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Consequences of the closure of General Practices: a retrospective cross-sectional study

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Abstract

Background
Two general practices close every week in the UK. Given the pressure on UK general practices, such closures are likely to persist. Yet we know little about the consequences. Closure refers to when a practice ceases to exist, merges or is taken over.

Aim
Does practice funding, list size, workforce composition and quality change in surviving practices, when surrounding general practices close?

Design and Setting
Cross-sectional study of English general practices, using data from 2016-20.

Method
The exposure to closure for all practices existing on 31.03.2020 was estimated. This is the estimation proportion of a practice’s patient list that had been through a closure in the preceding three years, between 01.04.2016 and 31.03.2019. The interaction between our exposure to closure estimate and the outcome variables (list size, funding, workforce and quality) was analysed through multiple linear regression, whilst controlling for confounders (age profile, deprivation, ethnicity and rurality).

Results
694 (8.41%) practices closed. A 10% increase in exposure to closure results in 1925.6 (1675.8, 2175.4) more patients in the practice with £2.37 (£4.22, £0.51) less funding per patient. Whilst numbers of all staff types increased, there were 86.9 (50.5, 123.3), 4.3%, more patients per GP. Increases for other staff types were proportionate to increases in patients. Patient satisfaction with services declines across all domains. No significant difference in QOF scores was identified.

Conclusion
Higher exposure to closure was leading to larger practice sizes in remaining practices. Closure changes workforce composition and reduces patient satisfaction with services.
Keywords
General Practice
Health Services research
Primary Care
Quality of Health Care
Workforce
How this fits in
Closures of UK general practices are increasingly common, yet little is known about the consequences. This cross-sectional study of English general practices finds practice closures increase list size in exposed practices, with changes in workforce composition and reductions in patient satisfaction.
Main text

Introduction

Two general practices are closing every week in the United Kingdom (UK). General practices are the principal providers of primary care within the UK, meaning that closures have impacted millions of patients.

Closure principally refers to organisations ceasing to exist or changing ownership. A change of ownership is when two or more companies combine, either via negotiation, a merger, or by acquisition, a takeover. Closure can also refer to financial failure, comprising bankruptcy, restructuring and financial under-performance. However, over 90% of healthcare organisations in financial distress do not cease to exist or change ownership; making this a poor definition in healthcare.

General practice in England consists of partnerships of primary care physicians, known as general practitioners, who hold a contract with the National Health Service (NHS) to provide primary medical services. Every person in the UK is entitled to register with a single practice, bringing funding of £99.70 per patient. This funding is weighted for variations in workload dependent upon patient characteristics such as age. Practices then act as the gatekeepers to the wider NHS. Beyond this core funding, practices can also opt into other funding streams. This includes a pay-for-performance scheme known as the Quality and Outcomes Framework (QOF), as well as the provision of additional services known as Enhanced Services.

Closures of UK general practices accelerated from less than 1 a week in 2013 to around 6 per week in 2018 before declining to around 4 a week in 2020. This is alongside a gradual increase in average list size from 6,914 to 9,007 between 2013 and 2020, with 1,398 fewer practices overall. This suggests a gradual consolidation of patients into expanding practices over the previous decade. This is in concordance with the general practice policy environment where practices are encouraged to serve larger populations, such as primary care networks. This potentially brings benefits through scale mechanisms and resilience from GP retirements. However, some evidence suggests that these larger practices may have poorer continuity of care, with working at scale not in itself improving patient access or clinical performance.

When ceasing to exist, practices will hand their contract back to the NHS (commissioner) who will then be responsible for offering an alternative practice. In practice, patients will then register at alternative local practices, who may be forced to accept them. Ownership change is likely to be more complicated, but principally involves the consolidation of multiple contracts into one, with negotiation between the constituent providers.

There is heterogeneity in the existing literature on the consequences of primary care closure, with both increases and decreases in healthcare utilisation, quality and patient care being identified. Many papers explore physician exits, as opposed to facility closure, which may have different outcomes. Further, heterogeneity may reflect differences between the health systems studied or closure definitions used. However, despite
heterogeneity, this existing literature demonstrates that closures do have impacts on the health system and patient outcomes.

General practice in England is under increasing pressure due to multiple patient, system and supply side factors. This will likely translate into the persistence or increase in practice closures. However, we need to clarify the consequences of these closures in England.

