1-9, doi: [10.1186/s12916-018-1234-0](https://doi.org/10.1186/s12916-018-1234-0).
- Morris, J., Campbell-Richards, D., Wherton, J., Sudra, R., Vijayaraghavan, S., Greenhalgh, T., Collard, A., Byrne, E. and O'Shea, T. (2017), "Webcam consultations for diabetes: findings from four years of experience in Newham", *Practical Diabetes*, Vol. 34 No. 2, pp. 45-50, doi: [10.1002/pdi.2078](https://doi.org/10.1002/pdi.2078).
- Munasinghe, S., Page, A., Mannan, H., Ferdoudi, S. and Peek, B. (2020), "Determinants of treatment non-attendance among those referred to primary mental health care services in Western Sydney: a retrospective cohort study", *BMJ Open*, Vol. 10 No. 10, pp. e1-e9, doi: [10.1136/bmjopen-2020-039858](https://doi.org/10.1136/bmjopen-2020-039858).
- Murray, M. and Tantau, C. (2000), "Same day appointments: exploding the access paradigm", *Family Practice Management*, Vol. 7 No. 8, pp. 45-50.
- NHS (2019), "Missed GP appointments costing NHS millions", available at: <https://www.england.nhs.uk/2019/01/missed-gp-appointments-costing-nhs-millions/> (accessed 13 March 2021).
- NHS (2021), "NHS long term plan", available at: <https://www.longtermplan.nhs.uk/> (accessed 13 May 2021).
- Opon, S., Tenambergen, W. and Njoroge, K. (2020), "The effect of patient reminders in reducing missed appointment in medical settings: a systematic review", *PAMJ One Health*, Vol. 2 No. 9, pp. e1-e10, doi: [10.11604/pamj-oh.2020.2.9.21839](https://doi.org/10.11604/pamj-oh.2020.2.9.21839).
- Parente, C., Salvatore, D., Gallo, G. and Cipollini, F. (2018), "Using overbooking to manage no-shows in an Italian healthcare centre", *BMC Health Services Research*, Vol. 18 No. 1, pp. e185, doi: [10.1186/s12913-018-2979-z](https://doi.org/10.1186/s12913-018-2979-z).
- Parsons, J., Bryce, C. and Atherton, H. (2021), "Which patients miss appointments with general practice and the reasons why: a systematic review", *British Journal of General Practice*, Vol. 71 No. 707, pp. e406-e412, doi: [10.3399/BJGP.2020.1017](https://doi.org/10.3399/BJGP.2020.1017).
- Petrou, P., Samoutis, G. and Lionis, C. (2018), "Single-payer or a multipayer health system: a systematic literature review", *Public Health*, Vol. 163, pp. 141-152, doi: [10.1016/j.puhe.2018.07.006](https://doi.org/10.1016/j.puhe.2018.07.006).
- Poll, R., Allmark, P. and Tod, A. (2017), "Reasons for missed appointments with a hepatitis C outreach clinic: a qualitative study", *International Journal of Drug Policy*, Vol. 39, pp. 130-137, doi: [10.1016/j.drugpo.2015.12.027](https://doi.org/10.1016/j.drugpo.2015.12.027).
- Powell, C. and Appleton, J. (2012), "Children and young people's missed healthcare appointments: reconceptualising 'did not attend' to 'was not brought' – a review of the evidence for practice", *Journal of Research in Nursing*, Vol. 17 No. 2, pp. 181-192, doi: [10.1177/1744987112438158](https://doi.org/10.1177/1744987112438158).
- Ramlucken, L. and Sibiya, M. (2018), "Frequency and reasons for missed appointments of outpatient mental health care users in the uMgungundlovu District", *Curationis*, Vol. 41 No. 1, pp. 1-4, doi: [10.4102/curationis.v41i1.1835](https://doi.org/10.4102/curationis.v41i1.1835).
- Rohman, L., Maruszewski, D. and Boyce Cam, N. (2015), "The impact of a text messaging service on orthopaedic clinic Did Not Attend rates", *Journal of Telemedicine and Telecare*, Vol. 21 No. 7, pp. 408-413, doi: [10.1177/1357633X15583778](https://doi.org/10.1177/1357633X15583778).
- Rutherford, M., McKenzie, K., Forsyth, K., McCartney, D., O'Hare, A., McClure, I. and Irvine, L. (2016), "Why are they waiting? Exploring professional perspectives and developing solutions to delayed diagnosis of autism spectrum disorder in adults and children", *Research in Autism Spectrum Disorders*, Vol. 31, pp. 53-65, doi: [10.1016/j.rasd.2016.06.004](https://doi.org/10.1016/j.rasd.2016.06.004).
