Reducing missed appointments in general practice: evaluation of a quality improvement programme in east London.

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Abstract

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Background

Missed appointments are common in primary care, contributing to reduced clinical capacity. NHS England estimates there are 7.2 million missed general practice appointments annually, at a cost of £216 million. Reducing these numbers is important for an efficient primary care sector. Missed appointments may translate to patient presentations at less appropriate care settings with additional health and financial costs.

Aims

To evaluate the impact of a system wide quality improvement (QI) programme on the rates of missed appointments with general practitioners (GPs), and to identify effective practice interventions.

Design and setting

Based in a clinical commissioning group (CCG) in east London, with an ethnically diverse and socially deprived population. 25/32 practices engaged with the programme.

Method

Study practices engaged in a generic quality improvement programme which included sharing data on appointment systems and *Did Not Attend* (DNA) rates. 14/25 practices implemented DNA reduction projects supported by practice-based coaching.
Appointment data was collected from practice electronic health records.
Evaluation included comparisons of DNA rates pre- and post-intervention using interrupted times series analysis.

Results

The average DNA rate at baseline was 7% (range 2-12%). Two years following the generic intervention DNA rates were 5.2%. This equates to a reduction of 4,030 missed appointments. The most effective practice intervention was reducing the forward booking time to 24 hours.

Conclusions

Forward booking time in days is the best predictor of practice DNA rates. Sharing appointment data produced a significant reduction in missed appointments. Behaviour change interventions with patients had a modest additional impact. In contrast, introducing structural change to the appointment system effectively reduced DNA rates. To reduce non-attendance the appointment system needs to change – not the patient.

How this Fits in

Missed appointments (DNAs) in general practice reduce clinical capacity and waste money. Most research on reducing DNAs focus on changing patient behaviour to optimise the existing appointment system.

This study shows the impact of quality improvement coaching, including sharing appointment system data, among practices in one CCG. A case study illustrates how structural change to the appointment system can produce sustained reductions in DNA rates.

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Background

Non-attendance for appointments is a widely experienced problem across healthcare settings. In primary care *Did Not Attend* (DNAs) result in wasted appointments, reduced clinical capacity and inequality of access to healthcare.(1) NHS England reports that '*missed GP appointments cost millions',* calculating that 5% - more than 15 million - appointments in primary care are missed every year of which 7.2 million are booked GP appointments.(2) This equates to 1.2 million GP hours with estimated NHS costs of £216 million annually. To address these costs NHS England exhorts patients to *"cancel appointments rather than just not show up"*. Such reports also generate media headlines: *"GP appointments missed by 20,000 patients each day. Failure to attend wastes £200m a year".(*3*)* This comes at a time of constrained NHS finances, and lengthening waiting times to see a GP.(4)

Non-attendance as a problem is a relatively recent phenomenon, arising from the creation of appointment systems. Between 1951 and 1981 the proportion of practices in the UK using an appointment system increased from 2% to 88%.(5)

GPs and reception teams typically cite patient factors as the main driver for non-attendance, and judge patients who DNA as being forgetful, leading chaotic lives or not valuing the appointment enough to attend.(6) Reception teams feel the impact of DNAs on capacity most acutely, as they try to fit patients in to scarce appointments.(7) In contrast many GPs might challenge the assertion that all DNAs represent 'waste'. The time is filled with other work, particularly when they happen late in in a surgery session.(7) DNAs can also be an indicator of patient risk, for example a pointer to possible neglect in a child repeatedly not brought to appointments. There are also vulnerable patient groups, where a missed appointment may trigger a proactive check on welfare.(1)

Patients report competing demands that influence their attendance. Fitting appointments around work and family commitments, difficulty in getting an appointment and long wait times are reported as factors influencing non-attendance. Busy phone lines act as a barrier to cancelling appointments.(7, 8) Viewed from a systems-perspective the percentage of DNAs is a useful indicator of the 'health' of an appointment system. In the study CCG, practices with good access (based on national surveys and Healthwatch data) have lower DNA rates.(9)

There are conflicting motivations for addressing the problem of DNAs. For many GPs they represent a chance to catch-up or take a comfort break during a long surgery session. In UK general practice, with capitation as the largest funding element, there is no direct financial incentive to address non-attendance. This contrasts with healthcare systems based on item of service or attendance payments. However, addressing DNA rates is important for an efficient primary care sector. A missed appointment does not necessarily mean the problem has resolved. The patient may still present, but at less convenient times and in less appropriate settings, with the additional health and financial implications that frequently accompany a worsening condition.(10)

When considering DNA rates it is important to recognise that GP surgeries essentially run two systems in parallel. Reactive care, which comprises most GP workload, and planned care for long-term conditions provided by nursing and healthcare assistant workforce. These two systems function differently, and should be considered separately. In east London a consistent finding is that DNA rates for nursing or community pharmacist appointments (proactive care) are twice that of GP appointments (reactive care). As GP appointments comprise the largest volume and cost to the service they are the focus of this study.

