

# GP Cluster Level Comparators

**This resource has been retired (January 2025)**

This resource has been retired and is no longer considered an AWMSG-endorsed resource.

The resource underwent an assessment for review in June 2024. At that time members of the All Wales Prescribing Advisory Group (AWPAG) considered it appropriate to retire the resource.

The content contained within the resource was considered to be out of date and, without an indication that an updated version of the resource would be of significant benefit to NHS Wales, AWPAG members considered it most appropriate for the resource to be retired at this time.

If you think this resource should be reconsidered for review, please get in touch with AWTTC by emailing [AWTTC@wales.nhs.uk](mailto:AWTTC@wales.nhs.uk).

This report has been prepared by the Welsh Analytical Prescribing Support Unit (WAPSU), part of the All Wales Therapeutics and Toxicology Centre (AWTTC), with support from the All Wales Prescribing Advisory Group (AWPAG), and has subsequently been endorsed by the All Wales Medicines Strategy Group (AWMSG).

**This resource has now been retired and is no longer considered an AWMSG endorsed resource.**

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## 1.0 INTRODUCTION

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This report outlines a proposed method for the development of cluster group comparators, based on socio-economic similarity and disease prevalence, to enable benchmarking of prescribing. The respiratory therapeutic area is used here to illustrate the method, due to the impact of respiratory illness on the population, the high cost of prescribing respiratory items, recent changes in the evidence base and the potential for prescribing review.

Historically, patients or prescribing units (which account for patient population size, age and sex) have been used to present prescribing data. The overall aim of this work is to enable health boards and localities to benchmark their prescribing, taking into account additional variables such as disease prevalence and deprivation to add context to the data. There are limitations to the interpretation of prescribing data for therapeutic areas, as the model is not intended to explain variations in prescribing, and it should be recognised that a variety of other factors, both national and local, can influence prescribing behaviour. Particularly when interpreting respiratory data, it is important to account for outcomes such as admission and exacerbation rates.

The report highlights:

- The methodology of producing comparators for each GP cluster in Wales based on disease prevalence and socio-economic data, for the purposes of benchmarking prescribing with demographically similar areas;
- Respiratory prescribing data for GP cluster groups in Wales presented in eight groups of the most similar clusters based on respiratory disease prevalence and deprivation. This is presented as an example, and will enable GP cluster groups and health boards to compare their prescribing rates with areas of a similar demographic profile, and may highlight where variations in prescribing are due to prescribing practice and not due to variations in disease prevalence and other demographic factors.

The next stages in this project will include:

- A detailed respiratory prescribing report incorporating the GP cluster level comparators. The report will include prescribing data at national, health board and GP cluster level, presented in a way that allows GP clusters to benchmark against their most similar comparators in terms of disease prevalence and deprivation;
- Production of sets of homogenous GP cluster comparators for other therapeutic areas, such as cardiovascular disease and diabetes;
- As the ultimate aim of the work, production of GP cluster comparators for various therapeutic areas for the purpose of benchmarking on a platform such as a dashboard. It is intended that the dashboard will enable prescribing leads to use an interactive tool to look at their prescribing data, with an option to benchmark within a group of similar GP clusters based on disease prevalence and/or other socio-economic factors.

GP clusters are groups of 4–13 practices in a geographical area with patient numbers ranging from 20,000 to 100,000. The Public Health Wales Observatory produced a set of profiles in 2013 to support the development of GP clusters. GP clusters do not have specific geographical confines; however, the GP clusters work in partnership with other health and social care agencies who are confined to administrative or geographical boundaries such as health boards and local authorities<sup>1</sup>.

## 2.0 OPTIMISING COMPARATORS

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To make realistic comparisons of primary care prescribing between Wales and England, between the health boards and between the 64 established GP clusters in Wales, consideration of all confounding factors is essential. It would be useful for Wales as a whole, and for health boards and cluster groups within Wales, to have comparators, which are similar in terms of disease prevalence and socio-economic variables, in order to appropriately benchmark prescribing data and influence prescribing behaviour accordingly.

The intention is to utilise this method of presenting prescribing data for a range of therapeutic areas, such as cardiovascular, endocrine and mental health, if it is considered useful. The method could also potentially be applied to Clinical Commissioning Groups (CCGs) in England in order to make comparisons between Welsh health boards and English CCGs.

In this paper, overall respiratory prescribing for GP clusters is analysed and therefore relevant variables for comparators are respiratory disease prevalence and deprivation.

### *Other considerations*

It may be appropriate to view comparators in the context of other differences in practice, especially when making comparisons with areas in England or other nations. These could include local initiatives, dispensing GP practices, procurement costs, prescription charge exemptions and differences between local guidelines and formularies.

### **2.1 Disease prevalence**

Disease prevalence varies across the health boards in Wales, and data on prevalence are available at GP cluster level from the GP Cluster Profiles 2013<sup>1</sup>. The source of the data is Audit+ – a non-mandatory analysis tool for GP practices used by more than 95% of GP practices in Wales to submit data weekly. Audit+ provides a count of patients with the identified chronic condition by 10-year age groups and sex. Another possible source of disease prevalence data would be the Quality and Outcomes Framework (QOF), as chronic conditions are defined in the same way in both. QOF data is used primarily to monitor GP practice performance against a contract; secondary use of QOF data must be interpreted with caution<sup>1</sup>.

