

Supplementary File 1. GP practice mergers

Introduction

A variety of new integrated care models for the NHS have been developing since around 2015.¹ The GP Forward View in 2016 provided a framework for some of these changes in primary care,² with a focus on investment, workforce, workload, infrastructure and care redesign. On care redesign, the GP Forward View focused on support for individual practices, but also on new larger groupings of practices, including horizontal practice mergers, and the integration of primary and community health services. General practice in England is diverse across geographies, and one size will not fit all when it comes to the future models developed. Since 2016, in line with strategic policy and funding changes such as the development of PCNs,³ new and larger primary care structures are developing across England.

Evidence on the impact of GP practice mergers on healthcare quality is still emerging,^{4,5} but data have not been systematically collected on how primary care has been re-organising in the last decade.⁶ Approaches include looking at GP practices where list sizes have increased, or exploring where GP codes have disappeared, as proxy measures for horizontal mergers.⁶

GP mergers have methodological implications for statistical analyses. For example, cluster randomised trials where the GP practice is the unit of randomisation are a standard tool for health services research.⁷ Mergers lead to statistical challenges including changes in the intra-class correlation coefficient (a measure of the differences in variation of health and healthcare outcomes between and within GP practices) or changes in treatment groups assignment where intervention and control practices potentially merge. Pragmatic approaches to allow for this have included using “intention to merge” as an exclusion criterion for a trial.⁸

Taking practice mergers into account in our analysis

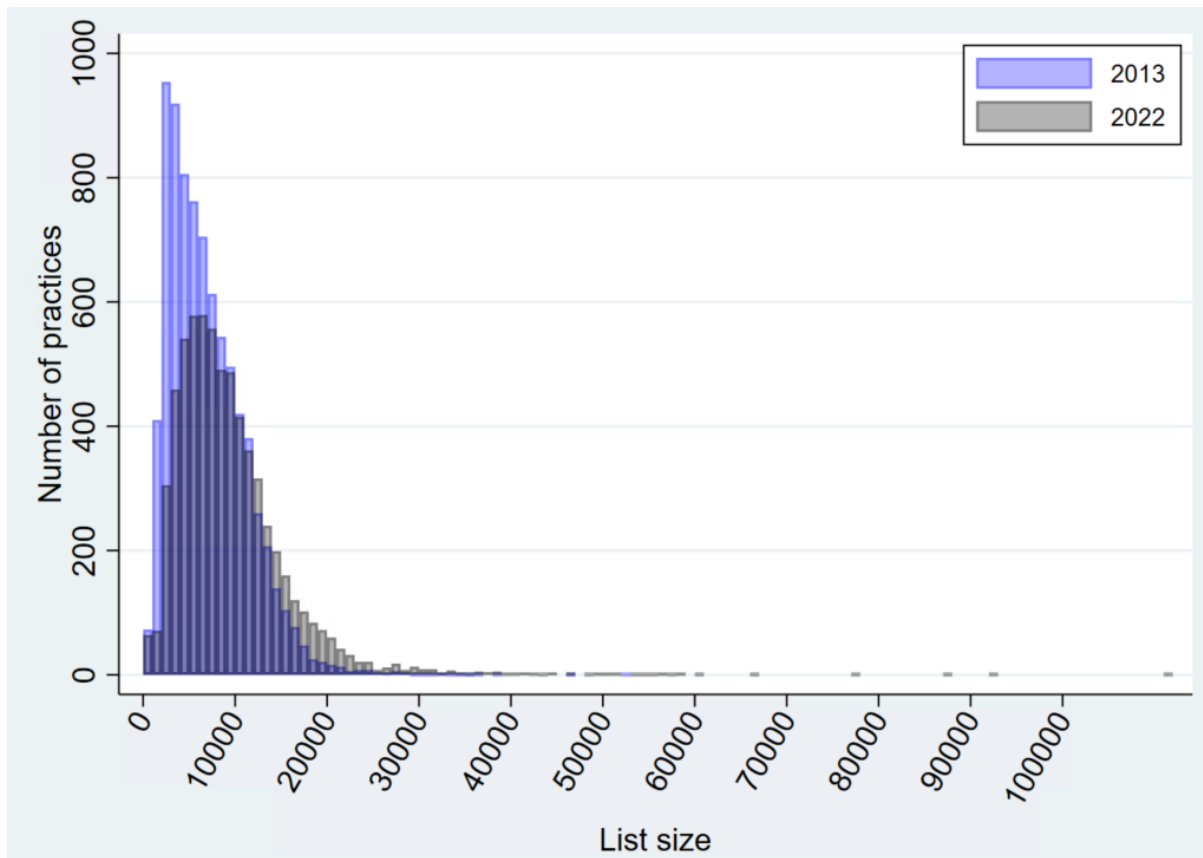
We found in Work Package 1 of our study that GP practices might undergo several stages of reorganisation as part of the vertical integration process, for example initially becoming a practice that is vertically integrated with a trust, and then undergoing horizontal mergers with other practices that are integrated with the same trust, and possibly switching contract type as well.

