Regional variation in practitioner employment in general practices in England: 

a comparative analysis

INTRODUCTION

The foundation for comprehensive health services provision is cost-effective universal primary care.\(^1\)\(^-\)\(^3\) However, many countries report problems with providing adequate access to these services\(^4\)\(^-\)\(^6\) because of difficulties with recruitment and retention of doctors trained to provide community-based generalist health care.\(^3\)\(^-\)\(^5\) Health policy has therefore focused on addressing the shortfall in workforce capacity and associated problems.\(^6\)\(^-\)\(^8\) Variation in primary care resources and expectations across different health systems (including funding, roles, and workload in general practice) makes it difficult to interpret differences in workforce composition between countries.\(^9\) In addition, there are limited data about the extent and impact of care provided by non-physicians.\(^14\)\(^-\)\(^15\) Birch et al’s extended analytical framework,\(^16\) which aligns human resource planning with population needs and provider characteristics, recognises that there are other factors that make it difficult to estimate healthcare need and make adequate investment in workforce training.\(^17\) This article addresses these issues in the context of the English NHS.

Context of UK primary care workforce

While the number of practising doctors [per 100 000 population] in the UK is lower than in many European countries,\(^18\) the headcount of GPs (79.57 per 100 000 population in 2013) is close to the mean European Union level (79.47 per 100 000 population; range 9.12–160.11).\(^11\) Workforce modelling indicates a continuing projected shortage of GPs and practice nurses.\(^16\)\(^-\)\(^19\) An insufficient number of GPs will be available as a result of historic recruitment deficits and poor career retention,\(^20\)\(^-\)\(^23\) and there has been little increase in the number of nurses.\(^24\)

Increasing workloads have led to government policy changes including recent recommendations regarding the deployment of a broader range of practitioner types.\(^27\)\(^-\)\(^28\) This is often termed ‘skill mix’ and it is proposed that a wider range of practitioner skills in the workforce, such as physiotherapists, paramedics, physician associates, pharmacists, and advanced nurse practitioners, should in future provide better alignment with projected healthcare needs.\(^29\)\(^-\)\(^30\) In addition to diversification within GP practices, from July 2019, structural and funding changes have begun to facilitate employment of practitioners to deliver integrated out-of-hospital care by working across more than one GP practice through the formation of primary care networks [PCNs].\(^27\)\(^-\)\(^31\)

This article reports an analysis of new data that describe the composition of the...
English primary care workforce immediately before an anticipated workforce expansion associated with the introduction of PCNs. Following the lead of previously published analyses of the geographical distribution of GPs and practice nurses, this study looked at regional differences in workforce composition. In this study, workforce composition was compared using the 13 Health Education England (HEE) regions as geographical units, since the previously used administrative boundaries no longer exist or have relevance for decisions about staff employment. This choice also recognises the pivotal role played by HEE in workforce planning, training, and commissioning in response to local needs and changing workforce requirements.

NHS Digital routinely gathers data about the primary care workforce in England and publishes quarterly reports of employment across different practitioner types. A comprehensive analysis of these data was undertaken to provide a detailed picture of the location and work participation using full-time equivalent (FTE) of all practitioner types and to identify shifts in the proportion of practitioner types in the workforce.

This study aimed to examine NHS Digital data for variations in practitioner employment using richer data than have previously been available; to provide a baseline analysis of the workforce composition before any impact of PCNs; to look for geographical variation that may be associated with historical employment and/or HEE-prioritised activity; and to set out a methodological basis for identification of associations between workforce composition and data about healthcare activity and quality, and for establishing how progressive changes may be associated with health outcomes and costs.

METHOD
Data
The study uses practice-level workforce data that are publicly available from NHS Digital as part of the Workforce Minimum Data Set. This is a quarterly extraction of data that GP practices are contractually required to provide about staff working at NHS GP practices or other primary care organisations in England. Detailed guidance about the reporting requirements are provided online. Statistics are reported using the practice-level data from 30 June 2019 data extract.