To begin to address this research gap, this study aims to understand if the closure of English General Practices changes the funding, workforce composition and quality indicators of remaining practices.

Method
Study design
Utilising a retrospective cross-sectional methodology, practice financial, workforce, quality, demographic and neighbourhood data were linked at practice-level for English general practices for the 2019-20 financial year. 2019-20 was chosen to avoid any influence from the COVID-19 pandemic.

Closure exposure coefficient
The closure of a practice was gathered from the NHS Digital organisational data services, who maintain a complete list of practices in England and Wales. This codes practices as either open, closed, dormant or proposed. Open practices are those actively prescribing, whilst those closed are not, comprising practices that have merged or ceased trading. Dormant and proposed practices are in a transitional state and thus removed. Practices closing between 01/04/2016 and 31/03/2019 were identified and the constituent practice population by LSOA gathered. LSOAs are geographically defined groupings of 1000-1500 patients, created from the 2001 census. Each LSOA is linked to multiple practices and practices linked to multiple LSOAs. Patient movements due to practice closure are detailed in figures 1 and 2. For every LSOA, the number of patients registered at closed practices was divided by the total patients in that LSOA, providing the percentage of the LSOA exposed to closure. For each surviving practice, this percentage was then multiplied by the number of the surviving practice’s patients from that LSOA. The sum of these values for the practice’s constituent LSOAs was calculated and divided by the total practice list size to provide the closure exposure coefficient, detailed in figure 3. The closure exposure coefficient is between 0 and 1 whereby 0 represents no exposure to closure, whilst 1 indicates all of the practice’s patients were at a practice that closed. A closure exposure coefficient of 0.05 indicates an estimated 5% of a practice’s patients were from a closed practice.

Only English practices were included as the outcome variables are not standardised across the UK. Each practice was given a unique code to link datasets.

Neighbourhood and Demographic (confounder) data
We were interested in controlling for key confounders from the composition of the community. The IMD income deprivation score, a surrogate for deprivation using data from 2019, was gathered for each practice with the higher a score the more deprived the practice population. Rurality was defined through the binary urban or rural classification from 2011
based on the practice post-code. 71 of the practices had missing rurality data, so authors manually inputted this data via the post-code location. Extremes of age distribution, defined as % of practice population <4 or >75 were calculated from the March 2020 General Practice Workforce data, held by NHS Digital. Public health England general practice ethnicity estimates were linked, created as combination of 2011 census and 2015/16 LSOA data. Collinearity was checked for confounding data using Pearson correlation coefficient.

Funding data
Total NHS payments to general practice and unweighted list sizes was obtained from NHS England’s NHS Payments to general practice 2019-20 data set. This includes all payments from the core contract, quality and outcomes framework, enhanced services and other payment schemes.

Workforce data
General Practice Workforce data from March 2020, held by NHS Digital, was obtained. Full time equivalent (FTE) general practitioner, nurse, direct patient care (DPC) and admin categories were used, as a measure of time worked. The number of patients per FTE staff was calculated.

Quality and outcomes framework
The overall quality and outcomes framework (QOF) score was gathered from NHS Digital. This is a pay for performance mechanism, scores of which can be used as a proxy for quality of care. Total number of QOF points was used.

General Practice Patient Survey
This is annual data gathered from a sample of practice patients, which includes patient satisfaction with their registered practice. Responses are weighted to account for varying response rates across population groups. Survey data from January 2020 on patient satisfaction of phone and website access (% easy (total)), confidence in the healthcare professional (% yes (total)) and overall satisfaction (% good (total)) was used.

Participants
The above data sources were linked with practices. Given concerns practices may maintain an active prescription code, without being an active practice atypical practices were removed, defined as <500 (n=8) or >5000 patients (n=213) per FTE GP, or <750 total registered patients (n=26). 63 practices had <1 FTE administrative staff, including 45 practices that had none. Practices are mandated to be open from 0830-1830, meaning that this data was implausible and as such these practices were removed prior to analysis. This left a total of 6192 practices included.