Exploration of GP practice list size over time

In preliminary analyses to understand the scale and scope of horizontal mergers we described the changes over time in GP practice numbers and list sizes during the study period between 2013-2022 using practice list size data published by NHS Digital.^{9,10} We found that the number of GP practices

declined at a rate of between 100 and 300 per year from 8,044 practices in 2013 with a mean list size of 6,967 to 6,518 practices in 2022 with a mean list size of 9,455 (Figure X1). The number of small practices, those with list sizes under 5,000 patients, decreased substantially during this time period.

Figure X1. GP Practice list sizes in 2013 and 2020



We found that in general GP practice list sizes stayed roughly constant, but with ‘jumps’ up in numbers of registered patients when a merger occurred. There was one notable exception to this pattern: GP at Hand (Babylon), which has been increasing the numbers of patients registered with it over time^{11,12} to more than 100,000 registered patients by the start of 2022. We have therefore excluded Babylon from our list of potential control practices.

Identification of practice mergers

This preliminary descriptive work using data from NHS Digital¹⁰ identified the scale of GP practice mergers over time and the impact on list size. However, these administrative sources only present data for GP practices that are currently present as discrete entities, and do not include any information about previous GP practices which have merged into single codes. We therefore defined a merger in our analysis as where two (or more) GP practices change to share a single administrative

organisation code. In order to identify GP practice mergers, we took a two-stage approach. In stage one we used person-level outpatient data from HES, held under the BRACE Data Sharing Agreement for use in the VI evaluation. In the second stage we used publicly available practice-level data on branch surgeries listed by the NHS Organisation Data Service via NHS Digital.⁹

In detail, in stage one we used HES outpatient data sets from financial year April 2013 - March 2014, to financial year April 2019 - March 2020. In each year we selected practices with at least 1,000 registered patients on 1 April of that year (identified from practice list size data published by NHS Digital).¹⁰ We then used person-level hospital outpatient activity data and identified practices in the following financial year where over 50% of patients with an outpatient appointment record from the previous financial year were now registered. We then took a similar approach working backwards, looking at patients registered in practices with at least 1,000 patients in the later financial year, and looking in the data set from the previous year for practices where the majority of patients were registered previously. We then cross-checked codes from the two approaches.

In the second stage we matched current practice codes for branch surgeries with historic practice codes for practices at the same postcode (where a postcode was unique by practice) which no longer had registered patients. This identified a small number of additional mergers.

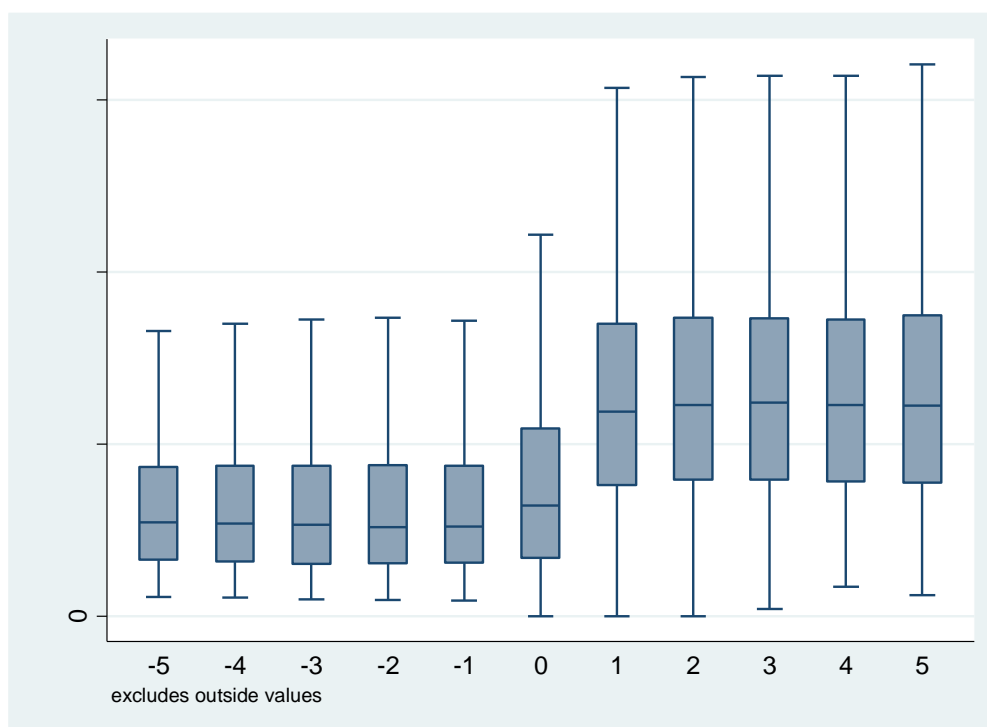
We included 8,065 practices with at least 1,000 patients registered on 1 April in any year between 2013 and 2020.¹⁰ We grouped these into 6,987 unique codes at the study end. Of these 275 had fewer than 1,000 patients registered on 1 April 2020 and may have closed completely. Eight practice codes de-merged into two separate new codes during the time period. We found that 6,199 out of 8,065 (77%) of practices did not undergo any mergers. The remaining 1,874 practices underwent at least one horizontal merger, reducing to 788 unique practice codes by March 2020. The majority of mergers were between two practice codes, but we also identified some mergers between larger numbers of practices (Table X1).