Categorisation of workers
Data are split across four workforce groups: GPs, nurses, direct patient care, and administration. Administration roles are omitted from this study because the focus is on workers who deliver patient care.

There are four categories of GP: GP partners, salaried GPs, locum GPs, and doctors training as GPs.

From the nursing categories, statistics are presented for practice nurses and advanced nurses, which is a composite category, constructed because of issues with role descriptors and low numbers in some constituent roles. The category is defined as the sum of the advanced, specialised, and extended role nursing categories. Because of their low level in reported data, trainee nurses are omitted from this analysis.

From the direct patient care group, the study includes healthcare assistants, pharmacists, physiotherapists, physician associates, and paramedics (roles directly responsible for healthcare delivery).

Level of analysis
Workforce statistics are presented for each of the 13 HEE regions because of the multiple levels at which HEE activity may have an impact on the local availability of primary care practitioners.

Statistics
For each HEE region and staff group the study presents:

- the proportion of practices in the region who employ some of the staff group;
- total headcount of each staff group in the region;
RESULTS

Table 1 shows the numbers of practices in each region and list size while Figure 1 summarises regional employment. A total of 86 practices with missing or atypical characteristics (as indicated by having <1000 registered patients or a missing list size), were excluded from this analysis. Substantial variability is noted in the number of omitted practices across the HEE regions and the average patient list size varies from 7119 in North West London to 11 272 in Wessex, while the mean list size for England is 8775 patients.

Table 2 presents workforce statistics for GPs in each HEE region. A total of 92.38% of practices report having at least one GP partner, with 67.92% employing at least one salaried GP. The total FTE to total headcount ratio is lower among salaried GPs than partner GPs; the average FTE for partner GPs is 0.85 and for salaried GPs is 0.63 (totals not shown in table).

GP partners

The proportion of practices with ≥1 GP partner varies between 85.49% (North West) and 96.14% (Wessex). The average FTE per thousand patients of partner GPs is higher in Wessex (0.35), South West (0.34), and East Midlands (0.33), while the regions with the fewest FTE per thousand patients are the three London regions: South London (0.25), North Central and East London (0.26), and North West London (0.26).

Salaried GPs

Thames Valley has the highest percentage of practices with ≥1 salaried GP (82.01%), while West Midlands has the lowest at 59.32%. The regions with the largest FTE salaried GPs per thousand patients are the four London regions: South London (0.18), South West (0.16), North Central and East London (0.15), and North West London (0.15). The fewest salaried GP FTE per thousand patients are reported in East of England (0.11) and East Midlands (0.12).

Locum and trainee GPs

North West London and North Central and East London practices report the highest locum GP employment rate in terms of FTE per thousand patients (0.04). North West London reports the lowest numbers of GPs in training (ST1-4 0.05 FTE per thousand patients) and has among the lowest combined FTE per thousand patients of partner and salaried GPs (0.41 FTE per thousand patients in each of North West London, North Central and East London,
East of England, and Kent, Surrey and Sussex)

Nurses
Table 3 presents workforce statistics for nurses and healthcare assistants in each region. A total of 93.57% of practices in England employ ≥1 practice nurse and 46.26% employ ≥1 advanced nurse. Employment of ≥1 practice nurse varies from 85.96% in North West London to 97.80% in South West. For advanced nurses, this ranges from 22.06% of practices in North Central and East London to 64.48% of practices in Wessex. Regions with the largest practice nurse FTE per thousand patients are South West (0.22), closely followed by Yorkshire and the Humber, East Midlands, and Wessex. The regions with the lowest practice nurse FTE per thousand patients are the three London regions: North West London [0.12], North Central and East London [0.12], and South London [0.15].

Direct patient care
Healthcare assistants (headcount total 8993) are the most numerous of the direct patient care categories (Table 3). Table 4 reports the remaining categories, with physiotherapists (headcount total 77), and physician associates (headcount total 213) having relatively low numbers.

DISCUSSION
Summary
This analysis demonstrates regional variation in both the practitioner composition of the workforce and the total primary care practitioner workforce in terms of FTE employment per thousand patients.