Study Aims

1. To evaluate the impact on practice DNA rates of a system-wide quality improvement programme (EQUIP) which includes data sharing on appointment systems and DNA rates.
2. To compare the effectiveness of different interventions to reduce DNA rates for GP appointments.

Methods

Setting

This quality improvement project was set in east London primary care between April 2017 to March 2019. All 32 practice teams in Tower Hamlets Clinical Commissioning Group (CCG) were invited by the project organisers to participate. 25/32 practices, with a registered population of 238,090, engaged with the project. In the 2011 UK Census, almost half of the population in this CCG is of non-white ethnic origin(11), and the locality falls in the lowest decile for social deprivation in England.(12)

All practices in the CCG use the EMIS Web clinical system (13), and have access to Edenbridge Apex, a business intelligence and data visualisation platform with an Approved Provider Interface with EMIS Web.(14) In-practice configuration of Edenbridge Apex ensured that the software reliably captured GP appointment activity.

Intervention

EQUIP (Enabling Quality Improvement in Practice) is a quality improvement (QI) programme funded by Tower Hamlets CCG. The aim is to empower practice staff to make, and evaluate, operational changes which have a tangible impact on staff and patient satisfaction. (15)

Practices taking part in the EQUIP programme:

- Sign a data sharing agreement.
- Have access to QI training. This included a half-day basic training and coached learning sets with three days of face-to-face learning over four months.
- Attend a facilitated ‘Data Wall’ session where practice teams have a 360 degree view of their practice using the 5Ps (Purpose, Process, Patients, People, Patterns) framework (16). This is a tested method encouraging team members to ask new

questions about their system. Discoveries made using the 5Ps help teams select their own themes for improvement. Data walls contain detailed information on patterns of access, time lost to DNAs, and DNA rates plotted against the forward booking time.

- Regular in-practice coaching from external improvement coaches who support the projects which each practice chooses to undertake.
- Access to LifeQI, an online project management platform allowing teams to track their improvement work.(17)

Practice generated improvement themes included managing test results, increasing use of online services and improving document workflow. During the study period 14/25 practices tested approaches to reduce DNA rates. Most practices chose patient behavioural interventions such as publicising the number of appointments lost to DNAs, SMS reminders, hotline/text cancellation services or telephone reminders for those with a history of DNAs. Collectively we characterised these changes as *'nudge'* as they focus on patient behaviour change, encouraging altruistic behaviour to enable the existing system to run effectively.

One practice instituted a systematic change to the appointment system reducing the maximum booking time from one month to one working day.

Data sources

Monthly appointment data for practices were collected from EMIS Web between April 2014 and March 2019. Data included the number and type of appointments booked, DNAs, and length of time between booking and appointment. For each practice which undertook a '*reducing DNA project'* the intervention start date was recorded.

Patient-level data were pseudonymised at source and extracted from individual practices for analysis through Edenbridge Apex software.

The monthly practice DNA rate was calculated as the number of DNAs / number of appointments booked. The DNA status of an appointment is automatically recorded on EMIS Web at 10 minutes after the booked time. This is an automatic setting within EMIS hence the data was not susceptible to practice variation in data collection.

Data analysis

To investigate whether the DNA rate declined after a generic intervention in the 25 EQUIP practices, or following specific DNA project work in 14 practices, interrupted time series analysis, based on Poisson regression models, was used. (18) The main outcome was a difference in slope of the DNA trend line pre and post intervention. As practices had different intervention start dates, these were taken into account during analysis. All models were corrected for over-dispersion. Analysis was undertaken in STATA version 16.0.

Results

Data from all 32 practices in Tower Hamlets CCG were available for analysis, comprising more than 4 million booked appointments between April 2014 and March 2019. Before the project start (April 2016) the mean DNA rate across all practices was 7.0%, with a range of 2-12% (see Figure 1). This variation in DNA rates between practices was unrelated to practice size. Smaller practices with a list size ≤6,000 showed a similar range of variation as practices with a list size ≥10,000. (see Table 1 for baseline practice data)

Baseline data for all practices in the CCG, showed a positive association between the DNA rate and the length of time in days between booking and the appointment date (see Figure 2). Booking in advance beyond 2 days explained 75% of the DNA total.