### **2.2 Deprivation**

The link between poor health and deprivation is well recognised and people in the most deprived areas have higher levels of mental illness, hearing and sight problems, and in particular chronic conditions such as respiratory disease, cardiovascular disease and arthritis<sup>2</sup>. In Wales, the majority of deprived areas are found in areas of Cardiff, Swansea and Newport, the Welsh valleys and areas of the North Wales coast<sup>3</sup>.

While disease prevalence gives a straightforward measure of the proportion of the population with a condition, deprivation can have a more complex effect on prescribing levels through factors such as behavioural determinants, access to services and education<sup>4</sup>.

#### **2.2.1 Index of Multiple Deprivation**

Deprivation is multi-dimensional and takes into account many factors, which include income, housing, employment, general health, education, access to services, community safety and physical environment. The four countries of the UK each have their own index of multiple deprivation (IMD), each with slightly different ways of weighting certain factors. However, around half of the weight of each IMD comes from employment and income; factors which are common to all four countries and are major drivers of deprivation. Therefore, it may be appropriate to use the countries' IMDs for purposes of comparison if the differences in weightings are adjusted for<sup>5</sup>.

## 3.0 METHOD

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### 3.1 Variable selection

For the GP cluster respiratory analysis, asthma and chronic obstructive pulmonary disease (COPD) prevalence and deprivation data were taken from Cluster Profiles 2013 developed by the Public Health Observatory Wales<sup>1</sup>.

### 3.2 Determining similarity of GP clusters

In order to assign GP clusters into comparator groups, a method was needed to determine the similarity of GP clusters based on respiratory disease prevalence and deprivation.

GP clusters were assigned into groups using Ward's statistical method of hierarchical classification. Ward's method uses Squared Euclidean Distance (SED) as a similarity measure; two GP clusters are said to be similar if the SED, based on standardised respiratory disease prevalence and deprivation data, is small.

### 3.3 Grouping GP clusters

There are two proposed methods of grouping the GP clusters; respiratory prescribing for methods i) and ii) is shown in Appendix 1 and 2 respectively.

#### i) Grouping GP clusters into $n$ exclusive groups

This method groups all 64 GP clusters into  $n$  groups based on SED (in Appendix 1,  $n = 8$ ). The groups may be different sizes as this method allocates GP clusters to maximise within-group similarity and for this reason it may not be statistically appropriate to force the number of groups to contain a set number of GP clusters, i.e. it may not be appropriate to force GP clusters into eight groups of eight, as overall within-group similarity may be lower than for unequal group sizes.

This method may be useful for the purposes of presenting national respiratory data at cluster level and comparing prescribing among demographically similar clusters.

#### ii) Grouping each GP cluster with its $n$ most similar GP clusters

This method groups each of the 64 GP clusters with their  $n$  most similar GP clusters based on SED (in Appendix 2,  $n = 8$ ). This way each cluster has a group of  $n$  GP clusters with which to benchmark prescribing.

This method would be less suitable for national reporting of data at cluster level due to the large numbers of groups and may be more suited to use by individual GP clusters or health boards as a tool for comparison when analysing prescribing.

To illustrate degree of similarity between GP clusters, the following categories are defined:

- **Extremely similar** if they have an SED of less than 1% of the range.
- **Very similar** if they have an SED of less than 2.5% of the range.
- **Similar** if they have an SED of less than 5% of the range.
- **Somewhat similar** if they have an SED of less than 10% of the range.
- **Not similar** if they have an SED of more than 10% of the range.

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\* Respiratory disease prevalence and deprivation data were 'z-score' standardised prior to calculating SED due to the variables being measured on different scales.

## REFERENCES

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- 1 NHS Wales. GP Cluster Profiles 2013. 2013. Available at: <http://www.wales.nhs.uk/sitesplus/922/page/67714>. Accessed May 2014.
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- 5 Office for National Statistics. UK indices of multiple deprivation - a way to make comparisons across constituent countries easier. 2012. Available at: <http://www.ons.gov.uk/ons/rel/hsg/health-statistics-quarterly/no--53--spring-2012/uk-indices-of-multiple-deprivation.html>. Accessed Mar 2014.

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## APPENDIX 1: ANALYSIS OF GP CLUSTER LEVEL DATA FOR RESPIRATORY PRESCRIBING

Appendix 1 shows the Welsh GP clusters assigned to eight groups based on their statistical similarity according to figures from the Welsh Index of Multiple Deprivation and asthma and COPD prevalence. Prescribing data can be presented nationally at cluster level, factoring in disease prevalence and deprivation variables to allow a GP cluster to benchmark within these groups. Other prescribing measures such as quantities or daily defined doses could be explored as a way of presenting the data in the most appropriate way and this may change depending on the specific area or products being analysed. The model can also be manipulated to look specifically at an area of prevalence e.g. COPD when looking at respiratory products used primarily in COPD treatment, although limitations of the prescribing data mean that specific products cannot be linked to an indication or diagnosis.

Below is a proposed way of presenting respiratory prescribing data for GP cluster analysis in Wales. Each figure presents respiratory prescribing data for a group of clusters, allocated using the classification methodology described in Section 3.3 (i). Group assignment is represented visually in the dendrogram in Appendix 3.

The graphs show prescribing of all respiratory product items per 1,000 prescribing units (PUs) for each group of demographically similar GP clusters for the period April 2013–March 2014.

From the figures below it can be clearly seen that there is variation in prescribing within cluster groups, which is due to reasons other than disease prevalence and/or deprivation, and only local knowledge can help to interpret this. Presentation of prescribing data in this format should help to direct review of prescribing in specific areas.