Regional variation in practice list size may be associated with specific aspects workforce composition. For example, the largest average list sizes are in Wessex, which also has the highest proportion of practices with ≥1 GP partner and ≥1 practice nurse. Conversely, as the region with smallest average list sizes, North West records the fewest practices as having ≥1 partner GP and ≥1 practice nurse.

Three of the four lowest average total workforce ratios (in terms of FTE per thousand patients) are in London regions: North West London [0.12], North Central and East London [0.12], and South London [0.15].

This is consistent with other studies,23 and
Locum GP employment is highest in London regions, while the distribution of trainee GPs (those specialist trainees in years 1–4 of GP training programmes) is dispersed across HEE regions. These data do not differentiate between trainees in early and later stages of their training, therefore it is not possible to determine the extent to which they require supervision or when they will be qualified to work independently.

Practice nurse and advanced nursing ratios are low in London regions, while higher ratios of advanced nurse practitioners tend to occur in regions that also have higher ratios of healthcare assistants [highest in South West] and higher average total workforce ratios. Employment of advanced level nurses shows marked regional variation with an FTE ratio per thousand patients of 0.13 in the North East compared with a ratio of 0.02 in North Central and East London. Regional availability of the training and support to prepare for advanced nursing roles may account for variation in their employment in different HEE regions, but deeper investigation is needed. Apart from healthcare assistants, other staff in direct patient care categories are reported relatively infrequently and at levels that are not suitable for comparable analyses. This highlights the limited contribution to health care made by these practitioners. It also demonstrates the scale of expansion in numbers that would be required for them to provide a meaningful volume of potential ‘substitutes’ for GPs or to have an impact on GP workload and access for patients by performing complementary tasks. Furthermore, it is unclear whether these practitioners reduce GP work by effective substitution or whether their supervision may generate additional GP work.36

Strengths and limitations
This study used an established and widely referenced national (England) dataset, which is updated, monitored, and checked by NHS Digital. The dataset reports greater detail than ever before in terms of FTE working and multiple role descriptions. New reporting processes have replaced older processes to improve data reporting. Guidance updates are regularly distributed by NHS Digital and a quarterly data refresh means that practice staff become familiar with the process.

In common with self-reporting processes generally, there are deficiencies in data quality. Some GP practices do not submit regular or full returns, therefore, the dataset is incomplete and some practices have been

---

Table 3. Workforce statistics for nurses and healthcare assistants in each Health Education England region

| HEE Region                      | Practice nurse | Advanced nurse | Healthcare assistant |
|--------------------------------|----------------|----------------|---------------------|
|                                | Practice with HC>0, % | Total HC | Total FTE | Mean FTE PTP | Practice with HC>0, % | Total HC | Total FTE | Mean FTE PTP | Practice with HC>0, % | Total HC | Total FTE | Mean FTE PTP |
| East Midlands                  | 95.18          | 1485          | 1007.49 | 0.21        | 57.33          | 621          | 475.24 | 0.10        | 82.93          | 884          | 613.66 | 0.13        |
| East of England                | 95.49          | 1873          | 1201.96 | 0.18        | 55.94          | 750          | 567.79 | 0.09        | 77.74          | 995          | 661.62 | 0.10        |
| Kent, Surrey and Sussex        | 95.24          | 1388          | 850.79  | 0.18        | 44.84          | 418          | 299.22 | 0.06        | 44.84          | 429          | 271.71 | 0.06        |
| North Central and East London  | 91.13          | 755           | 465.39  | 0.12        | 22.06          | 129          | 85.81  | 0.02        | 54.43          | 369          | 257.47 | 0.07        |
| North East                     | 94.91          | 785           | 549.98  | 0.20        | 62.87          | 439          | 350.33 | 0.13        | 84.73          | 525          | 382.13 | 0.14        |
| North West                     | 91.67          | 2234          | 1516.96 | 0.20        | 41.76          | 794          | 624.46 | 0.08        | 66.29          | 1122         | 777.42 | 0.10        |
| North West London              | 85.96          | 508           | 294.23  | 0.12        | 23.03          | 102          | 64.29  | 0.03        | 63.20          | 327          | 206.91 | 0.09        |
| South London                   | 92.46          | 814           | 528.65  | 0.15        | 29.90          | 171          | 115.91 | 0.03        | 60.55          | 338          | 225.52 | 0.07        |
| South West                     | 97.80          | 1782          | 1119.72 | 0.02        | 58.28          | 672          | 496.95 | 0.10        | 87.82          | 1063         | 682.83 | 0.14        |
| Thames Valley                  | 95.82          | 712           | 453.08  | 0.17        | 46.86          | 203          | 138.20 | 0.05        | 82.01          | 364          | 238.50 | 0.09        |
| Wessex                         | 96.14          | 947           | 598.55  | 0.21        | 64.48          | 389          | 285.98 | 0.10        | 87.64          | 463          | 308.65 | 0.11        |
| West Midlands                  | 93.83          | 1837          | 1189.96 | 0.19        | 43.32          | 600          | 448.25 | 0.07        | 73.05          | 958          | 630.58 | 0.10        |
| Yorkshire and the Humber       | 92.71          | 1781          | 1219.73 | 0.21        | 54.46          | 823          | 636.67 | 0.11        | 81.85          | 1156         | 798.96 | 0.14        |
| England                        | 93.57          | 16 901        | 10 996.49 | 0.19 | 46.26            | 6111         | 4589.10 | 0.08        | 71.97          | 8993         | 6055.96 | 0.11        |

