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RCGP Research and Surveillance Centre Annual Report 2014–2015:

disparities in presentations to primary care

Abstract

Background
The Royal College of General Practitioners (RCGP) Research and Surveillance Centre (RSC) comprises over 100 general practices in England, with a population of around 1 million, providing a public health surveillance system for England and data for research.

Aim
To demonstrate the scope of data with the RCGP Annual Report 2014–2015 (May 2014 to April 2015) by describing disparities in the presentation of six common conditions included in the report.

Design and setting
This is a report of respiratory and communicable disease incidence from a primary care sentinel network in England.

Method
Incidence rates and demographic profiles are described for common cold, acute otitis media, pneumonia, influenza-like illness, herpes zoster, and scarlet fever. The impact of age, sex, ethnicity, and deprivation on the diagnosis of each condition is explored using a multivariate logistic regression.

Results
With the exception of herpes zoster, all conditions followed a seasonal pattern. Apart from pneumonia and scarlet fever, the odds of presenting with any of the selected conditions were greater for females ($P<0.001$). Older people had a greater probability of a pneumonia diagnosis (≥75 years, odds ratio [OR] 6.37; $P<0.001$). Common cold and influenza-like illness were more likely in people from ethnic minorities than white people, while the converse was true for acute otitis media and herpes zoster. There were higher odds of acute otitis media and herpes zoster diagnosis among the less deprived (least deprived quintile, OR 1.32 and 1.48, respectively; $P<0.001$).

Conclusion
The RCGP RSC database provides insight into the content and range of GP workload and provides insight into current public health concerns. Further research is needed to explore these disparities in presentation to primary care.

Keywords
common cold; general practice; herpes zoster; human influenza; medical records systems, computerised; otitis media; pneumonia; scarlet fever.

INTRODUCTION

The Royal College of General Practitioners (RCGP) Research and Surveillance Centre (RSC) publishes an annual report highlighting trends in key infectious and non-infectious conditions in England. This is based on an automated and contemporaneous data extraction from the computerised medical records of over 100 representative sentinel general practices in England covering a population of around 1.2 million patients. The RCGP RSC population is reasonably representative of the national population (Box 1); further details are published elsewhere.[1]

The RCGP RSC was established as a Weekly Returns Service in 1964 and is one of the oldest sentinel networks; member practices receive feedback in order to improve data quality and value of this longitudinal surveillance dataset. These weekly reports provide timely surveillance of infectious diseases and identification of epidemics, with influenza surveillance being a key priority for the network.[2] In addition to its weekly report, the RCGP RSC produces an annual report.[3]

The network has reported influenza surveillance data since 1966.[4] Data from the network in the early 1990s were used to illustrate the relationship between respiratory illness presenting to general practice and registered deaths, particularly in older people.[5] It has also demonstrated the relationship between peaks of respiratory illness and winter pressures on hospitals.[6] The RSC contributed to the management of the 2009 influenza pandemic and important improvements were made, in light of the lessons learnt, to current plans for pandemic management.[7] The network's monitoring of seasonal influenza, in collaboration with Public Health England, is ongoing and contributes to the national influenza surveillance programme coordinated by Public Health England.

The RCGP RSC has also had an important long-term role in measuring the effectiveness of influenza and pandemic influenza vaccines.[8] In addition to its national work, it has collaborated in a wide range of European projects.[9] This work continues,[10] and it is actively involved in assessing influenza vaccination

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How this fits in

The RCGP Research and Surveillance Centre has a long history as a surveillance network providing data about infections. The annual report contains important details about presentation across a wide range of conditions. Understanding patterns of disease in primary care may identify areas of further research to explain apparent disparities, as well as demands that will be placed on health systems. The odds of a common cold diagnosis were greater in those from minority ethnic groups and the most deprived, whereas the converse was true of acute otitis media. Both were less likely in males. Influenza-like illness had a higher incidence in working-age groups and was more common in females and ethnic minorities, whereas incidence of pneumonia increased with age and did not have any disparities in diagnosis by sex, ethnicity, or level of deprivation. The probability of herpes zoster presentations increased with age, female sex, and among the less deprived. Scarlet fever presentations increased in the second part of the year compared with the 10-year baseline, and were more common among the 0–4-year age group, with no other disparities evident in presentation.

at a time where antigenic drift might reduce influenza vaccine effectiveness.[11] The RSC is also contributing towards the ongoing assessment of the effectiveness of the new live attenuated influenza childhood vaccine.[12] One of the network's key advantages is the capability of linking the participating practices with laboratories, with the purpose of obtaining timely and accurate microbiological sample results.

The richness and data quality of the RCGP RSC database allows further exploration of the profile of any given condition. The RSC practices have received feedback on their data quality, particularly for infectious diseases, over many decades. The particular aspects of data quality fed back are incidence rates, compared with the rest of the network, and the ratio of incident consultations (first and new infections) compared with follow-ups/repeat consultations. The RSC network is unique in the timeliness of its data; anonymised consultation data are uploaded twice per week using automated procedures and any unusual patterns or events are taken up directly and validated with the practice concerned. Combining the recording of acute infections with chronic disease data has enabled new insights into chronic disease management, for example, investigating the potential downsides associated with poor glycaemic control in diabetes.[13]

This study assesses and explores disparities in diagnoses presenting to the practices within the network in six chosen conditions. These conditions were selected from the 37 routinely reported in the weekly and annual reports as exemplars of the spectrum of diseases included in the network's surveillance work, either because of their topical nature (changing incidence, recent introduction of relevant vaccines) or the burden presenting to GPs.