- Schwebel, F. and Larimer, M. (2018), "Using text message reminders in health care services: a narrative literature review", *Internet Interventions*, Vol. 13, pp. 82-104, doi: [10.1016/j.invent.2018.06.002](https://doi.org/10.1016/j.invent.2018.06.002).
- Sharma, S., Cruise, A., Salamasi, H. and Narula, A. (2014), "Non-attendance at the ENT outpatient clinic", *Bulletin of the Royal College of Surgeons of England*, Vol. 96 No. 2, pp. e6-e9, doi: [10.1308/003588414X13814021677197](https://doi.org/10.1308/003588414X13814021677197).

- Sheridan, R., Oliver, S., Hall, G., Allgar, V., Melling, P., Bolton, E., Atkin, K., Denton, D., Forbes, S., Green, T., Macleod, U. and Knapp, P. (2019), "Patient non-attendance at urgent referral appointments for suspected cancer and its links to cancer diagnosis and one year mortality: a cohort study of patients referred on the Two Week Wait pathway", *Cancer Epidemiology*, Vol. 63, pp. e1-e11, doi: [10.1016/j.canep.2019.101588](https://doi.org/10.1016/j.canep.2019.101588).
- Sims, H., Sanghara, H., Hayes, D., Wandiembe, S., Finch, M., Jakobsen, H., Tsakanikos, E., Okocha, C. and Kravariti, E. (2012), "Text message reminders of appointments: a pilot intervention at four community mental health clinics in London", *Psychiatric Services*, Vol. 63 No. 2, pp. 161-168, doi: [10.1176/appi.ps.201100211](https://doi.org/10.1176/appi.ps.201100211).
- Slive, A. and Bobele, M. (2013), "Walk in counselling services: making the most of one hour", *Australian and New Zealand Journal of Family Therapy*, Vol. 33 No. 1, pp. 27-38, doi: [10.1017/aft.2012.4](https://doi.org/10.1017/aft.2012.4).
- Tan, E., Shah, A., De Souza, W., Harrison, M., Chettur, C., Onathukattil, M., Smart, M., Mata, M., Chitewe, A. and Binley, E. (2017), "Improving the patient booking service to reduce the number of missed appointments at east London NHS foundation trust community musculoskeletal physiotherapy service", *BMJ Open Quality*, Vol. 6 No. 2, e000093, doi: [10.1136/bmjopen-2017-000093](https://doi.org/10.1136/bmjopen-2017-000093).
- Tomkins, A., Naylor, S. and Morgan, E. (2018), "Short message service cancellation intervention to reduce integrated sexual health and HIV 'did not attend' appointment rates", *International Journal of STD and AIDS*, Vol. 30 No. 2, pp. 201-203, doi: [10.1177/0956462418804656](https://doi.org/10.1177/0956462418804656).
- Ullah, S., Rajan, S., Liu, T., Demagistris, E., Jahrstorfer, R., Anandan, S., Gentile, C. and Gill, A. (2018), "Why do patients miss their appointments at primary care clinics?", *Journal of Family Medicine and Disease Prevention*, Vol. 4 No. 3, pp. e1-e5, doi: [10.23937/2469-5793/1510090](https://doi.org/10.23937/2469-5793/1510090).
- Williamson, A., Ellis, D.A., Wilson, P., McQueenie, R. and McConnachie, A. (2017), "Understanding repeated non-attendance in health services: a pilot analysis of administrative data and full study protocol for a national retrospective cohort", *BMJ Open*, Vol. 7 No. 2, p. e014120, doi: [10.1136/bmjopen-2016-014120](https://doi.org/10.1136/bmjopen-2016-014120).
- Winchester, C. and Salji, M. (2016), "Writing a literature review", *Journal of Clinical Urology*, Vol. 9 No. 5, pp. 308-312, doi: [10.1177/2051415816650133](https://doi.org/10.1177/2051415816650133).
- Wolff, D., Waldorff, F., Plessen, C., Mogensen, C., Sorensen, T., Houlind, K., Bogh, S. and Rubin, K. (2019), "Rate and predictors for non-attendance of patients undergoing hospital outpatient treatment for chronic diseases: a register-based cohort study", *BMC Health Services Research*, Vol. 19 No. 1, pp. 386-397, doi: [10.1186/s12913-019-4208-9](https://doi.org/10.1186/s12913-019-4208-9).
- Wolthers, O. (2018), "Non-attendance in a secondary paediatric referral centre", available at: https://ugeskriftet.dk/files/scientific_article_files/2018-10/a5515_0.pdf (accessed 02 July 2021).
- Yasin, A., Fatima, R., Wen, L., Afzal, W., Azhar, M. and Torkar, R. (2020), "On using grey literature and Google Scholar in systematic literature reviews in software engineering", *IEEE*, Vol. 8, pp. 1099-1100, doi: [10.1109/ACCESS.2020.2971712](https://doi.org/10.1109/ACCESS.2020.2971712).

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