Statistical analysis
All data analyses were conducted in R Studio 1.4.1717. Collinearity was assessed using variance inflation factors. 92.03% of practices had full data availability, with workforce variables being the most commonly missing variable, with 4.37% and 2.22% of FTE DPC and nursing data being missing respectively. As this is <5% for each individual variable with >90% full data availability, missing data was ignored.
Mean and confidence interval of the mean, alongside standard deviation, was calculated for each covariate, detailed in table 1. Outcome variables included unweighted list size, total practice funding, total practice funding per patient, FTE GP, unweighted list size per FTE GP, FTE nurse, unweighted list size per FTE nurse, FTE admin, unweighted list size per FTE admin, FTE DPC, unweighted list size per FTE GPC, patient satisfaction with phone access (% Easy (total)), patient satisfaction with website access (% easy (total)), patient confidence with healthcare professional (% yes (total)), overall satisfaction with practice (% good (total)) and total QOF points. Meanwhile confounding variables were % Age <4, income deprivation score, non-white ethnicity and practice rurality. Univariable linear regression (logistic regression for rurality) of the closure exposure coefficient on the confounding variables was performed to analyse their confounding influence, as presented in table 2.

The impact of the closure exposure coefficient on the outcome variables was analysed via multiple regressions whilst controlling for the confounding characteristics. Each individual outcome variable was analysed in a separate multiple regression with beta coefficient, confidence intervals, p value and variance inflation factor presented in table 3.

Results
A final sample of 6192 practices were included. The average closure exposure coefficient was 0.03, ranging from 0 to 0.78. 5137 (82.96%) were urban practices, whilst 1055 (17.04%) were rural. Table 1 details the characteristics of the included practices.

Table 3 details the results of the multiple linear regression. We present the effect of a 0.1 increase in the closure exposure coefficient, representing a 10% increase in practice population exposed to closure. Table 2 details the interaction between the closure exposure coefficient and the confounding variables.

Practices with increased exposure to closure had a significantly greater proportion of their patients <4 years of age, increased income deprivation, non-white ethnicity and in urban settings, whilst fewer of their patients were older than 75. Strong negative correlation was observed between Age >75 and non-white ethnicity (-0.63) and Age <4 (-0.54) and thus was not included in the regression equations.

Population size and funding
A 0.1 increase in closure exposure coefficient resulted in 1925.6 (1675.8, 2175.4) more patients per practice and a disproportionate £282,268.66 (£241,147.72, £323119.60) increase in funding, with a £2.37 (£4.22, £0.51) reduction in funding per patient.

Workforce
A 0.1 increase in closure exposure coefficient resulted in an increase in all full-time equivalent staff types (FTE GP = 0.7 (0.6, 0.9) FTE nurse = 0.7 (0.6, 0.8), FTE admin = 2.7 (2.3, 3.0) and FTE DPC = 0.6 (0.5, 0.7)). However, when taking account of patient increases this showed a mixed picture, with significantly more patients per FTE GP 86.9 (50.5, 123.3) whilst no significant change in patients per other staff type was found.
Quality (Univariate then multivariate)
A 0.1 increase in closure exposure coefficient resulted in significantly lower patient satisfaction scores throughout all variables (Phone = -1.87 (-2.75, -0.99), Website = -1.05 (-1.57, -0.53), Confidence = -0.06 (-0.09, -0.02), Overall = -1.14 (-1.56, -0.72)). No significant change in QOF score was found.

Discussion
Summary
Practice closures are associated with a decrease in funding per patient and reduced patient satisfaction within surviving practices. Increases in patient list size results in an increase in the number of patients per FTE GP.

Patient and funding changes may be due to consolidation of patients in the surviving practices. The £2.37 (1.48%) reduction in funding per patient with increasing exposure to closure suggests inequality may be exacerbated by closures, although this change was small. The changes in the number of patients per GP may be the result of GPs from closing practices reducing or stopping practicing in the geographic area. The universal reduction in satisfaction may indicate declines in the quality of the service. However, QOF remained stable so no change in clinical quality has been observed.

Strengths and limitations
The study utilised key datasets as well as age profile, ethnicity, rurality and deprivation which are important confounding variables. This enabled the analysis of the association between practice funding, workforce and quality with practice closures.

As with all cross-sectional studies, reverse causation needs to be considered. Areas with lower patient satisfaction, proportionate funding or proportionate workforce may be predisposed to closure.

Patient need and associated resource requirements vary between practices. This is addressed in UK primary care by weighting the list size using the Carr-Hill formula. Unweighted patient list size was chosen due to the probable correlation with confounders that the weighting mechanism uses. Further, the weighting mechanism is commonly criticised for failing to address differences in need anyway.