The six conditions selected were:

- common cold and acute otitis media — these are two minor acute conditions with marked annual variation that, for the period of this report, followed predicted seasonal trends;
- pneumonia and influenza-like illness — these are two more serious conditions that have a marked seasonal pattern with variation resulting in increased hospital pressures; and
- herpes zoster and scarlet fever — these are two conditions of interest because of recent increasing activity. The crude incidence of herpes zoster has seen a steady increase over the years, and there has been a recent resurgence in scarlet fever cases, first observed in 2013–2014, continuing since, and reported in the RSC annual report.[14]

Box 1. Representativeness of RCGP Research and Surveillance Centre population

- **Age and sex of population:** The population is largely representative. However, compared with the 2011 census it has a slightly higher proportion of younger adults (25–44 years) and a low proportion of people aged ≥75 years.
- **Ethnicity:** Most patients in the RCGP RSC network were of white ethnicity (84.4%), similar to the census population (85.4%). There is a slightly higher (though within 1%) prevalence of Asian and black ethnicities.
- **Deprivation:** There is a distribution of deprivation across all centiles with overrepresentation in 2nd, 7th, 9th, and 10th deciles, using the Index of Multiple Deprivation. Overall therefore the population is less deprived: the mean deprivation score for the RCGP RSC population was 19.8 (SD = 0.00682), compared with the English population (mean deprivation score 21.8; SD = 0.00050).
- **Geographical coverage:** There is a broad distribution across England, with a higher concentration of practices in London, and a slightly lower number in the southwest and east of England. Additionally, there are some practice clusters, probably due to effective recruitment strategies using the support of clinical commissioning groups.
- **Chronic conditions:** The crude prevalence of common chronic diseases was similar to that reported nationally in the English Quality and Outcomes Framework (QOF), a pay-for performance scheme for chronic disease management. Largely due to the slightly younger age group and lower level of deprivation, the population is underrepresented in diabetes, learning disabilities, obesity, and pulmonary disease, but overrepresented in cardiovascular disease.
- **Higher level of achievement of chronic disease management scores:** Perhaps unsurprisingly this network is overrepresented in the higher four deciles of chronic disease management scores and has very low numbers in the lowest quintiles. The mean proportion of QOF targets achieved by the RCGP RSC network (97.4%; SD = 0.0233%) was higher (94.7%; SD = 0.0006%).
- **Prescribing:** The prescription rates in the network were in line with those reported at the national level by *British National Formulary* chapter. The differences in prescribing rates are likely accounted for by the population's age and deprivation scores. There are higher prescribing rates in the infections chapter and lower prescribing rates in the nutrition and blood chapters.

Box 2. Policies and education for RCGP RSC practices to ensure reliability and validity of data recording

The RCGP RSC has had a consistent policy for the recording of diagnoses and/or problem titles, and more recently introduced training and feedback:

Practices are asked to always code the problem title. They are asked to use the following hierarchy:
(1) *Code a diagnosis* where possible — practitioners are asked to do this based on their clinical judgement;
(2) Use a *symptom code* where it is impossible to make a diagnosis; and
(3) Use a *process of care code* where it is impossible to use a diagnosis or symptom code, for example, when providing contraception or completing a medical assessment. Avoid, for example, asthma annual review being a problem title — instead code the disease.

Practices are asked to implement two additional policies:
(1) Do not change the diagnosis or problem title unless it will add something to patient care.
Additionally, practices are only asked to change a diagnosis or symptom code used as a problem title where this makes a difference to patient care. This is important to avoid overestimates of incidence from the data. For example, if one GP has labelled the condition upper respiratory infection and the patient comes back — if a second doctor thought the initial diagnosis should have been a more specific laryngitis the problem title should not be changed to avoid inflating the incidence of a condition. However, additional data can be coded in that consultation.
(2) Avoid multiple near synonyms for the same diagnosis.
It is easy to end up with multiple codes for the same condition, for example, allergic asthma, late-onset asthma, asthma NOS (not otherwise specified). If this happens the codes should be grouped on the most specific one and that assigned the likely date of diagnosis.

Training and feedback:
(1) All members of each practice are incentivised to complete, each year, online training about the purpose for which data collected are used, information governance, and data quality.
(2) Practices receive feedback comparing their recording of acute and chronic conditions and if they are recording episode type compared with the rest of the network. To keep interest up a range of different data items are fed back including rates of administration of influenza vaccine by risk group, again compared with the rest of the network.

RCGP RSC practice clinicians are incentivised to complete training on coding and receive practice-specific feedback comparing their practice with the rest of the network.

Coding clinicians are provided with structured education (financially incentivised) to follow this approach.

This exploration of disparities in presentations to primary care was carried out to highlight the potential of routine data to provide insights into clinical practice and to provide insight into priority areas for current public health activity.

METHOD

Data were extracted from 106 volunteer practices that are members of the RCGP RSC, resulting in a cohort of 963 162 patients; this is a group that is representative of the English population. The extracted data were anonymised and encrypted; only coded data from the general practice were extracted from computerised medical records, not free text. Data were coded with Read Version 2, or Clinical Terms Version 3.[15]

The incidence of the six conditions described is based on their recording in practice computerised medical record systems. The RCGP RSC practices are encouraged to record the clinician's opinion as to the most likely diagnosis as a problem title, also assigning an 'episode type' to differentiate first or new presentations from ongoing care. Since its inception, the RCGP RSC has encouraged participating GPs to record valid and reliable diagnostic data; these approaches have been in place for some decades, particularly with respect to acute respiratory infections.[16] More recently, financially incentivised training and practice-specific comparative feedback have been introduced, modelled on the principles of audit-based education.[17] Box 2 gives details of the current approaches taken by the RSC.

The results for each condition were reported in two parts. First, the rate of the condition, any trends, and the age–sex, ethnicity, and deprivation distribution were described. The odds ratio (OR) of having the condition was then calculated, using a multivariate logistic regression.

Weekly incidence rates per 100 000 population were calculated for common cold, acute otitis media, pneumonia, influenza-like illness, herpes zoster, and scarlet fever, presenting to primary care between 1 May 2014 and 30 April 2015. Population denominators were based on the population registered in the participating practices for the study period. Temporal trends in incidence rates for each condition were examined graphically over the study period, and compared with a 10-year historical baseline, other than pneumonia, which has a 5-year baseline. The weeks are numbered according to the International Organization for Standardization, ranging from week 1 to week 52 in a single year.[18]

For the first part, the age–sex profiles for people who presented with these conditions were compared with the rest of the registered population (results are available from the authors on request). Ethnic groups, based on the 2011 English census categories, were assigned using an algorithm that incorporated proxy markers for ethnicity, such as language spoken.[19] Level of deprivation was determined using the Indices of Multiple Deprivation,[20] scored from 0.5 (least deprived) to 92.6 (most deprived), based on each patient's Lower Super Output Area, determined from their postcode.[21]

Additionally, the difference in uptake of influenza vaccine was reported for different ethnic groups. For herpes zoster, crude annual incidence rates were explored within the database for the past 5 years. Long-term trends for this condition need to be explored, given the introduction of an adult immunisation programme in 2013.[22]

Differences in the deprivation score distributions were tested using a Kolmogorov–Smirnov test,[23] and ethnic group differences were tested using a χ^2 test. In order to examine the isolated effect of each variable after controlling for the others, six separate multivariate logistic regression models were constructed with the probability of presenting with each of the selected conditions as the outcome variable, and age (age bands = 0–4, 5–24, 25–49, 50–74, ≥75 years), sex, ethnicity, and deprivation (Indices of Multiple Deprivation scores grouped into quintiles) as the explanatory variables. The reference categories were the 0–4-year age band, female sex, white ethnicity, and the first deprivation quintile (most deprived); OR and *P*-values were reported.