To investigate whether the DNA rate declined after the generic intervention in the 25 EQUIP practices, an interrupted time series analysis was used, comparing 25 EQUIP project practices with 7 non-EQUIP practices which acted as natural controls. (see Figure 3). For all 25 EQUIP practices the observed rate of DNA is 0.052 (5.2%) at 24 months after the intervention. Had the intervention not been in place the predicted rate of DNA would be 5.8%. This difference is equivalent to an absolute reduction of 4,031 DNAs per year (based on 762,851 booked appointments in 2018). As a DNA costs £30 (2), this represents an estimated saving of £120,930 per year for the 25 EQUIP practices.

A similar analysis was used to examine the change in DNA rates after specific DNA-projects in 14 practices. The 11 comparison practices undertook a range of QI projects unconnected with DNA rates. This showed that DNA-project practices had a modest additional drop in DNA rates compared to practices undertaking other projects. (see Supplementary Figure 1).

Case study

One of the 14 practices working on DNA reduction projects implemented a systematic change to their appointment system. This involved reducing the forward booking availability from one month to one working day.

Practice X, with a registered population of 9000 patients, faced a shortfall of appointments due to GP changes. Just prior to the intervention they had a 9.5% DNA rate for GP appointments, equivalent to over 6 hours of GP time each week. Using Edenbridge Apex the team identified that >70% of DNAs occurred when the gap between booking and appointment date was over two days. They decided to test reducing the booking time from 28 days to one working day.

The team discussed which groups of patients might be disadvantaged by this approach, (carers and patients with specific advocacy needs which require advance booking) and exempted them from the policy. Following the intervention DNAs rapidly fell to 3-4%; this level was maintained to the end of the study period.

There were some adverse effects from the change. The supply of appointments was still not sufficient to meet demand, and patients had to call again if there were no appointments the next working day. As mitigation, the practice now has a small number of advance appointments, and allows online booking a few days in advance, as these appointments have lower DNA rates.

This case study demonstrates that addressing DNAs alone is insufficient, and needs to be seen in the broader context of practice work on capacity and demand.

Prior to the system change the average DNA rate for this practice was 7.8%. After making the change the DNA rate fell rapidly, reaching 3.9% by 24 months following the intervention. (see Figure 4)

Discussion

Summary

Before the intervention practice DNA rates ranged from 2-12% and showed a consistent relationship to the length of forward booking. This is the first study to demonstrate the impact of data sharing and generic QI training on appointment systems and demand management across practices in a local health economy. The reduction in DNAs across the 25 study practices equated to 4,031 gained appointments and a potential saving of £120,930 per year.

Most practices chose to test patient behaviour change interventions, leaving the appointment system unchanged. Our data support previous findings that such interventions have only a modest impact. The single practice which made a system change had the greatest effect on DNA rates, sustained to the end of the study period.

Strengths and limitations

This study is based on data from over 4 million GP appointments over five years, in a multi-ethnic, deprived urban area where most practices had DNA rates above the national average. The data on appointment booking and DNA rates are robust, being a core element of the computer system used by all practices in the study locality. Although practices started their DNA interventions at different times, it was possible to take account of this in the evaluation.

Study weaknesses include the heterogeneity of practice behavioural change interventions, and the fact that only one practice made a structural change to the appointment system. The study was a non-randomised quality improvement project, hence we were unable to take account of practice selection bias, or other important contextual factors which may independently affect DNA rates.

Comparison with existing literature

Most published literature on primary care DNAs focuses on the behaviour of the service-user to explain non-attendance. Explanatory characteristics include young age (19), ethnicity (19-22), literacy levels and depression (8, 23) rurality and deprivation. (1, 24)

Published interventions to reduce DNAs similarly concentrate on behaviour change. These include getting patients to record their appointment times, reinforcing positive attending behaviours (10) and focusing on ‘hot spotters’, when service users *‘at high risk of no-shows’* are targeted.(20, 21) Studies have explored appointment reminder systems such as SMS (7, 21-23, 25-27) or compared SMS and telephone reminders.(26) In general such interventions have only a modest impact, and generate associated financial and resource costs. Other interventions, such as ‘*dynamic scheduling*’, attempt to increase efficiency by overbooking based on predictions of DNA numbers (28). Dynamic scheduling suggests innovative practice, however in reality most GPs operate a process of overbooking on a daily basis.

System change, in particular the reduction of advance appointment booking, although only undertaken by one practice, had the largest sustained effect. This concurs with the literature around advanced access models. (29, 30)

Implications for research and practice

This study demonstrates the impact of sharing practice organisational data in an easily accessible format, alongside QI training and coaching to support changes to GP appointment systems.