FTE = full-time equivalent. HC = headcount. PTP = per thousand patients.
dropped from this analysis. Furthermore, it is not certain that data are captured for all practitioners who are not directly employed by or wholly based at GP practices, in other words, those who may be regarded as employed by an external organisation such as a clinical commissioning group, or who work at multiple sites.

It is important to recognise that these workforce data do not add information about the roles, duties, or responsibilities undertaken by practitioners and therefore cannot add detailed information about how they contribute to delivery of health care.

It was also observed that the practitioner descriptors guidance supplied by NHS Digital are open to interpretation and do not always match the role titles used in GP practices. Furthermore, since practices can only record one role for each staff member, those having more than one role cannot be recognised in the dataset, and their additional roles may be under-reported.

The analysis has not been extended to include contextual factors, such as variation in demographic characteristics, or the prevalence of illnesses that may be associated with different health needs in different regions or practice populations.

Comparison with existing literature
No published analyses were found about the distribution of multiple types of practitioners, apart from online national summaries from NHS Digital. In contrast with previous studies reporting geographical variation in the distribution of GPs and practice nurses, reports from HEE and the King’s Fund refer to regional variation but do not report in sufficient depth to reveal regional differences in the composition of the workforce.

Implications for research and practice
This article sets out a methodological approach to understanding variation in workforce composition and establishes a baseline for comparison with future datasets. Regional level statistics are presented on the current scale of skill mix employment in primary care and regional variation is indicated in the different types of practitioner in terms of FTE per thousand patients. This provides a more nuanced picture than has previously been available and lays the foundations for future analysis of other data that are potentially associated with workforce capacity and practitioner composition. This is an essential step towards a broader consideration of what sort of workforce is required to meet local