The receiver operating characteristic c-statistic was calculated for each model. This is widely used to assess the discriminative ability of probability-based diagnostic tests.[24] If this model has a c-statistic close to 1, then this means that, if a patient with the outcome and a patient without the outcome were selected, the patient with the outcome would have a higher predicted probability than the patient without the outcome of developing the outcome. The variance inflation factor was also calculated to test for multicollinearity within the model.[25] Multicollinearity (two explanatory variables having a high correlation) should be avoided in a model, as this may inflate the coefficients. Both of these tests were conducted using functions in the statistical software R (version 3.2.5).

Table 1. Results of multivariate logistic regression models, for selected conditions presenting between May 2014 and April 2015 to practices in the RCGP RSC network

		Age bands in years (Ref: 0–4)				Sex (Ref: female)	Ethnic group (Ref: white)					Index of Multiple Deprivation quintiles (Ref: 1st quintile = most deprived)			
Condition		**5–24**	**25–49**	**50–74**	**≥75**	**Male**	**Asian**	**Black**	**Mixed**	**Other**	**Unknown**	**2nd**	**3rd**	**4th**	**5th**
Common cold	OR	0.18	0.10	0.09	0.10	0.72	1.51	1.13	1.23	1.15	0.77	0.98	0.94	0.89	0.86
	95% CI	0.17 to 0.18	0.10 to 0.10	0.09 to 0.10	0.10 to 0.11	0.71 to 0.74	1.45 to 1.57	1.06 to 1.20	1.14 to 1.33	1.03 to 1.27	0.75 to 0.78	0.95 to 1.02	0.91 to 0.97	0.86 to 0.92	0.83 to 0.89
	P-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.01	<0.001	0.33	<0.001	<0.001	<0.001
Acute otitis media	OR	0.18	0.04	0.03	0.02	0.85	0.78	0.50	0.73	0.69	0.75	1.16	1.35	1.36	1.32
	95% CI	0.17 to 0.19	0.04 to 0.05	0.03 to 0.03	0.02 to 0.02	0.82 to 0.89	0.70 to 0.85	0.43 to 0.59	0.63 to 0.85	0.54 to 0.86	0.72 to 0.78	1.07 to 1.25	1.26 to 1.45	1.27 to 1.45	1.23 to 1.40
	P-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Pneumonia	OR	0.33	0.57	1.58	6.37	0.99	0.71	0.66	1.00	0.68	0.77	1.10	1.22	1.00	0.97
	95% CI	0.20 to 0.57	0.37 to 0.92	1.05 to 2.52	4.24 to 10.12	0.87 to 1.14	0.44 to 1.08	0.33 to 1.18	0.40 to 2.05	0.17 to 1.79	0.66 to 0.89	0.84 to 1.46	0.94 to 1.58	0.78 to 1.28	0.76 to 1.24
	P-value	<0.001	0.01	0.04	<0.001	0.92	0.13	0.20	1.00	0.51	<0.001	0.48	0.14	0.98	0.79
Influenza-like illness	OR	2.27	4.03	3.90	2.40	0.76	1.64	1.38	1.49	1.55	0.86	0.98	1.13	1.08	1.02
	95% CI	1.69 to 3.14	3.02 to 5.55	2.92 to 5.37	1.76 to 3.37	0.72 to 0.81	1.44 to 1.85	1.14 to 1.64	1.14 to 1.91	1.15 to 2.03	0.80 to 0.93	0.87 to 1.10	1.01 to 1.26	0.97 to 1.20	0.92 to 1.14
	P-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.71	0.04	0.15	0.65
Herpes zoster	OR	4.22	5.31	13.64	22.41	0.67	0.62	0.50	0.45	0.50	0.71	1.32	1.38	1.41	1.48
	95% CI	2.49 to 7.96	3.15 to 9.96	8.11 to 25.53	13.28 to 42.02	0.62 to 0.72	0.49 to 0.78	0.34 to 0.70	0.24 to 0.76	0.25 to 0.88	0.65 to 0.76	1.13 to 1.54	1.20 to 1.60	1.23 to 1.62	1.30 to 1.70
	P-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.01	0.03	<0.001	<0.001	<0.001	<0.001	<0.001
Scarlet fever	OR	0.37	0.02	0.01	<0.001	0.93	0.64	0.55	1.15	0.37	0.47	0.95	1.24	1.03	1.28
	95% CI	0.30 to 0.46	0.01 to 0.03	0.00 to 0.01	0.00 to 0.00	0.77 to 1.12	0.39 to 1.00	0.26 to 1.01	0.64 to 1.90	0.06 to 1.14	0.38 to 0.59	0.66 to 1.37	0.89 to 1.74	0.75 to 1.43	0.96 to 1.74
	P-value	<0.001	<0.001	<0.001	0.92	0.43	0.06	0.08	0.61	0.16	<0.001	0.80	0.20	0.85	0.10

OR = odds ratio. RCGP = Royal College of General Practitioners. RSC = Research and Surveillance Centre.

RESULTS

Common cold

The 2014–2015 weekly incidence rates for common cold followed expected seasonal trends, peaking at week 51; the mean weekly incidence was 105.09

Figure 1. Weekly incidence rate per 100 000 of common cold in England for the period May 2014 to April 2015. ISO = International Organization of Standardization.