GP patient survey data is commonly used in this field of research due its public availability and is considered reliable. However, it is important to be cognisant of the influence of the low response rate. Total QOF score is an aggregate of different domains. Further insights may be gained by analysing the constituent QOF domains.

Comparison with existing literature
No studies have been conducted on the consequences of practice closure in English general practice. Different primary care physicians have different practicing styles, which results in changed utilisation patterns when patients move. Utilisation is not directly measured here, but this may be reflected in the reduced satisfaction with remaining services.
Research on continuity of care is more advanced. Disruption in continuity can be expected from practice closures. Improvements in patient satisfaction and outcomes are observed with improved continuity of care.\textsuperscript{26} This may partly explain the reduced satisfaction observed with practice closures.

**Implications for research**

Whilst pressure in UK general practice is recognised,\textsuperscript{20} closures of practices is under researched. This study identifies that practice closures change practice funding, workforce and quality.

Surviving practices are at risk of relative decline in funding, GP supply and patient satisfaction. Therefore, closures may make providing care in these practices more challenging, increasing the risk of supply-demand imbalance and associated access issues.\textsuperscript{27} Alternatively, given QOF remains stable, findings may indicate efficiency improvements; but declines in satisfaction contradicts this.\textsuperscript{21} Given closures are more common amongst practices serving deprived and non-white populations, they may widen existing inequalities.\textsuperscript{22,23} Practices and commissioners may be able to mitigate for the consequences of closures through policy changes, such as preventing the closure or increasing resources for surviving practices. However, there is currently minimal evidence on how best to intervene.

Practice closure describes a broad set of organisational changes. These findings may alter by closure definition, therefore it is important to study the individual closure mechanisms for their associated consequences. Understanding the causes of the different closure definitions would also be helpful in healthcare planning.

Similarly, this study used broad workforce and quality indicators. If workforce outcomes are disaggregated, such as by nursing type, this would develop a deeper understanding of aspects such as substitution. Similarly, these results may not translate into deleterious patient outcomes, which needs to be studied.
### Tables and Figures

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>95% confidence interval of the mean</th>
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</thead>
<tbody>
<tr>
<td>Population &lt; 4 (%)</td>
<td>5.33</td>
<td>1.41</td>
<td>5.29, 5.36</td>
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<td>Population &gt; 75 (%)</td>
<td>8.14</td>
<td>3.57</td>
<td>8.05, 8.23</td>
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<tr>
<td>Non-white ethnicity (%)</td>
<td>16.55</td>
<td>19.74</td>
<td>16.05, 17.05</td>
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<td>Income Deprivation Score</td>
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<td>0.07</td>
<td>0.14, 0.14</td>
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<td>Total practice funding (£)</td>
<td>1411739</td>
<td>921786.5</td>
<td>1388775, 1434703</td>
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<td>Unweighted population</td>
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<td>5684.35</td>
<td>8888.3, 9171.5</td>
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<td>Total funding per unweighted patient</td>
<td>159.79</td>
<td>51.15</td>
<td>158.52, 161.07</td>
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<td>FTE GP</td>
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<td>5.1, 5.3</td>
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<td>Unweighted population per FTE GP</td>
<td>2013.7</td>
<td>811.61</td>
<td>1993.4, 2033.9</td>
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<td>FTE Nurse</td>
<td>2.6</td>
<td>2.36</td>
<td>2.5, 2.6</td>
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<tr>
<td>Unweighted population per FTE Nurse</td>
<td>5112.4</td>
<td>4199.08</td>
<td>5006.4, 5218.4</td>
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<td>FTE Admin</td>
<td>10.4</td>
<td>7.86</td>
<td>10.2, 10.6</td>
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<td>968.3</td>
<td>616.55</td>
<td>952.9, 983.7</td>
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<td>FTE DPC</td>
<td>2.0</td>
<td>2.49</td>
<td>2.0, 2.1</td>
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<td>Unweighted population per FTE DPC</td>
<td>7793.2</td>
<td>8507.39</td>
<td>7562.2, 8024.2</td>
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<td>Patient satisfaction with phone access (% easy (total))</td>
<td>69.71</td>
<td>20.10</td>
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<td>Patient satisfaction with website access (% easy (total))</td>
<td>77.20</td>
<td>12.02</td>
<td>76.90, 77.50</td>
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<td>Overall satisfaction with practice (% good (total))</td>
<td>82.88</td>
<td>10.00</td>
<td>82.63, 83.13</td>
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<tr>
<td>Confidence and trust in the healthcare practitioners (% yes (total))</td>
<td>95.23</td>
<td>37.68</td>
<td>95.15, 95.33</td>
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Table 1: Characteristics of included general practices