Most practices chose to test behavioural interventions to reduce DNAs despite being given information showing that booking delay is the major driver of DNA rates. This suggests that whilst system change is more impactful, it is more challenging for providers, requiring major changes to work routines. The one practice that changed the appointment system was forced to reassess access in response to a staffing crisis. It often takes a crisis to justify taking the (perceived) risk of changing ingrained working practices. The COVID-19 pandemic has accelerated change in general practice, with rapid adjustment to telephone triage of all appointments and remote consultations. We include a chart (supplementary Figure 2) showing the rapid fall in DNAs across all study practices from the start of the London epidemic.

This study highlights some of the challenges of undertaking improvement work with independent organisations. Whilst it seemed clear to facilitators which interventions would be effective, each practice was encouraged to choose the components of their improvement work. This creates obstacles to maximising the impact and effective evaluation of improvement work. As Dixon Woods reports ‘*Having hundreds of organisations all trying to do their own thing also means much waste, and the absence of harmonisation across basic processes introduces inefficiencies and risks’* (31).

Much is already known about demand, capacity and patient flow in primary care, hence the wide variation in appointment systems is noteworthy – given that a major component of general practice business is the provision of GP appointments. Access remains a continuing challenge in primary care, and the inconvenient truth remains that the existing GMS capitation-based contract provides little financial incentive to improve access.

GP DNA rates illustrate the improvement mantra that, "*every system is perfectly designed to get the results it gets*" .(32) DNAs should be viewed as an inevitable outcome of an appointment system, rather than a patient problem. And therefore, to meaningfully reduce non-attendance the appointment system itself needs to be altered, rather than just the behaviour of patients using the system.

DECLARATIONS

Ethics approval and consent to participate

Ethical approval was not required for this service improvement evaluation. This is compliant with national guidance: http://www.hra-decisiontools.org.uk/ethics/resultN2.html.
All patient-level data are anonymised, and only aggregated patient data are reported in this study. All GPs in the participating east London practices provide written consent to the use of their anonymised patient data for research and development for patient benefit.

Availability of Data and Materials

The datasets generated and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors have declared no competing interests.

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Authors' Contributions

The study was designed by TM and SH. JS undertook the literature review and collated the data. Data analysis was by CW.
The report was drafted by TM. All authors contributed to writing and review of the report. All authors have read and approve the final version.
TM is the guarantor of the project.

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Figure 1. Quarterly practice DNA% plotted against number of booked appointments. (Jan-March 2016 pre intervention).