### Primary care cluster prescribing data: All respiratory products (1 April 2013–31 March 2014)

Figure 1. Group 1: Respiratory items per 1,000 PUs

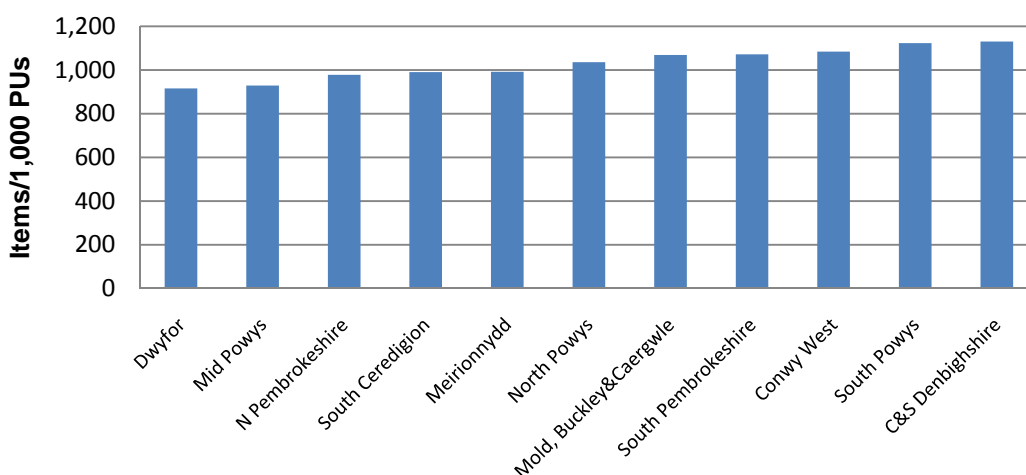


Figure 2. Group 2: Respiratory items per 1,000 PUs

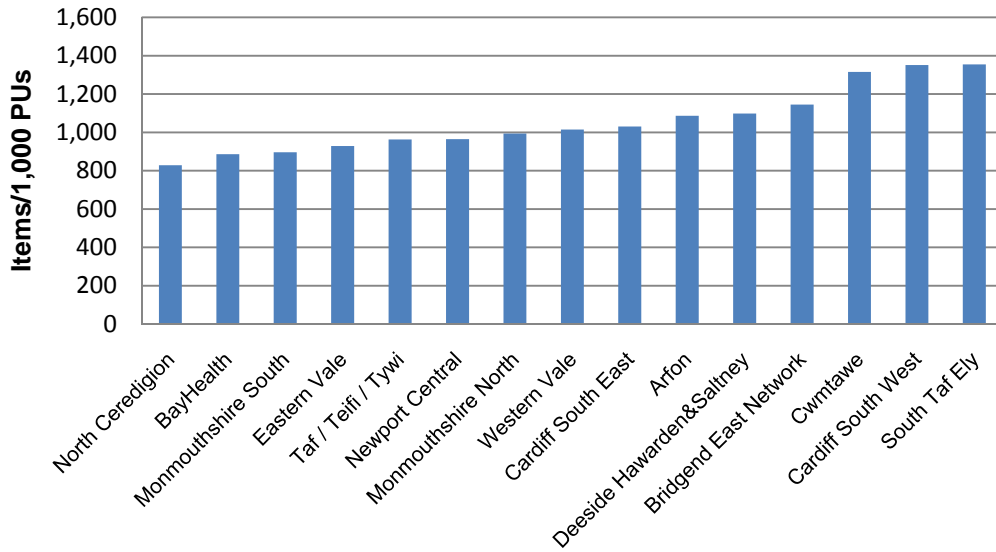


Figure 3. Group 3: Respiratory items per 1,000 PUs

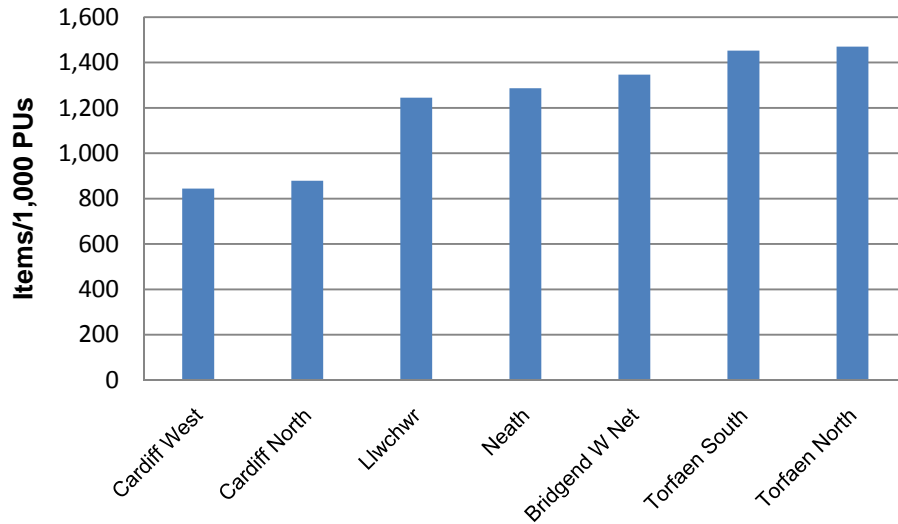


Figure 4. Group 4: Respiratory items per 1,000 PUs

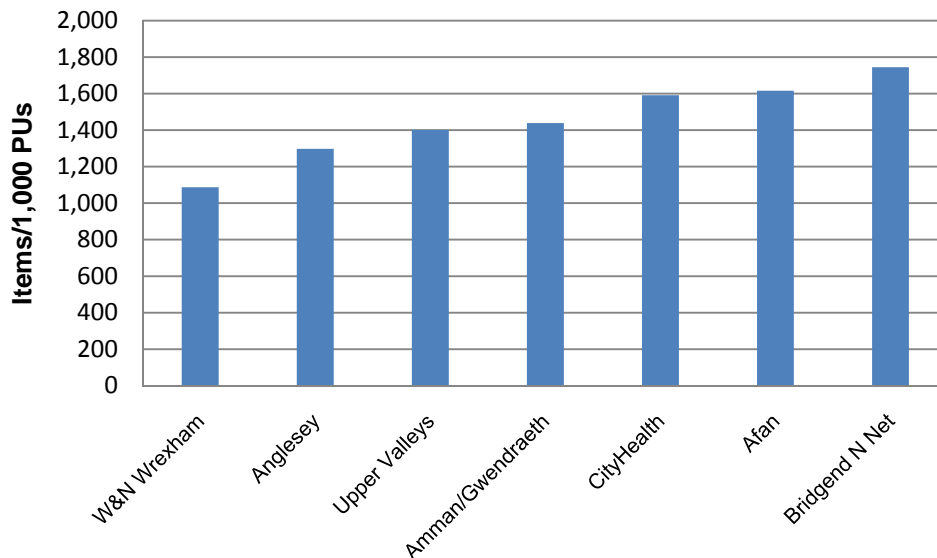


Figure 5. Group 5: Respiratory items per 1,000 PUs

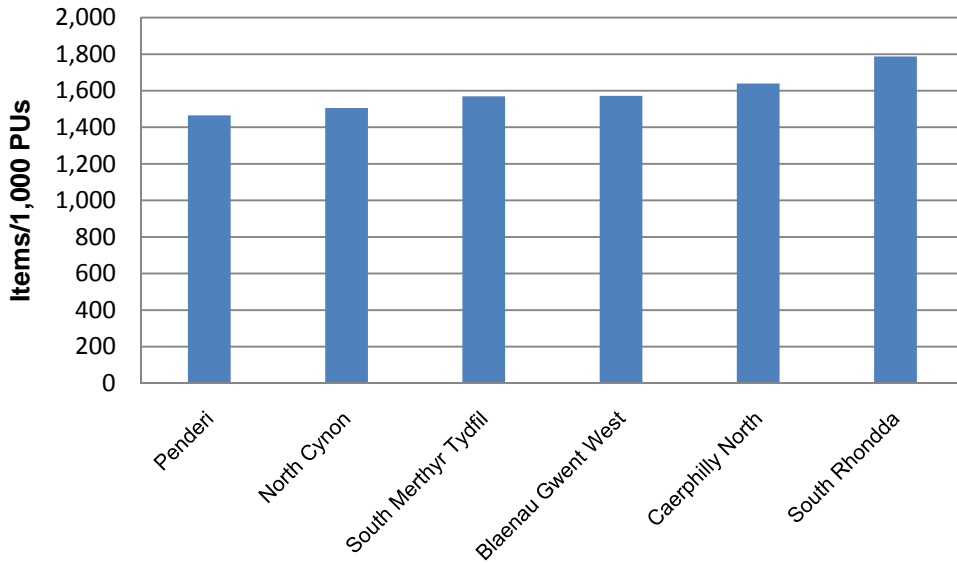


Figure 6. Group 6: Respiratory items per 1,000 PUs

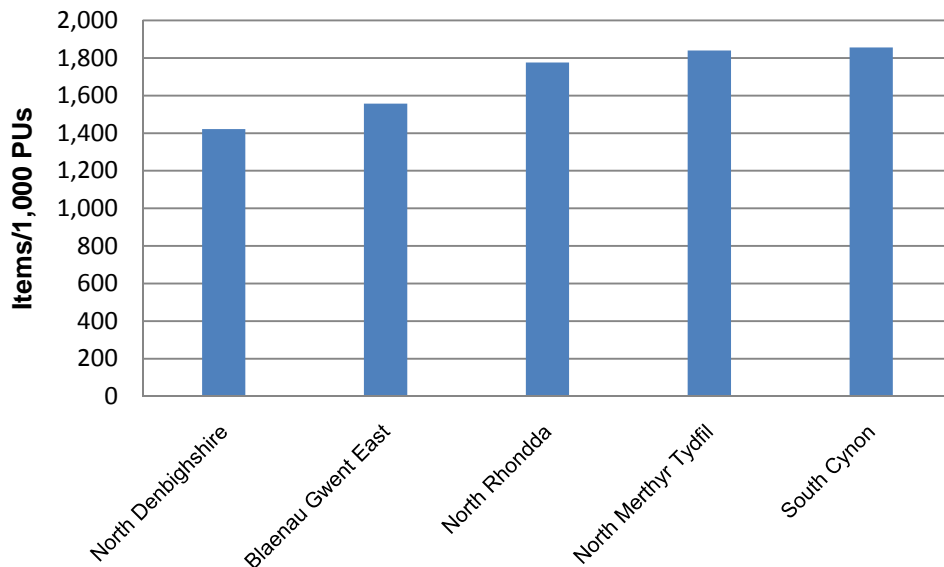


Figure 7. Group 7: Respiratory items per 1,000 PUs

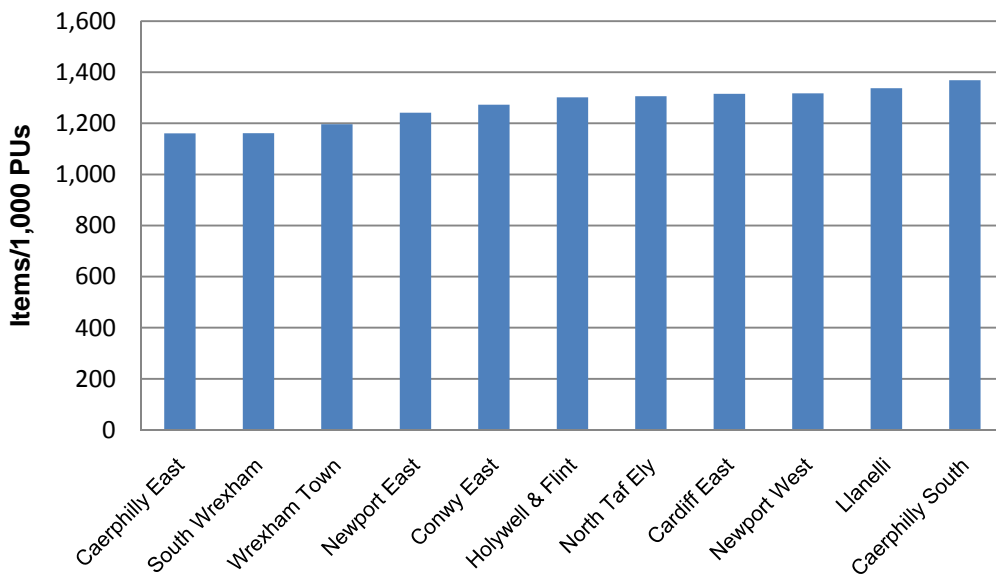
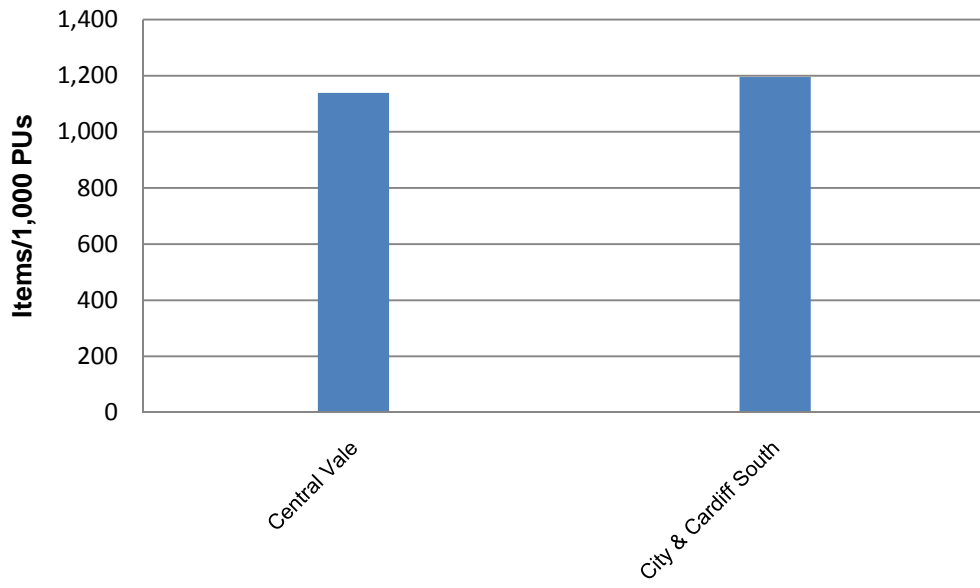


Figure 8. Group 8: Respiratory items per 1,000 PUs