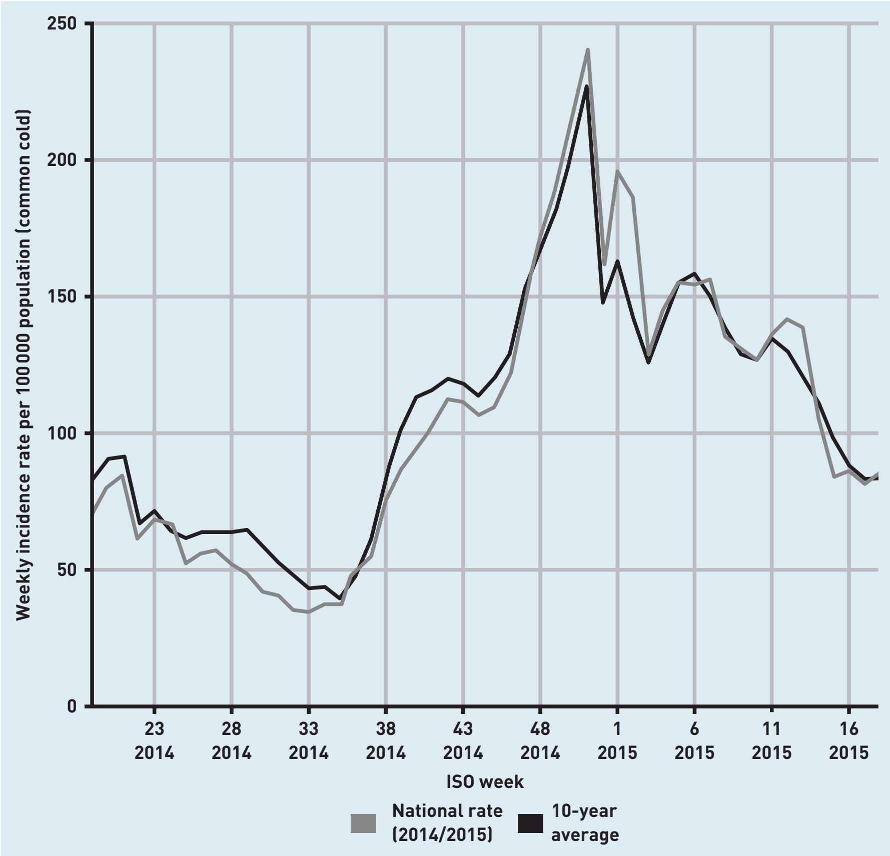


Figure 2. Weekly incidence rate per 100 000 of acute otitis media in England for the period May 2014 to April 2015.

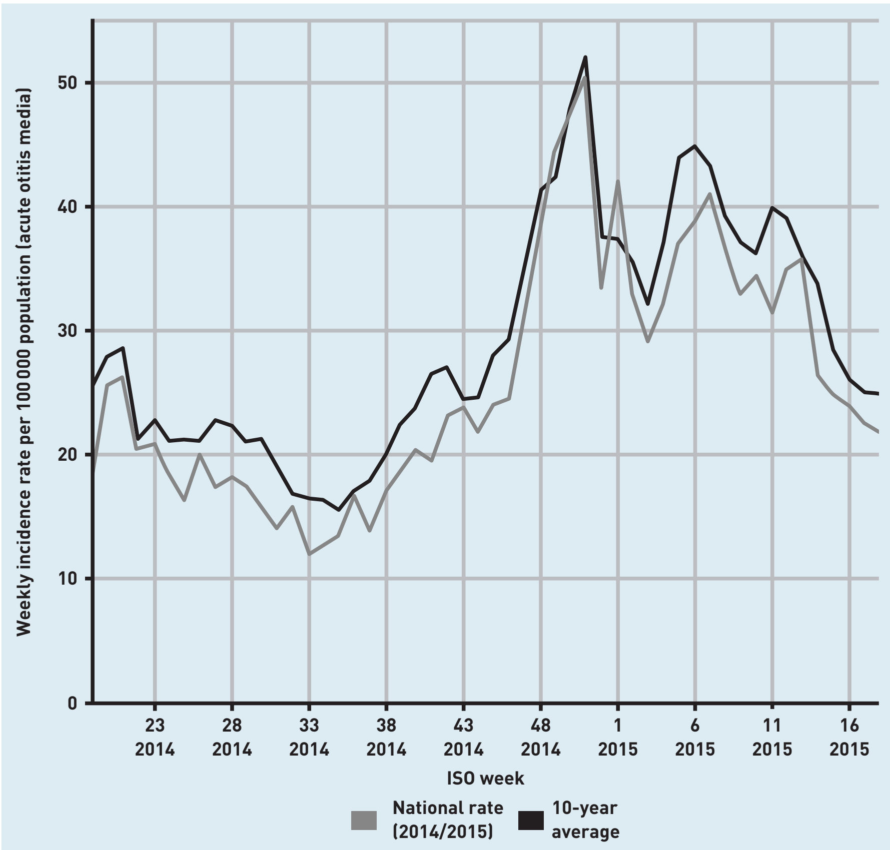


Figure 3. Weekly incidence rate per 100 000 of pneumonia in England for the period May 2014 to April 2015.