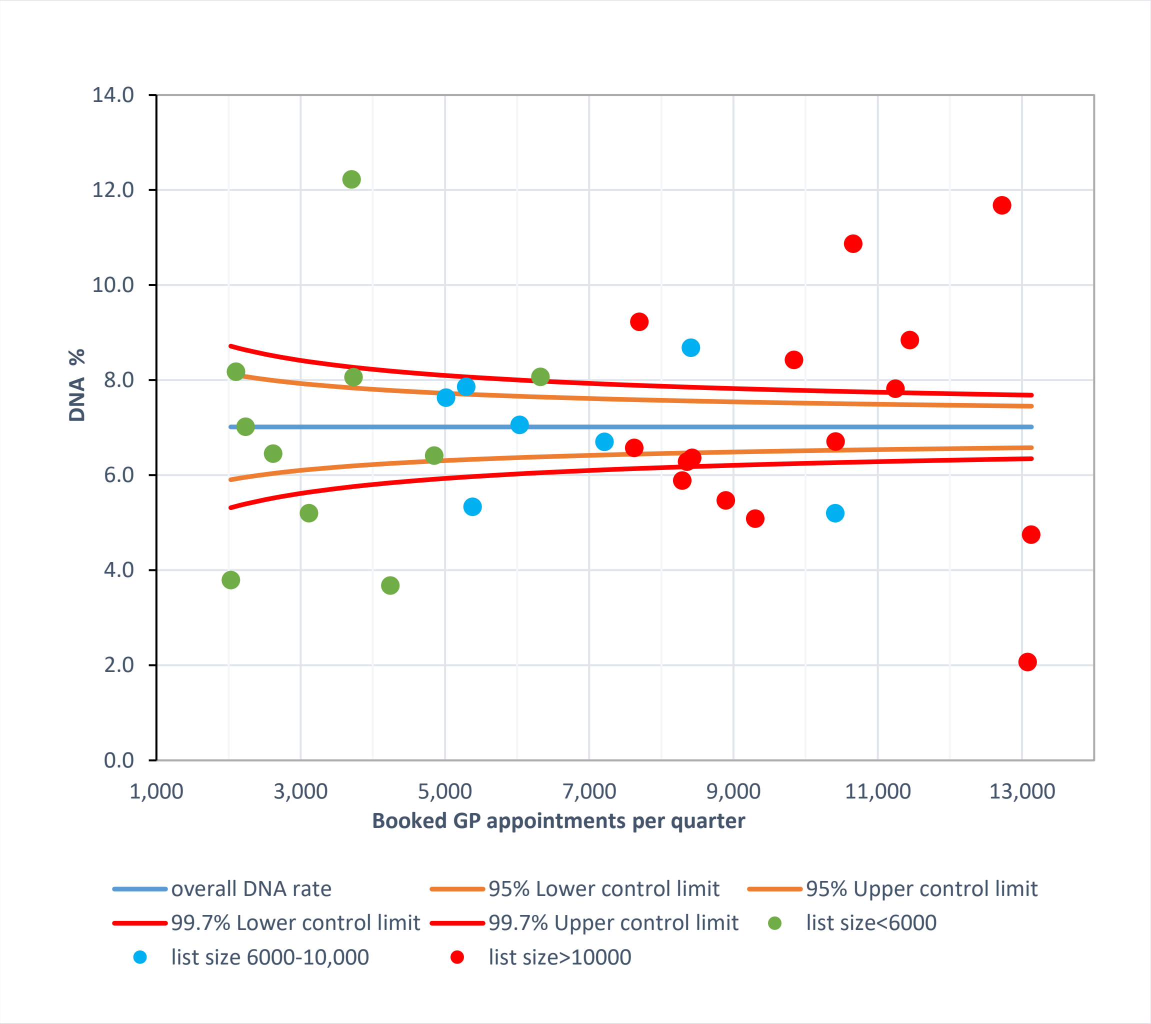


Figure 2. Cumulative DNA rate plotted against appointment delay in days. Based on 4 million appointments from all 32 practices: 2014-19

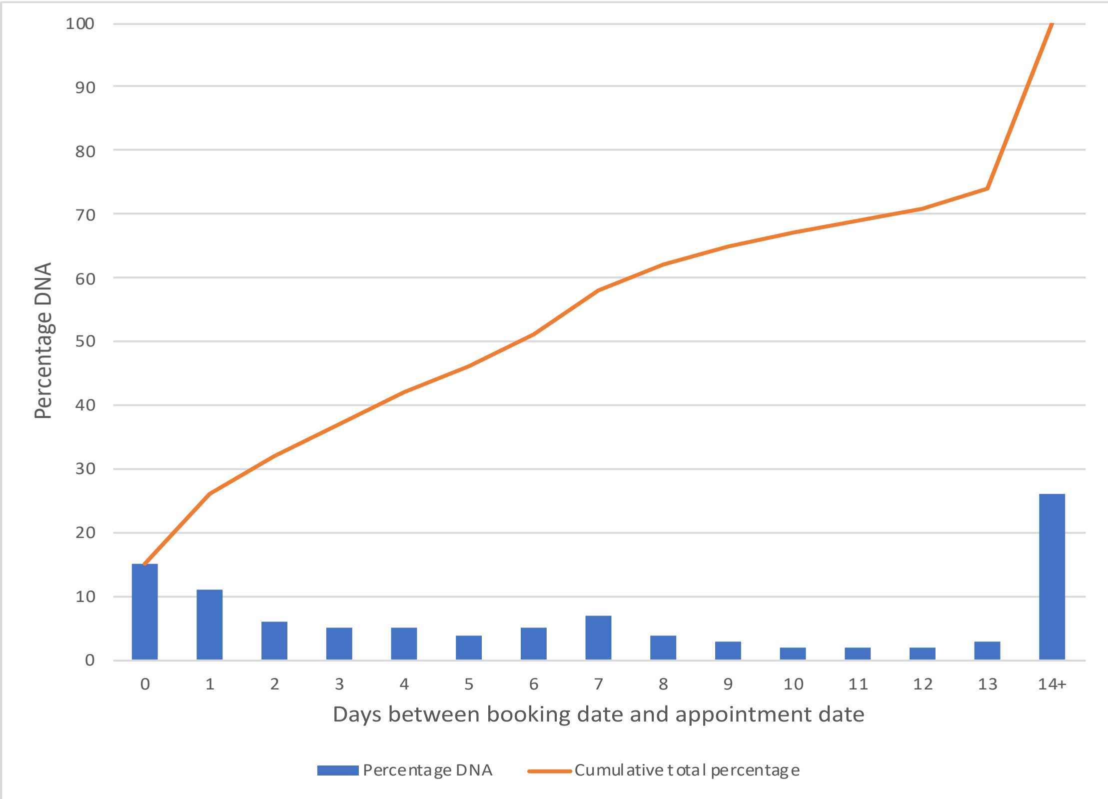
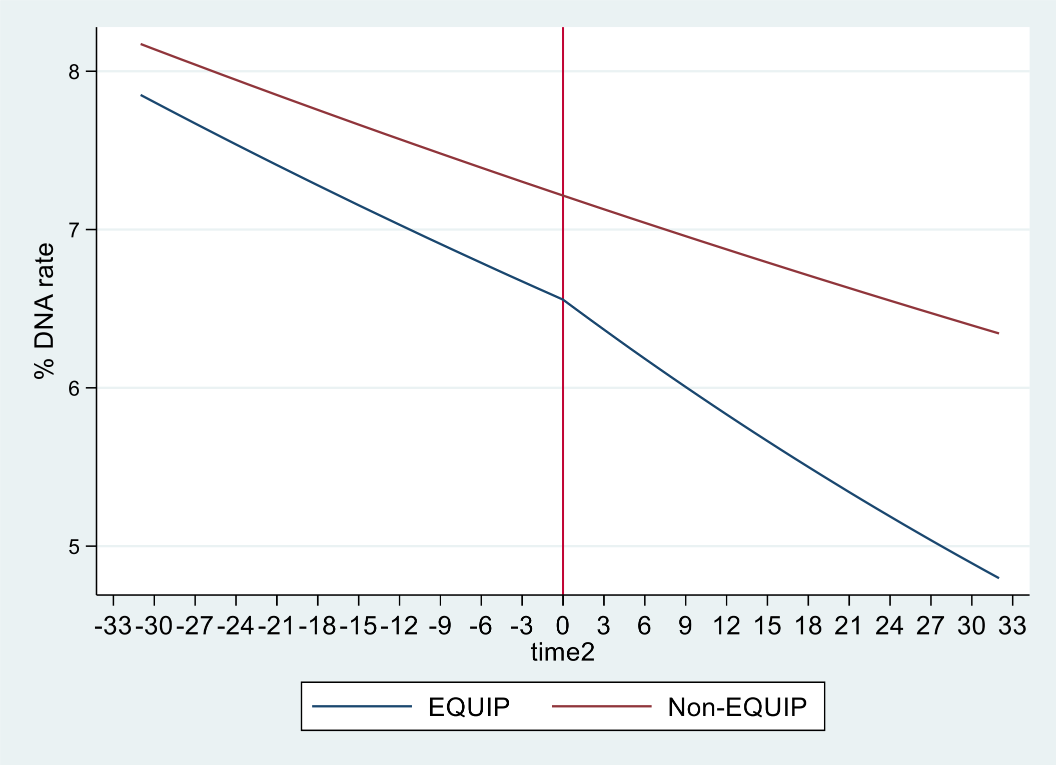