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**APPENDIX 2: WELSH GP CLUSTERS WITH EIGHT MOST SIMILAR CLUSTERS**

Appendix 2 shows each of the Welsh GP clusters with the eight most similar clusters as determined by the SED based on the Welsh Index of Multiple Deprivation and asthma and COPD prevalence. The smaller the SED, the more similar the groups. This method of grouping GP clusters may be more useful for individual GP clusters or health boards to benchmark their prescribing. Presenting national data in this format may not be appropriate due to the need for 64 separate groups of eight clusters.

Anglesey		Arfon		Central & South Denbighshire		Conwy East		Conwy West		Deeside, Hawarden & Saltney	
West & North Wrexham	0.285	Deeside, Hawarden & Saltney	0.040	Dwyfor	0.457	South Wrexham	0.272	South Pembrokeshire	0.333	Arfon	0.040
Amman/Gwendraeth	0.658	South Wrexham	0.253	Conwy West	0.612	Wrexham Town	0.344	Mid Powys	0.349	South Pembrokeshire	0.179
Upper Valleys	0.842	Newport Central	0.257	Mid Powys	0.640	Holywell & Flint	0.416	Wrexham Town	0.592	South Wrexham	0.229
Torfaen North	1.043	South Ceredigion	0.292	North Powys	1.151	Penderi	0.585	Central & South Denbighshire	0.612	South Ceredigion	0.244
Neath	1.470	Bridgend East Network	0.334	South Pembrokeshire	1.221	Torfaen North	0.680	South Powys	0.658	Wrexham Town	0.296
Bridgend West Network	1.651	South Pembrokeshire	0.364	Meirionnydd	1.268	North Pembrokeshire	0.706	North Powys	0.713	Newport Central	0.320
North Pembrokeshire	1.885	Wrexham Town	0.368	South Powys	1.324	North Taf Ely	0.753	Holywell & Flint	0.833	North Powys	0.380
Conwy East	1.892	North Powys	0.414	South Ceredigion	1.418	Newport East	0.849	South Ceredigion	0.839	South Taf Ely	0.412