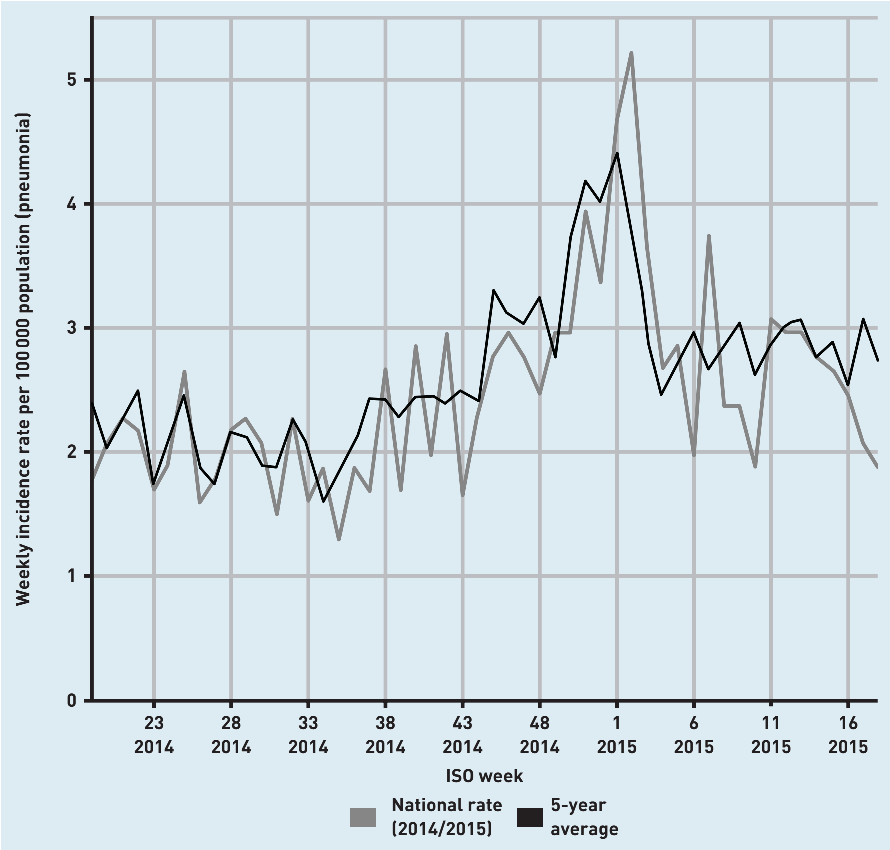
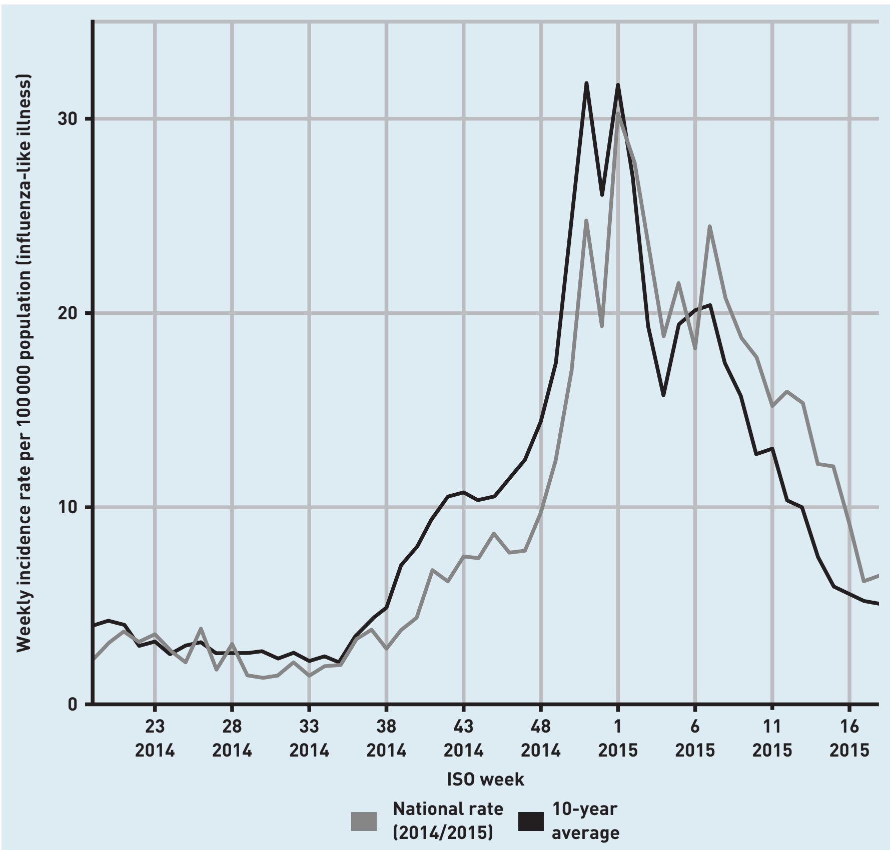


Figure 4. Weekly incidence rate per 100 000 of influenza-like illness in England for the period May 2014 to April 2015.



per 100 000 population (Figure 1). This condition was more commonly diagnosed in children <15 years old, with females aged 25–64 years also showing a high incidence.[3] There were some significant differences (P<0.001) in incidence by ethnic group, with overrepresentation of Asian patients (11.4% versus 7.4%) compared with the baseline population and underrepresentation of patients of white ethnicity (79.6% versus 85.6%).[3] People presenting with common cold tended to be living in more deprived areas, with a mean deprivation score of 19.3, compared with 17.9 in the rest of the registered population (P<0.001).[3]

The multivariate logistic regression model for common cold showed that the odds of presenting with this condition, after controlling for other factors, were greatest in those aged 0–4 years (P<0.001). Males were less likely to present (OR 0.72, P<0.001), compared with females. People from ethnic minorities had a greater probability of presenting, compared with those of white ethnicity (Asian: OR 1.51, black: OR = 1.13, mixed: OR 1.23, P<0.001). People in the most deprived quintile had a higher probability of presenting with common cold in primary care (P<0.001, Table 1).

Acute otitis media

The 2014–2015 weekly incidence rates for acute otitis media followed an expected pattern, similar to that of common cold, peaking at week 51, with a mean weekly incidence of 25.95 cases per 100 000 (Figure 2). This condition had a similar age–sex profile to common cold, and the distribution of diagnoses by ethnicity was close to that of the registered population.[3]

The multivariate logistic regression model (Table 1) showed that the odds of presenting with acute otitis media, after controlling for other factors, were greatest in those aged 0–4 years (P<0.001). Males were less likely to present (OR 0.85, P<0.001), compared with females. People from ethnic minorities had a lower probability of presenting, compared with those of white ethnicity (Asian: OR = 0.78, black: OR 0.50, mixed: OR 0.73, P<0.001). The odds of presenting with acute otitis media increased with decreasing levels of deprivation (P<0.001).

Pneumonia

The 2014–2015 weekly incidence rates for pneumonia followed an expected seasonal pattern (Figure 3). Mean weekly incidence for pneumonia was 2.48 per 100 000 population. Pneumonia was predominantly diagnosed in the older population (particularly those ≥75 years), especially females.[3] People presenting with pneumonia were more likely to be white (93.7% versus 85.6%, P<0.001).[3] Those with pneumonia were slightly less deprived than the overall population (mean deprivation score: 16.5, P = 0.023).[3]

The multivariate logistic regression model showed that the odds of presenting with pneumonia, after controlling for other factors, were greatest for those aged ≥75 years (OR 6.37) and lower for those in the 5–24 age band (OR 0.33), compared with those aged 0–4 years (P<0.001). There were no significant differences by sex, ethnic group, and deprivation levels for pneumonia (Table 1).