| Table 4. Workforce statistics for pharmacists, paramedics, physician associates, and physiotherapists in each Health Education England region |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Health Education England region | Pharmacist | Practice with Total Mean | Practice with Total Mean | Practice with Total Mean | Practice with Total Mean |
| | FTE | HC % | % | % | % |
| East Midlands | 18.52 | 60.07 | 0.02 | 5.33 | 67.90 | 26.15 | 0.01 | 6.73 | 3.14 | 0.00 | 0.58 | 3 | 1.77 | 0.00 |
| East of England | 17.74 | 16.5 | 0.02 | 0.97 | 89.17 | 7.65 | 0.01 | 3.61 | 3.41 | 0.00 | 0.3 | 1.06 | 7 | 2.64 | 0.00 |
| Kent, Surrey and Sussex | 15.28 | 69.90 | 0.01 | 0.41 | 87.24 | 12.15 | 0.01 | 4.46 | 2.64 | 0.00 | 0.8 | 2.77 | 0.00 |
| North Central and East London | 11.75 | 72.64 | 0.02 | 0.81 | 69.43 | 12.15 | 0.01 | 4.39 | 2.64 | 0.00 | 0.8 | 2.77 | 0.00 |
| North East | 14.09 | 72.64 | 0.02 | 0.81 | 69.43 | 12.15 | 0.01 | 4.39 | 2.64 | 0.00 | 0.8 | 2.77 | 0.00 |
| North West | 14.09 | 72.64 | 0.02 | 0.81 | 69.43 | 12.15 | 0.01 | 4.39 | 2.64 | 0.00 | 0.8 | 2.77 | 0.00 |
| South London | 18.09 | 82.64 | 0.02 | 0.81 | 69.43 | 12.15 | 0.01 | 4.39 | 2.64 | 0.00 | 0.8 | 2.77 | 0.00 |
| South West | 15.28 | 69.90 | 0.01 | 0.41 | 87.24 | 12.15 | 0.01 | 4.46 | 2.64 | 0.00 | 0.8 | 2.77 | 0.00 |
| Thames Valley | 14.09 | 72.64 | 0.02 | 0.81 | 69.43 | 12.15 | 0.01 | 4.39 | 2.64 | 0.00 | 0.8 | 2.77 | 0.00 |
| Wessex | 11.75 | 72.64 | 0.02 | 0.81 | 69.43 | 12.15 | 0.01 | 4.39 | 2.64 | 0.00 | 0.8 | 2.77 | 0.00 |
| Yorkshire and the Humber | 22.62 | 210.90 | 0.02 | 0.81 | 69.43 | 12.15 | 0.01 | 4.39 | 2.64 | 0.00 | 0.8 | 2.77 | 0.00 |

FTE = full-time equivalent. HC = headcount. PTP = per thousand patients.
health needs and the resources needed for their training and continuing deployment. In addition to monitoring how the workforce evolves over time, this article provides a foundation for future analyses, including overall costs and patient outcomes, which will usefully inform policy development with regard to workforce planning, practitioner training, and commissioning services. Additional work is needed to identify changes in primary care delivery that cannot be captured solely through analysis of workforce data; for example, the extent to which tasks and responsibilities are transferred between practitioners or whether additional work is generated for GPs by multi-level supervision of less qualified practitioners.

The extent to which newer types of practitioner can substitute for a depleted GP workforce remains unclear and consequences for costs have not yet been fully evaluated. Significant time and investment in training will be needed if the small proportion of newer types of practitioner is to expand sufficiently to relieve pressure on existing primary service providers. Therefore, delays in achieving widespread skill mix change cannot deliver a full and immediate solution to the current GP UK workforce crisis.

**Funding**
This study is funded by the National Institute for Health Research (NIHR) Project 17/08/25 HS&DR programme. The views expressed are those of the author(s) and not necessarily those of the NIHR or the Department of Health and Social Care.

**Ethical approval**
Ethical approval was obtained from the University of Manchester (REC reference: 18/NW/0650).

**Provenance**
Freely submitted; externally peer reviewed.

**Competing interests**
The authors have declared no competing interests.

**Open access**
This article is Open Access: CC BY 4.0 licence ([https://creativecommons.org/licenses/by/4.0/](https://creativecommons.org/licenses/by/4.0/)).

**Discuss this article**
Contribute and read comments about this article: [bjgp.org/letters](http://bjgp.org/letters)
REFERENCES