- = Extremely similar (SED < 1% of range)
- = Very similar (SED < 2.5% of range)
- = Similar (SED < 5% of range)
- = Somewhat similar (SED < 10% of range)
- = Not similar (SED >10% of range)

GP Cluster Level Comparators

Dwyfor		Holywell & Flint		Meirionnydd		Mold, Buckley & Caergwle		North Denbighshire		South Wrexham	
Mid Powys	0.261	North Taf Ely	0.156	North Pembrokeshire	0.547	South Powys	0.705	North Cynon	2.063	Wrexham Town	0.038
North Powys	0.436	Wrexham Town	0.238	South Powys	0.617	Taf/Teifi/Tywi	0.761	South Cynon	2.814	Deeside, Hawarden & Saltney	0.229
Central & South Denbighshire	0.457	South Wrexham	0.315	Conwy West	0.912	Bridgend East Network	0.917	Blaenau Gwent East	3.448	Arfon	0.253
South Ceredigion	0.521	Conwy East	0.416	Mid Powys	1.103	North Pembrokeshire	1.016	North Merthyr Tydfil	3.513	Conwy East	0.272
Monmouthshire North	0.683	Caerphilly South	0.497	North Powys	1.173	North Powys	1.038	South Rhondda	3.738	Holywell & Flint	0.315
South Pembrokeshire	0.780	Newport West	0.620	Mold, Buckley & Caergwle	1.232	Meirionnydd	1.232	Blaenau Gwent West	3.778	North Taf Ely	0.349
South Powys	0.859	Caerphilly East	0.790	West & North Wrexham	1.256	South Ceredigion	1.375	South Merthyr Tydfil	4.099	North Pembrokeshire	0.430
Conwy West	0.925	South Pembrokeshire	0.793	Central & South Denbighshire	1.268	Monmouthshire North	1.389	Caerphilly North	4.430	South Pembrokeshire	0.470

- = Extremely similar (SED < 1% of range)
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- = Not similar (SED >10% of range)

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West & North Wrexham		Wrexham Town		Mid Powys		North Powys		South Powys		Amman/Gwendraeth	
Anglesey	0.285	South Wrexham	0.038	North Powys	0.104	South Ceredigion	0.050	North Powys	0.138	Upper Valleys	0.036
North Pembrokeshire	1.035	Holywell & Flint	0.238	South Ceredigion	0.166	Mid Powys	0.104	North Pembrokeshire	0.249	Anglesey	0.658
Meirionnydd	1.256	Deeside, Hawarden & Saltney	0.296	South Pembrokeshire	0.191	South Powys	0.138	Mid Powys	0.278	Neath	0.779
Torfaen North	1.623	North Pembrokeshire	0.337	Dwyfor	0.261	Monmouthshire North	0.220	South Ceredigion	0.302	Bridgend West Network	0.857
Conwy East	1.770	North Taf Ely	0.341	South Powys	0.278	South Pembrokeshire	0.308	Arfon	0.472	Afan	0.930
Amman/Gwendraeth	1.800	Conwy East	0.344	Conwy West	0.349	Deeside, Hawarden & Saltney	0.380	South Pembrokeshire	0.485	Bridgend North Network	0.997
Mold, Buckley & Caergwle	2.002	Arfon	0.368	Monmouthshire North	0.482	Arfon	0.414	Deeside, Hawarden & Saltney	0.495	Torfaen North	1.071
South Powys	2.058	South Pembrokeshire	0.386	Deeside, Hawarden & Saltney	0.509	Dwyfor	0.436	Wrexham Town	0.577	CityHealth	1.222

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- = Somewhat similar (SED < 10% of range)
- = Not similar (SED >10% of range)

GP Cluster Level Comparators

Llanelli		North Ceredigion		North Pembrokeshire		South Ceredigion		South Pembrokeshire		Taf/Teifi/Tywi	
Cardiff East	0.140	Western Vale	1.699	South Powys	0.249	North Powys	0.050	Deeside, Hawarden & Saltney	0.179	Eastern Vale	0.307
Newport West	0.163	South Taf Ely	1.805	Wrexham Town	0.337	Monmouthshire North	0.111	Mid Powys	0.191	Cardiff South West	0.313
Newport East	0.224	BayHealth	1.881	South Wrexham	0.430	Mid Powys	0.166	South Ceredigion	0.234	Monmouthshire North	0.475
Cwmtawe	0.752	Dwyfor	1.906	Meirionnydd	0.547	South Pembrokeshire	0.234	North Powys	0.308	Bridgend East Network	0.504
Caerphilly East	0.765	Monmouthshire North	2.193	Arfon	0.650	Deeside, Hawarden & Saltney	0.244	Conwy West	0.333	Western Vale	0.592
North Taf Ely	0.802	Eastern Vale	2.253	North Powys	0.704	Arfon	0.292	Arfon	0.364	BayHealth	0.653
Penderi	0.870	Monmouthshire South	2.298	Conwy East	0.706	South Powys	0.302	Wrexham Town	0.386	Cardiff South East	0.707
Caerphilly South	0.934	South Ceredigion	2.582	Deeside, Hawarden & Saltney	0.716	South Taf Ely	0.321	Caerphilly South	0.468	Monmouthshire South	0.738