Influenza-like illness

The 2014–2015 weekly incidence rates for influenza-like illness followed an expected seasonal pattern, with the highest incidences between week 50 (2014) and week 2 (2015), and reaching a peak in week 1 (Figure 4). Mean weekly incidence cases for influenza-like illness were 9.77 per 100 000 population. People presenting with influenza-like illness had an overrepresentation in the black (5.1%) and Asian (10.7%) ethnic groups, compared with the overall population (3.9% and 7.6%, respectively); both these differences were significant (P = 0.002 and P<0.001, respectively).[3] There was a significant difference for the deprivation score distribution of people presenting with influenza-like illness, although the direction of the difference was not clear (P = 0.016).[3]

The logistic regression model showed that the odds of presenting with influenza-like illness, after controlling for other factors, were lowest in those aged 0–4 years (P<0.001; Table 1) and highest in adults. Males were less likely to present (OR 0.76, P<0.001), compared with females. People of ethnic minorities had a greater probability of presenting, compared with those of a white ethnicity (Asian: OR 1.64, black: OR 1.38, mixed: OR 1.49, P<0.001). People in the third deprivation quintile (middle quintile) had a higher probability of presenting with influenza-like illness in primary care (OR 1.13; P = 0.04).

Differences in seasonal influenza vaccine uptake between ethnic groups may have contributed to the higher incidence in ethnic minorities (Table 2); although there may be good uptake in the younger population, there is less uptake in older people from ethnic minorities. However, missing ethnicity data limits the inferences that can be made from this.

Table 2. Cross-tabulation of influenza vaccine status (in season 2014/2015), age band, and ethnicity, including χ^2 test results

Age, years	Vaccination status: Vaccinated n	%	Not vaccinated n	%	χ^2	Vaccinated: White ethnicity n	%	Non-white ethnicity n	%	Ethnicity not stated n	%	χ^2	Not vaccinated: White ethnicity n	%	Non-white ethnicity n	%	Ethnicity not stated n	%	χ^2
0–4	7573	3.8	28 128	3.7	0.047	4436	3.1	976	7.0	2161	4.8	<0.001	12 596	3.4	3650	4.7	11 882	3.8	<0.001
5–24	17 226	8.6	202 994	26.6	<0.001	11 158	7.9	1884	13.5	4184	9.3	<0.001	86 254	23.3	24 995	32.5	91 745	29.1	<0.001
25–49	23 861	11.9	316 072	41.4	<0.001	15 947	11.3	3611	25.8	4303	9.6	<0.001	162 379	43.8	37 921	49.3	115 772	36.7	<0.001
50–74	90 279	45.1	193 940	25.4	<0.001	65 505	46.3	5570	39.8	19 204	42.9	<0.001	100 858	27.2	9793	12.7	83 289	26.4	<0.001
≥75	61 278	30.6	21 811	2.9	<0.001	44 406	31.4	1965	14.0	14 907	33.3	<0.001	8576	2.3	591	0.8	12 644	4.0	<0.001
Totals	**200 217**	**20.8**	**762 945**	**79.2**		**141 452**	**70.6**	**14 006**	**7.0**	**44 759**	**22.4**		**370 663**	**48.6**	**76 950**	**10.1**	**315 332**	**41.3**	

Herpes zoster

The 2014–2015 weekly incidence rates for herpes zoster were higher than the 10-year baseline (Figure 5). This is as a result of an uneven increase in the annual crude incidence rates of this condition in previous years. This is due to the increasing population of older people and because this condition is most common in older adults. In 2010, there was an annual incidence of 312 cases per 100 000 registered patients, rising to a high of 342 cases per 100 000 in 2014. The age–sex profile for this condition differs from the general population, in that it was most commonly diagnosed in adults; females aged 45–64 years constituted the highest proportion of cases.[3]

People presenting with herpes zoster in primary care were more likely to be white (94.4%), when compared with the rest of the registered population (85.3%; P<0.001).[3] Those presenting with herpes zoster tended to live in less deprived areas, with a mean deprivation score of 15.1, compared with 17.9 in the rest of the registered population (P<0.001).[3]

The logistic regression model (Table 1) showed that the odds of presenting with herpes zoster, after controlling for other factors, were lowest in those aged 0–4 years old (P<0.001), with ORs increasing with age and highest in those aged ≥75 years (OR = 22.41; P = 0.00). Males were less likely to present (OR = 0.67, P<0.001). Those from ethnic minorities had a lower probability of presenting, compared with those of white ethnicity (Asian: OR = 0.62, black: OR = 0.50, P<0.001, mixed: OR = 0.45, P = 0.01). People in the least deprived quintiles had a higher probability of presenting with herpes zoster in primary care (P<0.001), with the ORs increasing with less deprivation.

Scarlet fever

The 2014–2015 weekly incidence rates for scarlet fever were higher than the 10-year baseline (Figure 6). A higher annual incidence of this condition was observed since the start of 2014, with 56.70 cases per 100 000 patients presented to primary care, compared with 22.06 cases in 2012 (relative risk (RR) = 2.57, 95% CI = 2.19 to 3.01) and 21.95 cases in 2013 (RR = 2.58, 95% CI = 2.20 to 3.03). The condition primarily affected children <15 years old, although a significant number of cases were diagnosed in people aged 25–44 years, in particular females.[3]

The distribution of ethnicity in diagnosed cases was similar to the rest of the registered population, with the exception of a slight overrepresentation of mixed ethnicity (5% versus 2%; P<0.001).[3] There were no significant differences in the distribution of the deprivation scores for people with the condition compared with the rest of the network (P = 0.301).[3]

The logistic regression model showed that the odds of presenting with scarlet fever, after controlling for other factors, were greatest in 0–4-year-olds (P<0.001), with the ORs decreasing with age. There were no significant differences between the sexes, ethnic groups, and deprivation levels for scarlet fever.