Figure 3. Quarterly trends in percentage of DNAs: comparison of 25 EQUIP practices* with 7 control practices (2014-2019) using interrupted times series analysis.



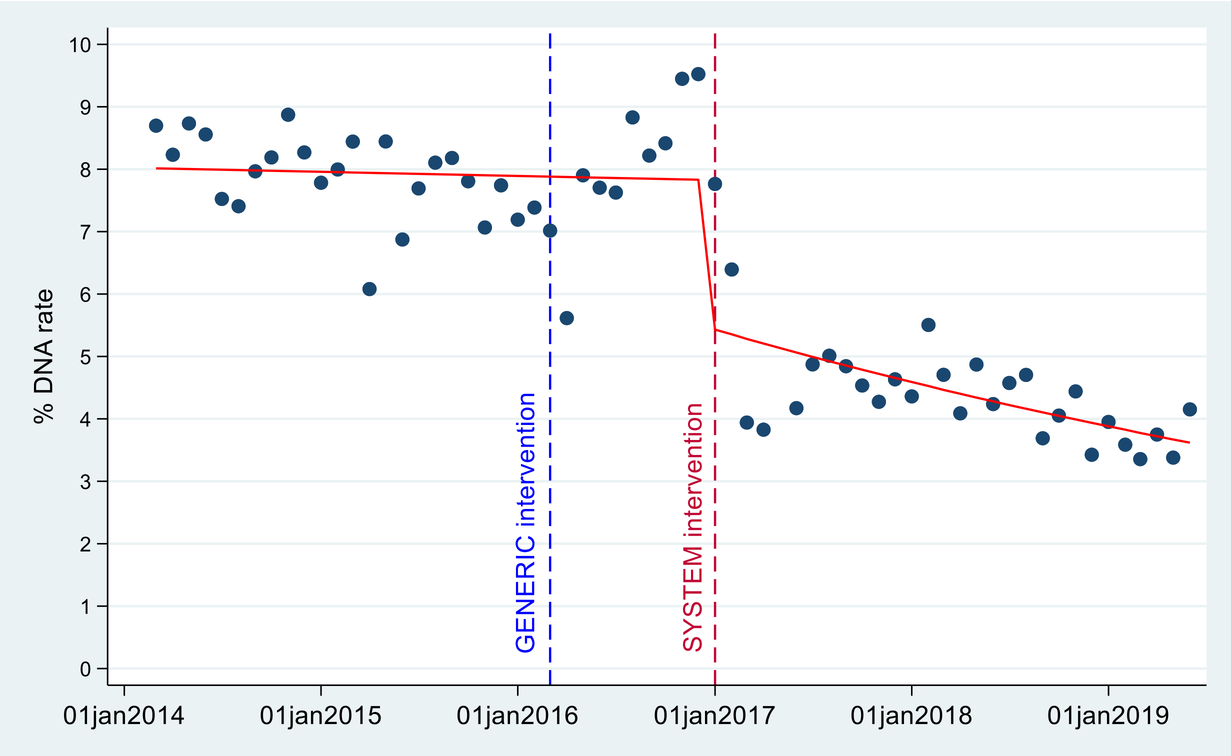
** Adjusted for the different intervention start date of each EQUIP practice.*