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Afan		BayHealth		Bridgend East Network		Bridgend North Network		Bridgend West Network		CityHealth	
CityHealth	0.453	Monmouthshire South	0.131	Arfon	0.334	Upper Valleys	0.670	Torfaen North	0.271	Bridgend West Network	0.350
Upper Valleys	0.689	Eastern Vale	0.192	Cardiff South West	0.429	Afan	0.848	CityHealth	0.350	Afan	0.453
Bridgend North Network	0.848	Western Vale	0.235	Taf/Teifi/Tywi	0.504	Amman/Gwendraeth	0.997	Cardiff West	0.507	Torfaen North	0.621
Amman/Gwendraeth	0.930	Cardiff South East	0.354	Cwmtawe	0.554	CityHealth	2.311	Cardiff North	0.766	Penderi	0.703
Bridgend West Network	1.078	South Taf Ely	0.355	Deeside, Hawarden & Saltney	0.602	Anglesey	2.415	Amman/Gwendraeth	0.857	Blaenau Gwent West	0.763
Blaenau Gwent West	1.240	Monmouthshire North	0.392	Newport Central	0.614	Bridgend West Network	2.843	Torfaen South	0.920	Caerphilly North	0.966
Caerphilly North	1.618	Cardiff South West	0.595	South Powys	0.715	Blaenau Gwent West	3.064	Upper Valleys	0.996	Upper Valleys	1.161
Torfaen North	1.629	Taf/Teifi/Tywi	0.653	South Wrexham	0.776	Neath	3.205	Afan	1.078	Amman/Gwendraeth	1.222

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GP Cluster Level Comparators

Cwmtawe		Llwchwr		Neath		Penderi		Upper Valleys		Cardiff East	
Newport Central	0.226	Neath	2.080	Amman/Gwendraeth	0.779	Newport East	0.327	Amman/Gwendraeth	0.036	Llanelli	0.140
Arfon	0.458	Torfaen South	3.235	Bridgend West Network	1.092	Blaenau Gwent West	0.355	Bridgend North Network	0.670	Newport East	0.158
Cardiff East	0.543	Cardiff West	4.110	Upper Valleys	1.103	Caerphilly North	0.363	Afan	0.689	Newport West	0.524
Bridgend East Network	0.554	Cardiff North	4.289	Anglesey	1.470	Conwy East	0.585	Anglesey	0.842	Cwmtawe	0.543
Deeside, Hawarden & Saltney	0.624	Bridgend East Network	4.774	Torfaen North	1.517	Newport West	0.682	Bridgend West Network	0.996	Penderi	0.833
South Wrexham	0.662	Mold, Buckley & Caergwle	4.781	Torfaen South	1.706	CityHealth	0.703	Neath	1.103	Cardiff North	0.886
Llanelli	0.752	Bridgend West Network	4.839	Cardiff West	1.789	Torfaen North	0.769	CityHealth	1.161	Cardiff West	0.954
Cardiff South West	0.857	Cardiff South West	5.060	Llwchwr	2.080	Cardiff East	0.833	Torfaen North	1.269	Conwy East	0.958

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Cardiff South East		City & Cardiff South		Cardiff North		Cardiff South West		Cardiff West		Central Vale	
Monmouthshire South	0.080	Central Vale	2.467	Cardiff West	0.103	Taf/Teifi/Tywi	0.313	Cardiff North	0.103	City & Cardiff South	2.467
BayHealth	0.354	North Ceredigion	3.854	Torfaen South	0.301	Bridgend East Network	0.429	Torfaen South	0.125	Llanelli	4.471
Eastern Vale	0.363	Caerphilly East	4.167	Bridgend West Network	0.766	Cardiff South East	0.531	Torfaen North	0.369	Newport West	4.752
Western Vale	0.499	Caerphilly South	4.414	Torfaen North	0.807	BayHealth	0.595	Bridgend West Network	0.507	Caerphilly East	4.870
Cardiff South West	0.531	South Taf Ely	5.099	Cardiff East	0.886	Eastern Vale	0.650	Cardiff East	0.954	Caerphilly South	5.371
Taf/Teifi/Tywi	0.707	North Taf Ely	5.688	Cwmtawe	1.061	Newport Central	0.655	Cwmtawe	1.009	Cardiff East	5.454
Monmouthshire North	1.192	Newport Central	6.161	Newport East	1.180	Monmouthshire South	0.656	Conwy East	1.094	Newport East	5.877
South Taf Ely	1.370	South Pembrokeshire	6.237	CityHealth	1.556	Monmouthshire North	0.841	Newport East	1.132	North Taf Ely	6.224

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GP Cluster Level Comparators