1. Starfield B, Shi LY, Macinko J. Contribution of primary care to health systems and health. Milbank Q 2005; 83(3): 457–502.
2. van den Berg MJ, van Looen T, Westert GP. Accessible and continuous primary care may help reduce rates of emergency department use. An international survey in 34 countries. Fam Pract 2016; 33(1): 42–50.
3. Basu S, Berkowitz SA, Phillips RL, et al. Association of primary care physician supply with population mortality in the United States, 2005–2015. JAMA Intern Med 2019; 179(4): 506–514.
4. National Audit Office. Improving patient access to general practice. London: NAO, 2017.
5. Healthwatch Trafford. New league table reveals GP shortages across England, as patients set to wait or more to see family doctor on 67 m occasions. 2015. https://healthwatchtrafford.co.uk/news/new-league-table-reveals-gp-shortages-across-england-as-patients-set-to-wait-week-or-more-to-see-family-doctor-on-67m-occasions (accessed 22 Jan 2020).
6. World Health Organization, United Nations Children’s Fund (UNICEF). A vision for primary health care in the 21st century. Geneva: WHO, UNICEF, 2018.
7. Joyce CM, McNeil JJ, Stoelewinier J. More doctors, but not enough: Australian medical workforce supply 2001–2012. Med J Aust 2006; 184(9): 441–446.
8. Knight V. America to face a shortage of primary care physicians within a decade or so. Washington Post 2019; 15 Jul. https://www.washingtonpost.com/health/america-to-face-a-shortage-of-primary-care-physicians-within-a-decade-or-so/2019/07/12/Bd144Da-a27d-11e9-bd36-ec6cb020d01d_story.html (accessed 22 Jan 2020).
9. Owen K, Hopkins T, Shortland T, Dale J. GP retention in the UK: a worsening crisis. Findings from a cross-sectional survey. BMJ Open 2019; 9(2): e026048.
10. Hackey RB, Grasso V, La Rochelle M, Seaver K. Rethinking the shortage of primary care physicians. JAAPA 2018; 31(6): 47–50.
11. Islam N. The dilemma of physician shortage and international recruitment in Canada. Int J Health Policy Manag 2014, 3(1): 29–32.
12. Campbell D. New GPs sign up to poorest areas after £20,000 incentives. The Guardian 2019; 19 Jan: https://www.theguardian.com/society/2019/jan/19/trainee-doctors-recruited-deprived-areas-england (accessed 22 Jan 2020).
13. BMA. International models of general practice. 2018. https://www.bma.org.uk/collective-voice/policy-and-research/nhs-structure-and-delivery/international-models-of-general-practice (accessed 22 Jan 2020).
14. Bodenheimer T, Pham HH. Primary care: current problems and proposed solutions. Health Aff 2010; 29(5): 799–805.
15. World Health Organization, European Health Information Gateway. Generalist medical practitioners, per 100 000. 2020. https://gateway.euro.who.int/en/indicators/hlthres_67-generalist-medical-practitioners-per-100-000 (accessed 22 Jan 2020).
16. Birch S, Kephart G, Tomblin-Murphy G, et al. Human resources planning and the production of health: a needs-based analytical framework. Canadian Public Policy 2007; 33 Suppl 1: S1–S16.
17. The National Academies of Sciences, Engineering, Medicine. Matching the Health Workforce to Population Needs. In: Future Economic Of Health Professional Education: Proceedings of a Workshop. 2017. https://www.nap.edu/read/24736/chapter/3 (accessed 22 Jan 2020).
18. Statistics Explained. Healthcare personnel statistics — physicians. 2019. https://ec.europa.eu/eurostat/statistics-explained/pdf/pdfcache/37382.pdf (accessed 22 Jan 2020).
19. Charlesworth A, Johnson P, eds. Securing the future: funding health and social care to the 2030s. 2018. https://www.fs.org.uk/uploads/11434.pdf (accessed 22 Jan 2020).
20. Bevan G, Karamokos M, Exley J, et al. The four health systems of the United Kingdom: how do they compare? Summary report. 2014. https://www.nuffieldtrust.org.uk/files/2017-01/4-countries-report-web-final.pdf (accessed 22 Jan 2020).