For the 25 EQUIP practices the pre-intervention monthly change in DNA rates was 0.993 (95% CI 0.992 to 0.994*). The post-intervention monthly change in DNA rates was 0.990 (95% CI 0.987 to 0.992).*

p value = 0.001 for difference in slopes pre- and post- intervention.

For the seven Non -EQUIP comparison practices the monthly change in DNA rates was 0.996 (95%CI 0.995 to 0.997)

Figure 4: System Change Practice: Monthly percentage of DNAs pre and post intervention,* using interrupted times series analysis.



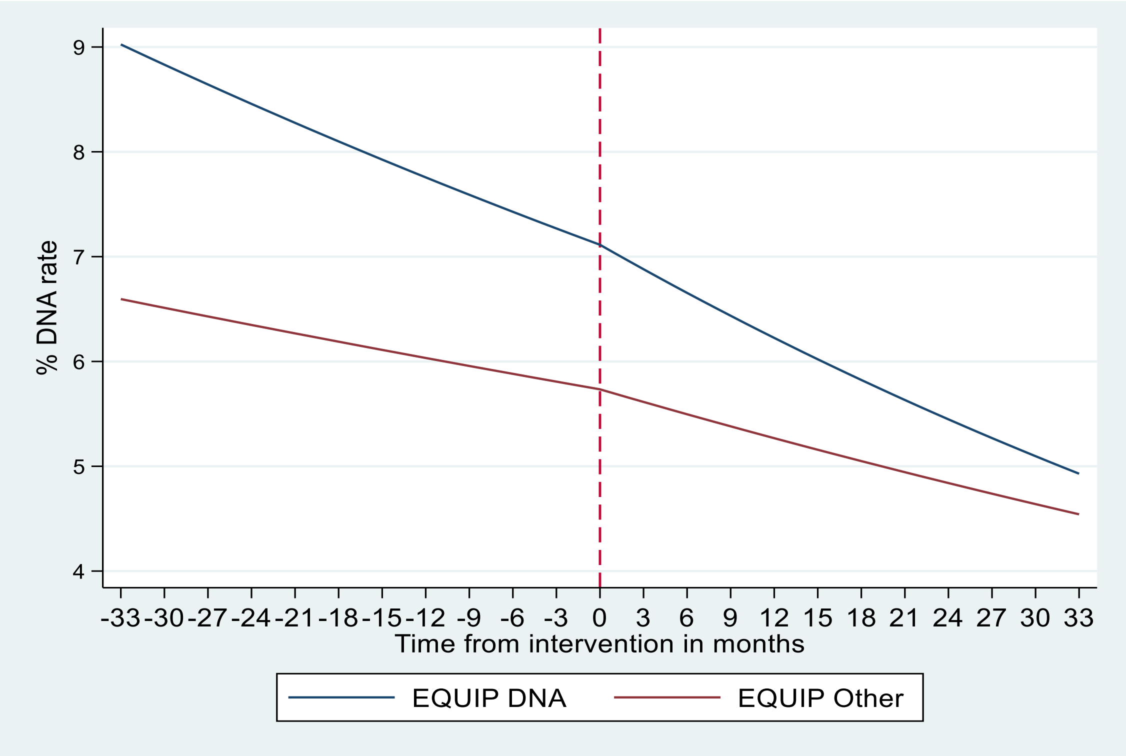
**generic QI intervention in April 2016, followed by 'system' change in January 2017*

Before the SYSTEM Intervention the monthly change in DNA rates was 0.999 (95% CI 0.996 to 1.003). Post-Intervention the monthly change in DNA rates was 0.986 (95%CI 0.980 to 0.992). P value = <0.001 for difference in slopes pre- and post-intervention.