Eastern Vale		Western Vale		North Cynon		North Merthyr Tydfil		North Rhondda		North Taf Ely	
Western Vale	0.052	Eastern Vale	0.052	South Merthyr Tydfil	0.615	Blaenau Gwent East	0.031	North Merthyr Tydfil	0.768	Caerphilly South	0.098
BayHealth	0.192	BayHealth	0.235	South Rhondda	0.770	North Rhondda	0.768	Blaenau Gwent East	0.807	Holywell & Flint	0.156
Monmouthshire South	0.215	Monmouthshire South	0.259	North Rhondda	0.907	North Cynon	0.937	North Cynon	0.907	Caerphilly East	0.256
Taf/Teifi/Tywi	0.307	Monmouthshire North	0.444	North Merthyr Tydfil	0.937	South Cynon	1.614	South Merthyr Tydfil	1.130	Wrexham Town	0.341
Monmouthshire North	0.356	Cardiff South East	0.499	Blaenau Gwent East	1.006	South Rhondda	2.466	South Rhondda	1.198	South Wrexham	0.349
Cardiff South East	0.363	Taf/Teifi/Tywi	0.592	Caerphilly North	1.736	South Merthyr Tydfil	2.504	Caerphilly North	3.081	South Pembrokeshire	0.521
Cardiff South West	0.650	South Taf Ely	0.795	Blaenau Gwent West	1.856	North Denbighshire	3.513	Blaenau Gwent West	3.742	Newport West	0.524
South Taf Ely	0.745	South Ceredigion	0.977	North Denbighshire	2.063	Caerphilly North	4.931	South Cynon	3.896	Deeside, Hawarden & Saltney	0.537

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South Cynon		South Merthyr Tydfil		South Rhondda		South Taf Ely		Blaenau Gwent East		Blaenau Gwent West	
Blaenau Gwent East	1.317	South Rhondda	0.349	South Merthyr Tydfil	0.349	Monmouthshire North	0.239	North Merthyr Tydfil	0.031	Caerphilly North	0.083
North Merthyr Tydfil	1.614	Caerphilly North	0.562	Caerphilly North	0.669	South Ceredigion	0.321	North Rhondda	0.807	Penderi	0.355
North Denbighshire	2.814	North Cynon	0.615	North Cynon	0.770	BayHealth	0.355	North Cynon	1.006	CityHealth	0.763
North Cynon	3.118	Blaenau Gwent West	0.865	Blaenau Gwent West	0.961	Newport Central	0.356	South Cynon	1.317	South Merthyr Tydfil	0.865
North Rhondda	3.896	North Rhondda	1.130	North Rhondda	1.198	Deeside, Hawarden & Saltney	0.412	South Rhondda	2.363	South Rhondda	0.961
South Rhondda	4.900	Penderi	1.202	Penderi	1.901	Arfon	0.485	South Merthyr Tydfil	2.610	Afan	1.240
South Merthyr Tydfil	6.096	Newport West	1.265	Blaenau Gwent East	2.363	South Pembrokeshire	0.564	North Denbighshire	3.448	Newport East	1.298
Blaenau Gwent West	8.227	Holywell & Flint	1.742	North Merthyr Tydfil	2.466	North Powys	0.622	Caerphilly North	4.951	Conwy East	1.355

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GP Cluster Level Comparators

Caerphilly East		Caerphilly North		Caerphilly South		Monmouthshire North		Monmouthshire South		Newport Central	
Caerphilly South	0.072	Blaenau Gwent West	0.083	Caerphilly East	0.072	South Ceredigion	0.111	Cardiff South East	0.080	Cwmtawe	0.226
North Taf Ely	0.256	Penderi	0.363	North Taf Ely	0.098	North Powys	0.220	BayHealth	0.131	Arfon	0.257
Deeside, Hawarden & Saltney	0.468	South Merthyr Tydfil	0.562	South Pembrokeshire	0.468	South Taf Ely	0.239	Eastern Vale	0.215	Deeside, Hawarden & Saltney	0.320
Newport Central	0.537	South Rhondda	0.669	Holywell & Flint	0.497	Eastern Vale	0.356	Western Vale	0.259	South Taf Ely	0.356
South Pembrokeshire	0.595	CityHealth	0.966	Deeside, Hawarden & Saltney	0.518	BayHealth	0.392	Cardiff South West	0.656	Caerphilly East	0.537
Arfon	0.674	Newport East	1.107	South Wrexham	0.604	Western Vale	0.444	Taf/Teifi/Tywi	0.738	Bridgend East Network	0.614
South Wrexham	0.677	Newport West	1.361	Wrexham Town	0.628	Taf/Teifi/Tywi	0.475	Monmouthshire North	0.844	Cardiff South West	0.655
South Taf Ely	0.712	Conwy East	1.612	Newport West	0.753	Arfon	0.478	South Taf Ely	0.918	Monmouthshire North	0.704

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Newport East		Newport West		Torfaen North		Torfaen South	
Cardiff East	0.158	Llanelli	0.163	Bridgend West Network	0.271	Cardiff West	0.125
Llanelli	0.224	Newport East	0.367	Cardiff West	0.369	Cardiff North	0.301
Penderi	0.327	Cardiff East	0.524	Torfaen South	0.585	Torfaen North	0.585
Newport West	0.367	North Taf Ely	0.524	CityHealth	0.621	Bridgend East Network	0.871
Conwy East	0.849	Holywell & Flint	0.620	Conwy East	0.680	Cwmtawe	0.895
Caerphilly North	1.107	Penderi	0.682	Penderi	0.769	Bridgend West Network	0.920
Cardiff West	1.132	Caerphilly South	0.753	Cardiff North	0.807	Conwy East	1.191
Cwmtawe	1.135	Caerphilly East	0.795	Anglesey	1.043	Cardiff East	1.358

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APPENDIX 3: DENDROGRAM OF GP CLUSTER GROUPING