21. Health Education England. Investing in people for health and healthcare. Workforce plan for England. Proposed education and training commissions for 2016/17. 2016. http://reciperovertimeplanning.hee.nhs.uk/Portals/0/HEWMLinksAndResources/HEEE%20Workforce%20Plan%20for%20England%202016%20v0516_0.pdf?ver=2015-05-31-125416-483 (accessed 22 Jan 2020).
22. NHS GP Taskforce Final Report. Securing the future GP workforce. Delivering the mandate on GP expansion. 2014. https://www.bma.org.uk/-/media/files/pdfs/news%20&%20views%20analysis/gp-taskforce-report.pdf (accessed 22 Jan 2020).
23. Gilson J, Sutton M, Spoerer S, et al. Ninth national GP workforce survey 2017. Manchester: PRUDComm, Manchester University, 2018.
24. Samsøn A, Terry R, Fletcher E, et al. Why do GPs leave direct patient care and what might help to retain them? A qualitative study of GPs in South West England. BMJ Open 2018; 8(11): e019849.
25. Spoerer S, Laverty L, Checkland K. The influence of training experiences on career intentions of the future GP workforce: a qualitative study of new GPs in England. Br J Gen Pract 2019; DOI: https://doi.org/10.3399/bjgp19X703887.
26. Dayan M, Arora S, Rosen R, Curry N. Is general practice in crisis? Briefing with an evidence-based overview of general practice in England. 2014. https://www.nuffieldtrust.org.uk/resource/is-general-practice-in-crisis (accessed 22 Jan 2020).
27. NHS England, British Medical Association. Investment and evolution: a five-year framework for GP contract reform to implement The NHS Long Term Plan 2019. https://www.england.nhs.uk/wp-content/uploads/2019/01/GP-contract-2019.pdf (accessed 22 Jan 2020).
28. Roland M, Noile E. The future shape of primary care. Br J Gen Pract 2014; DOI: https://doi.org/10.3399/bjgp14X700760.
29. Beech J, Bottery S, Charlesworth A, et al. Closing the gap: key areas for action on the health and care workforce. 2019. https://www.nuffieldtrust.org.uk/research/closing-the-gap-key-areas-for-action-on-the-health-and-care-workforce (accessed 22 Jan 2020).
30. Imison C, Castle-Clarke S, Watson R. Respacing the workforce to deliver the care patients need. Research report. 2016. https://www.nuffieldtrust.org.uk/files/2017-01/resspacing-the-workforce-web-final.pdf (accessed 22 Jan 2020).
31. Addicott R, Maguire D, Honeyman M, Jablaj J. Workforce planning in the NHS. 2015. https://www.kingsfund.org.uk/sites/default/files/field_publication_file/Workforce-planning-NHS-Kings-Fund-Apr-15.pdf (accessed 22 Jan 2020).
32. Hirst M, Lunt N, Atkin K. Were practice nurses distributed equitably across England and Wales, 1988-1995? J Health Serv Res Policy 1998; 3(1): 31–38.
33. Gravelle H, Sutton M. Inequality in the geographical distribution of general practitioners in England and Wales 1974–1995. J Health Serv Res Policy 2001; 6(1): 6–13.
34. NHS Digital. A guide to the staff group, job role and area of work classifications used in ESR. 2019. https://digital.nhs.uk/binary/content/assets/legacy/word/d/m/a_guide_to_the_staff_group_job_role_and_area_of_work_classifications_used_in_esr_v5_0_final.docx (accessed 22 Jan 2020).
35. Barker I, Stewarton A, Deery SR. Association between continuity of care in general practice and hospital admissions for ambulatory care sensitive conditions: cross sectional study of routinely collected, person level data. BMJ 2017; 356:j689.
36. Nelson PA, Bradley F, Martindale AM, et al. Skill-mix change in general practice: a qualitative comparison of three new non-medical roles in English primary care. Br J Gen Pract 2019; DOI: https://doi.org/10.3399/bjgp19X704117.
37. Public Health England. Facing the facts, shaping the future. A draft health and care workforce plan for England to 2027. 2017. https://www.nhs.uk/sites/default/files/documents/Facing%20the%20facts%20-%20Shaping%20the%20future%20-%20Draft%20draft%20health%20and%20care%20workforce%20strategy%20for%20England%202027.pdf (accessed 22 Jan 2020).

British Journal of General Practice, March 2020 e171