Supplementary Data

Figure S1

Interrupted time series comparing monthly change in DNA rates for 14 DNA-project practices and 11 'Other-project' practices.

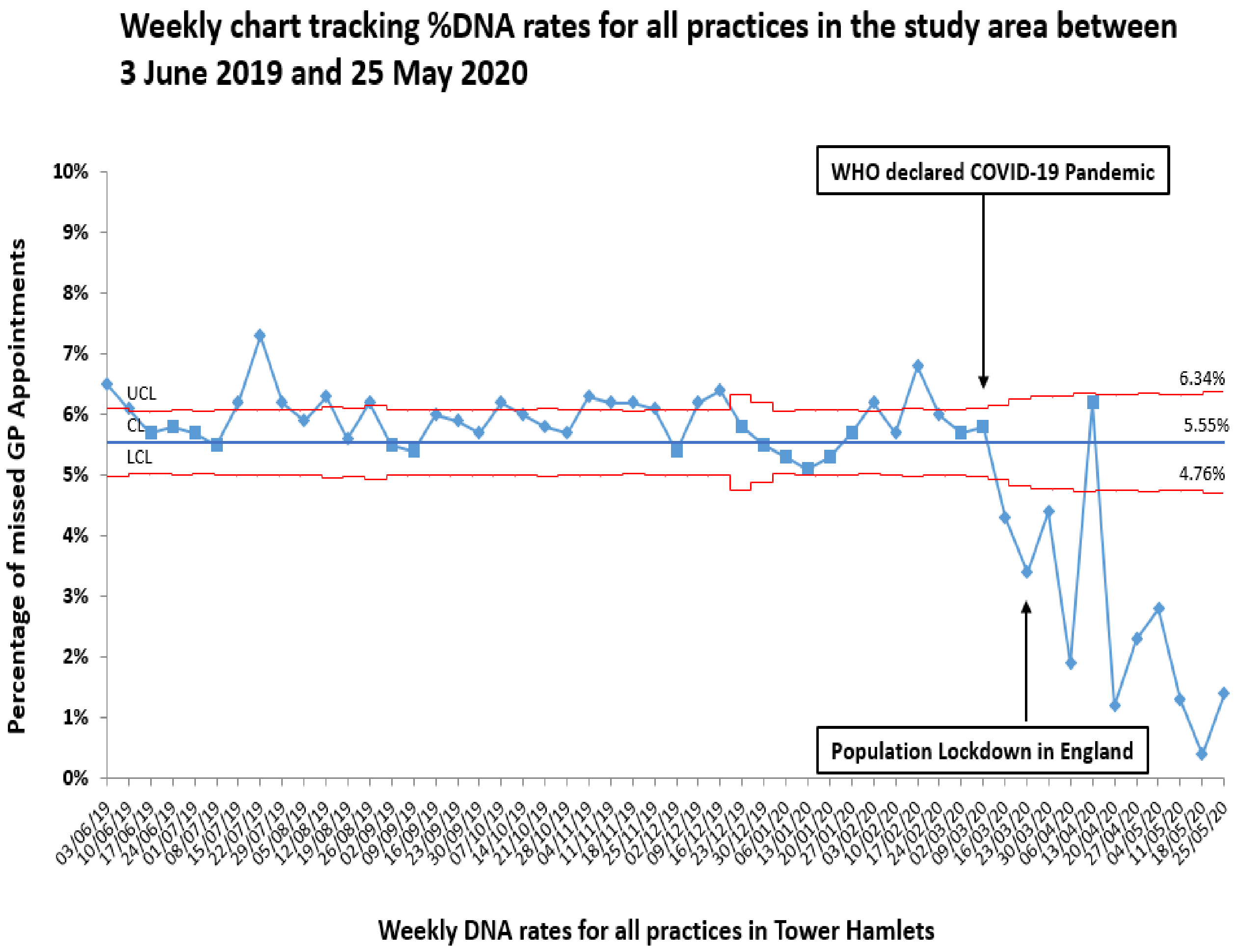


** Adjusted for the different intervention start date of each practice.*

Among the 14 DNA project practices pre- Intervention monthly change in DNA rates was 0.993 (95%CI 0.992 to 0.994) The Post- Intervention monthly change in DNA rates was 0.989 (95%CI 0.987 to 0.991) p value =0.007 for difference in slopes pre- and post- intervention

Among the 11 'other project' practices pre- Intervention monthly change in DNA rates was 0.996 (95%CI 0.995 to 0.997)
The post- Intervention monthly change in DNA rates was 0.993 (95%CI 0.991 to 0.995) p value =0.02 for difference in slopes pre- and post- intervention.

Figure S2



ucl = upper confidence level, lcl = lower confidence level