Table X1. Numbers of practices merging in GP practice mergers in England, 2013-2020

Size of merger (number of practices in merged group)	Number of practices initially	Number of unique practice codes in March 2020
2	1,184	592
3	417	139
4	136	34
5	50	10
6	48	8
7	21	3
8	8	1
10	10	1

We cross-checked using list size data the identification of merged practices using outpatient data (Figure X2).

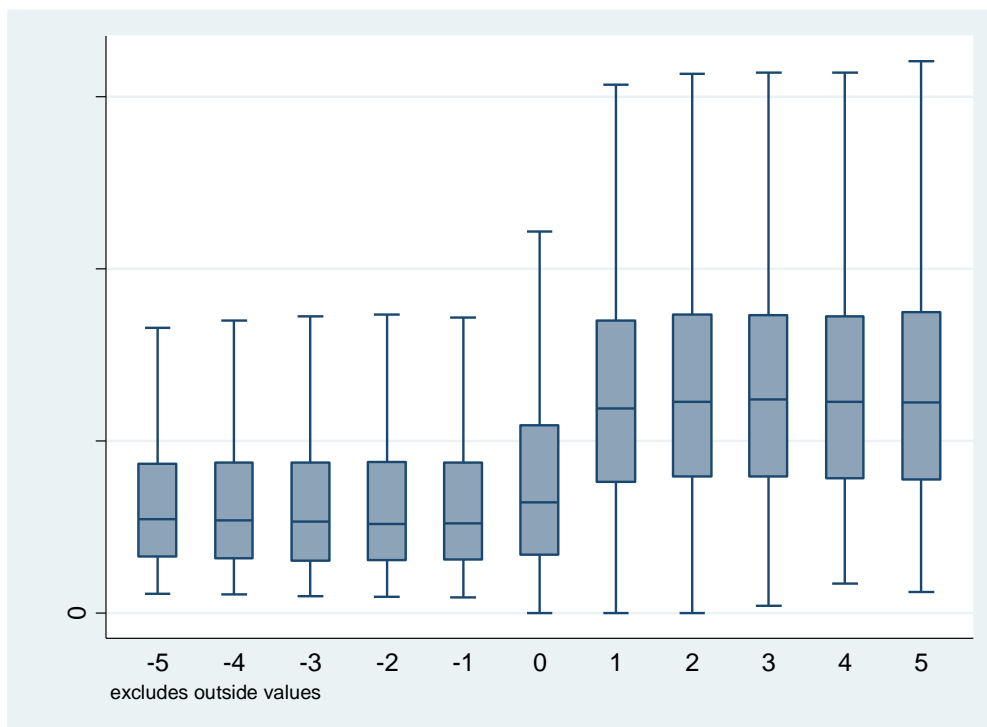
Figure X2. Median (IQR) practice list size over time (0 = year of practice merger; years before and after practice merger)



The strength of this approach following individuals registered with GP practices over time to identify GP practice mergers is that we created a data set for analysis which included information about GP

practices in 2020, and additionally the details of the practices which had merged to comprise this most recent code. We acknowledge, however, that there are limitations to this approach. Practice mergers are not always precisely defined; with several administrative changes potentially occurring. Practices may merge administratively before practice codes merge; we cannot identify this in the data at all and so these practices are included separately until one practice code disappears. Given our method of identifying mergers it is possible that we have classified a few cases as practice mergers where in fact one practice closed and the majority of the patients were transferred to a second practice. Additionally, for a few practice mergers identified, the original practice did not close but instead it appears that practices have demerged, with two smaller practices continuing independently; Octagon practice in Cambridgeshire and Peterborough is one such recent example.¹³ Finally, for many practices, once a merger occurs it takes several months before the original practice code disappears, or for patients to move lists.

Figure X2. Median (IQR) practice list size over time (0 = year of practice merger; years before and after practice merger)



References

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