Logistic regression quality markers

All variance inflation factor estimates were <3 for all of the explanatory variables; therefore, there is unlikely to be collinearity across the variables. The receiver operating characteristic c-statistic results were as follows for each model (the closer to 1, the better the predictive power of the model): common cold, 0.68; acute otitis media, 0.79; pneumonia, 0.76; influenza-like illness, 0.60; herpes zoster, 0.71; and scarlet fever, 0.88. The low receiver operating characteristic for influenza-like illness could be explained from omitted variables: an additional model was produced including seasonal influenza vaccination status, but this only improved the discriminatory ability of the model marginally (from 0.601 to 0.604), which means that there may be other variables that could explain more of the variation in influenza-like illness presentations.

DISCUSSION

Summary

The routinely collected data in the RCGP RSC have provided insights into the nature of presentations to primary care. The authors would like GPs to make more use of this resource to understand the pattern of presentations to primary care. The odds of presenting with a new case of common cold, acute otitis media, influenza-like illness, and herpes zoster were all greater for females. Although some seasonal variation is unpredictable, the RCGP RSC data can provide intelligence about changing patterns of disease through the year. Following the RCGP RSC weekly report for the winter rise in influenza-like illness would be a good place to start. The winter peak in influenza-like illness seems to be coincident with most winter pressures across the health service,[26] and anticipating this peak could allow service provision to be adjusted to meet this need.

Common colds and influenza-like illness were more likely to present in people from ethnic minorities than people of white

Figure 5. Weekly incidence rate per 100 000 of herpes zoster in England for the period May 2014 to April 2015.

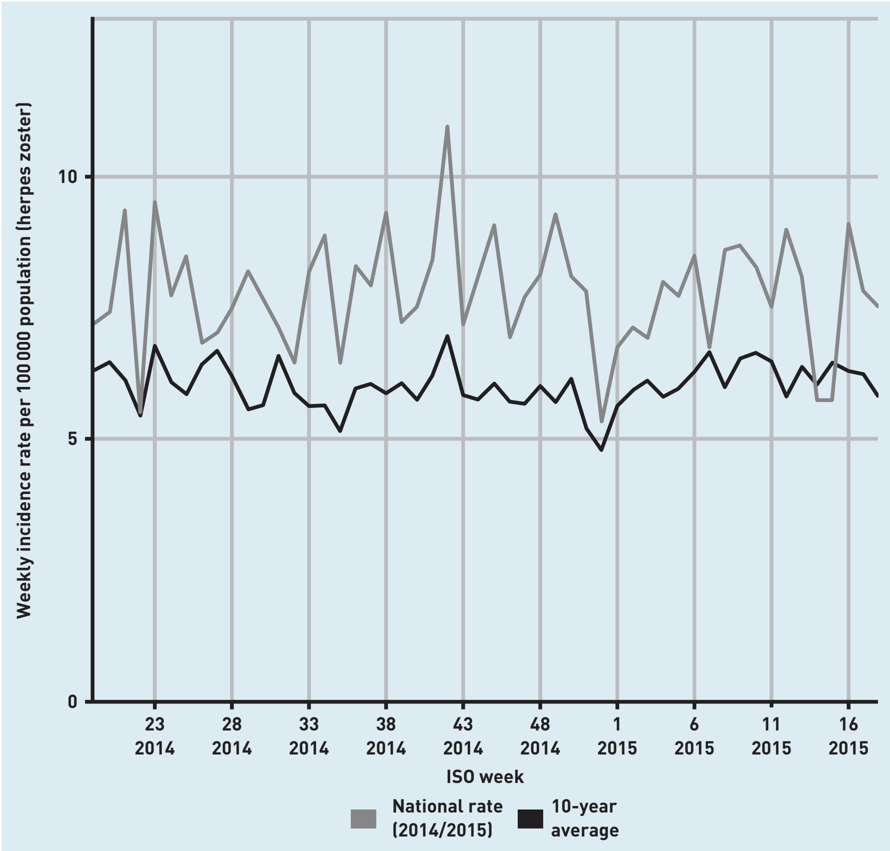
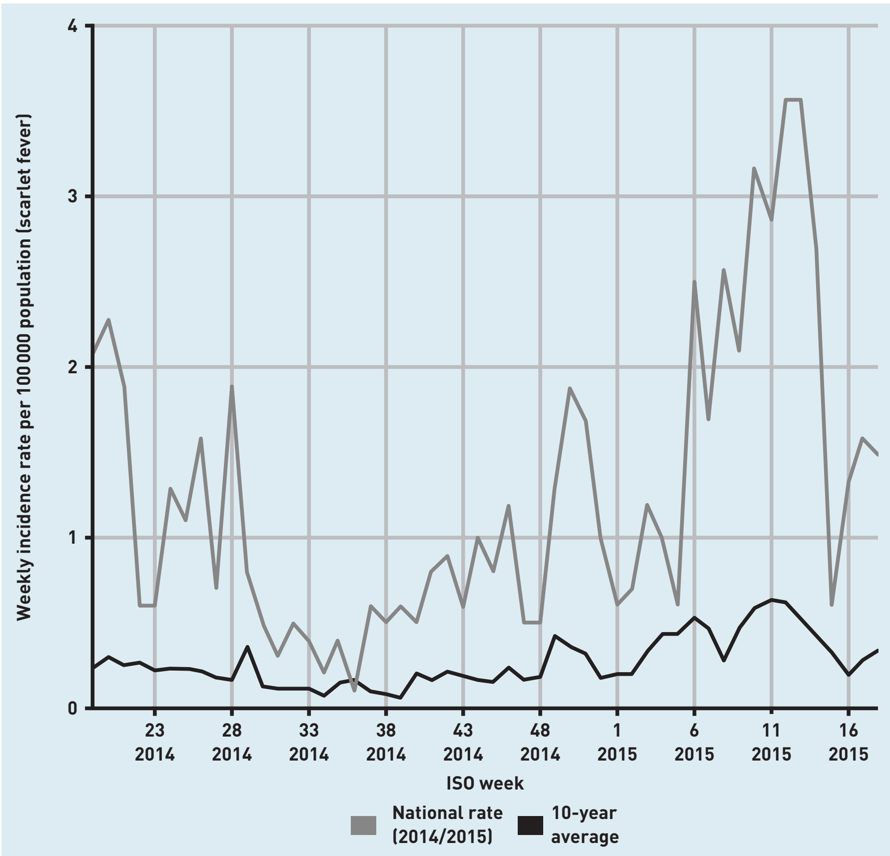


Figure 6. Weekly incidence rate per 100 000 of scarlet fever in England for the period May 2014 to April 2015.



ethnicity, whereas the converse was true for acute otitis media and herpes zoster. The lower uptake of influenza vaccine in people from ethnic minorities may be reflected in differences in influenza-like illness presentations. Better recording of ethnicity in the electronic patient record and further research may be needed to clarify this. There appeared to be greater odds of being diagnosed with acute otitis media and herpes zoster among the less deprived, while the opposite appears to be the case for common cold. Overall, there appear to be social class gradients, in opposite directions, associated with a diagnosis of acute otitis media (more likely in less deprived) and common cold (more likely in more deprived).