<table>
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<tr>
<th>Variable</th>
<th>Linear regression - 10% increase in practice population from closed practice</th>
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</thead>
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<tr>
<td></td>
<td>Beta Coefficient</td>
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<tr>
<td>Age &lt; 4 (%)</td>
<td>0.12</td>
</tr>
<tr>
<td>Age &gt;75 (%)</td>
<td>-0.48</td>
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<tr>
<td>Income Deprivation score</td>
<td>0.01</td>
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<tr>
<td>Non-white ethnicity</td>
<td>1.64</td>
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</table>

Logistic regression – rural:urban classification on closure exposure coefficient

Table 2 – Univariable regression results for the included confounding factors

<table>
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<th>Variable</th>
<th>Multiple regression^ - 10% increase in practice population from closed practice</th>
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<tbody>
<tr>
<td></td>
<td>Beta coefficient</td>
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<tr>
<td>Unweighted list size</td>
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<td>Total practice funding (£)</td>
<td>282268.66</td>
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<tr>
<td>Total practice funding per patient (£)</td>
<td>-2.37</td>
</tr>
<tr>
<td>FTE GP</td>
<td>0.7</td>
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<tr>
<td>Unweighted list size per FTE GP</td>
<td>86.9</td>
</tr>
<tr>
<td>FTE Nurse</td>
<td>0.7</td>
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<tr>
<td>Unweighted list size per FTE Nurse</td>
<td>-61.5</td>
</tr>
<tr>
<td>FTE Admin</td>
<td>2.7</td>
</tr>
<tr>
<td>Unweighted</td>
<td>6.4</td>
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<tr>
<td></td>
<td>Effect Size</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>List size per FTE Admin</td>
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<tr>
<td>FTE DPC</td>
<td>0.6</td>
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<td>Unweighted list size per FTE DPC</td>
<td>-293.5</td>
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<td>Patient satisfaction with phone access (% easy (total))</td>
<td>-1.87</td>
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<tr>
<td>Patient satisfaction with website access (% easy (total))</td>
<td>-1.05</td>
</tr>
<tr>
<td>Confidence (% yes (total))</td>
<td>-0.06</td>
</tr>
<tr>
<td>Overall satisfaction with practice (% good (total))</td>
<td>-1.14</td>
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<tr>
<td>Quality and Outcomes Framework total points</td>
<td>-0.17</td>
</tr>
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</table>

*Table 3 – Multiple linear regression results showing a 10% increase in practice exposure to closure*

*Multiple regression included Income deprivation score, % age <4, % non-white and rurality variables as confounders*
Figure 1: Example patient flow post a practice ceasing to exist using LSOA patient grouping
Figure 2: Closure exposure coefficient summary

Closure Exposure Coefficient diagrams for an example practice x in St Helens

- Percentage of the LSOAs at closed practices in St. Helens
- Estimated number of patients registered at practice x from closed practices, per LSOA

Closure exposure coefficient summary

- The number or patients per LSOA was gathered for all LSOAs in England
- The number of patients registered at practices that closed between 01/04/2016 and 31/03/2018 was gathered, per LSOA
- The percentage of each LSOA from closed practices was then calculated (iclose)
- The number of patients per LSOA per surviving practice was gathered (iprac)
- iclose was multiplied by iprac and summed for all the surviving practice’s LSOAs.
- This sum was divided by the total practice population to provide the closure exposure coefficient

Figure 3: Closure Exposure Coefficient equation

Additional information

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Ethical Approval
No ethical approval was required for this study

Competing interests
None declared

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1. Mohamoud, A. *Almost 800 GP practices have shut over the past eight years* Pulse, (2021) [online] Available at: https://www.pulsetoday.co.uk/almost-800-gp-practices-have-shut-over-the-past-eight-years/ [Accessed 26th July 2022]