However, such a gradient appears much flatter in influenza-like illness and pneumonia, perhaps conditions where the biomedicine is more predominant. Public health professionals and policymakers need to investigate whether access or other service factors contribute to these differences, and, if so, make changes to reduce them. The RCGP RSC could then monitor the impact of such changes. Practitioners should reflect on possible unconscious bias in diagnostic labelling, which may have implications for antibiotic stewardship.

The RCGP RSC has a central role in influenza and respiratory disease surveillance. Behind these reported rates of disease, particularly for influenza-like illness and pneumonia, will be people who are quite unwell and are more vulnerable, which may result in pressures on all parts of the health system. The RCGP RSC weekly and annual reports can provide insights into these patterns. The winter of 2014–2015 saw significant pressures on health services, with the impact particularly on older people, which should therefore encourage GPs to ensure they are vaccinating all eligible groups.

The RCGP RSC annual report provides details of the patterns of presentation of new cases through 2014–2015.[3]

Strengths and limitations

This article used the data collected for RCGP RSC Weekly Returns Service and Annual Report for the 2014–2015 season. The RCGP RSC was established in 1957 and practices have been receiving feedback about data quality since the 1960s. Although the authors accept there are limitations of routinely collected data for research,[27] data quality is considered the gold standard in primary care surveillance. This richness of research data available within a surveillance network can promptly produce initial insights into the epidemiology of a given disease, leading to more in-depth research. Although the RCGP RSC network only covers approximately 1.5% of the English population, it has been shown to be representative.[1] Although basic demographics are assessed, other factors (such as chronic conditions, living in the same or an overcrowded household as someone with the condition) could affect the probability of a person contracting the disease and developing complications; these confounding factors are not assessed in this article. Statistically significant differences were identified across ethnic groups and with level of deprivation; further research is needed to ascertain the causal mechanisms. Additionally, although disparities for the seasonal influenza vaccine are explored, disparities in pneumococcal and shingles immunisation coverage were not examined, which could have a strong impact on the incidence of pneumonia and herpes zoster, respectively.

Comparison with existing literature and other UK databases

The propensity for males to consult less than females may account for some of the difference between the sexes.[28] A higher incidence of herpes zoster in women has been observed before.[29] Others have reported ethnic differences in uptake of influenza vaccine.[30,31] The steady increase in the crude incidence of herpes may be linked to the ageing of the population; additionally, given that severity increases with age, this has been a strong basis for the implementation of an adult immunisation programme in England.[32] Other research has also shown how ethnicity and socioeconomic status are associated with differences in diagnosis and access to therapy.[33,34] Although the rising trends of scarlet fever presented in this article have been previously identified, research continues in an attempt to ascertain potential causes for the recent increase in cases and the impact on patients.[14]

The RCGP RSC is smaller than many of the other widely known UK primary care databases available for research. These include the Clinical Practice Research Datalink (CPRD),[35] The Health Improvement Network (THIN),[36] and QResearch.[37] All have similarities including the potential to link to other data such as hospital records and death data. The RCGP RSC differs in several ways. First, in their original form most of the other databases were derived from a single brand of computerised medical record system, whereas the RCGP RSC extracts data from all the clinical systems. This creates issues around difference in version of coding system between brands,[38] as well as their degree of problem orientation. The computerised medical record system brand primarily supplying data to CPRD and THIN has strict problem orientation, which is good for consistent recording of common conditions, but is less good for recording new conditions. This has to be adjusted for in analyses.[39] Finally, RCGP RSC data are probably the most up to date of the data sources, perhaps inevitably so, given the RSC's surveillance function. Data extracted up to the end of the previous week is analysed by noon on Wednesday and is in the public domain by 2 pm on Thursday of the following week.

Implications for research and practice

The RCGP RSC weekly reports could provide practices with in-year intelligence about what diseases, particularly infectious diseases (such as influenza-like illness), are circulating.[40] The annual report could be used to review seasonal disease patterns, how they might be changing compared with the 10-year average, and provide insight into the seasonal nature of many illnesses.

The conditions commented on are clinical diagnoses. A subset of influenza-like illness diagnoses have virology swabs taken in RCGP RSC practices, which are analysed in the Public Health England reference laboratory in Colindale (North London). This provides feedback to clinicians about their clinical acumen, but also microbiological confirmation about circulating influenza and other respiratory viruses. This information is used by the Chief Medical Officer to appraise when influenza is circulating and when it is appropriate for GPs to prescribe oral antiviral medication for influenza. Growth in new diagnostic technologies may facilitate further research to enable a wider range of pathologies to be identified.

Further research might focus on how infections interact with chronic disease, with possible implications for health service costs and utilisation.[41] Serological surveillance could add to the richness of our understanding of changes in patterns of disease.[42] The RCGP RSC can also provide insights into possible disparities in diagnosis between different ethnicities and levels of deprivation. It may also be possible to go further and be able to compare medical and non-medical influences on diagnostic labelling, and explore and monitor the effectiveness of interventions designed to overcome them.

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Competing interests

Simon de Lusignan is principal investigator in a GlaxoSmithKline (GSK)-funded pilot to assess the potential to detect European Medicines Agency-listed possible brand-specific adverse events following immunisation in near real time. Work package lead in Innovative Medicines Initiative (IMI)-funded project ADVANCE, consortium member of IMI-funded project FLUCOP. Ana Correa participated as a researcher in a GSK-funded pilot to assess the potential to detect European Medicines Agency-listed possible brand-specific adverse events following immunisation in near real time. Ivelina Yonova participated as a practice liaison officer in a GSK-funded pilot to assess the potential to detect European Medicines Agency-listed possible brand-specific adverse events following immunisation in near real time. All other authors have declared no competing interests.

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