GIG CYMRU NHS WALES
Iechyd Cyhoeddus Cymru
Public Health Wales

Cardiovascular Atlas of Variation

Part of a Value-Based Cardiovascular Care Programme for Wales

Produced by the Cardiovascular Atlas of Variation Sub Groups on behalf of NHS Wales

GIG CYMRU NHS WALES
Cydweithrediad Iechyd GIG Cymru
NHS Wales Health Collaborative

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Foreword

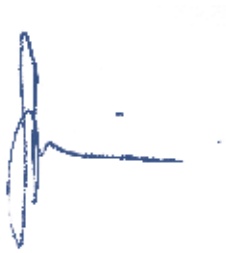
All those working in the NHS are striving to achieve the best outcomes for patients with the resources available to us. In doing so we are responsible as much for the outcomes of the wider population as for the person sitting in front of us. As clinicians we must practice evidence-based medicine, tailored to the individual's preferences and context and the onus is upon us to be stewards of the precious resources in our system. As managers and financial managers we have a responsibility to work with clinical teams to address unmet need and support the adoption and scaling up of best practice across Wales.

We must work together to ensure that resources are allocated for the greatest benefit to patients in our system. This means being prepared to innovate and adopt new technologies, but it also means taking care to eliminate practices which are of low value to patients. It also requires us to tackle unmet need and inequities. Understanding variation data is the first step to understanding value for patients across our Welsh NHS. Not all variation is bad and we must do all we can to distinguish unwarranted from warranted variation.

John Wennberg defined unwarranted variation as variation that cannot be explained on the basis of the evidence, medical need, illness severity or patient preference.

Unwarranted variation, both clinical and service, remains a significant issue in our system and if addressed has the potential to both improve outcomes that matter and sustainability. In an ideal system every action and intervention is timely and appropriate, carried out with maximum efficiency, minimum unwarranted variation (place, time, individual, team) with the best possible outcome for the person as defined by them.

This NHS Wales Cardiovascular Atlas of Variation is an important development in our efforts to improve access to good data for clinical teams to support decision-making towards better outcomes and value for Welsh people. The next step will be to expand this approach to other clinical areas along with the measurement of patient-reported outcomes.



Dr Sally Lewis
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Preface

The NHS Wales Cardiovascular Atlas of Variation was produced at the request of Welsh Government.

In planning the atlas, we have tried to follow a patient's journey from the community through primary care, secondary care and where necessary through to the specialist centres in tertiary care. We have focussed on three main cardiac conditions: Acute Coronary Syndromes, Acute Heart Failure and Atrial Fibrillation.

I would like to acknowledge the valuable help and guidance from Ms Erica Ison (Oxford Centre for Triple Value Healthcare) in developing the atlas, colleagues from the NHS Wales Informatics Service (NWIS) for obtaining and preparing the data for the atlas, and the Finance Delivery Unit who have costed hospital episodes for the three main disease groups.

The aim in publishing this NHS Wales Cardiovascular Atlas of Variation is to identify unwarranted variation in key aspects of cardiac care and thereby to investigate the reasons for unwarranted variation, whether of overuse, underuse or both. The presence of unwarranted variation indicates:

- Underuse of high-value interventions, often complicated by inequity because underuse tends to be greatest in the most-disadvantaged groups in the population.
- Overuse of lower-value interventions, that is providing treatment of limited value or providing treatment to people who are only mildly affected and get little benefit.

Whether you are a commissioner of a service, a provider of a service, or a service user, this atlas will raise questions about equity of access, effectiveness and value of the services provided by NHS Wales.

It is important to note that the data and information presented in each of the atlases will not always explain the reason for the variation, however the strength and power of the atlas series is in the questions this data will generate, and the need to know whether the observed variation is random, warranted, or unwarranted caused by under- or over- provision, failure to implement evidence guidelines or poor access for patients because of travelling times and socioeconomic factors.

This NHS Wales Cardiovascular Atlas of Variation should be used to start discussions, initiate further work involving triangulation of data from other sources to better understand whether the observed variation is random, warranted or unwarranted and catalyse transformation in the delivery of cardiac services in Wales.

The atlas provides evidence of unwarranted variation and waste. The key challenge is how we re-allocate funding to high value interventions, and how we improve data collection whilst at the same time increasing and making better use of patient reported outcome measures.

The Parliamentary Review of Health and Social Care in Wales made a strong case that a service based mainly on a medical model of health, and a separate system of social care, is not fit for the future. This atlas should act as a stimulus for transformation, innovation and delivery of evidence-based high value cardiac services.

Dr Jonathan Goodfellow
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Acknowledgements

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Special thanks to Welsh Government and the Oxford Centre for Triple Value Healthcare for their professional guidance, valuable support and constructive recommendations during the development of this Atlas and initial proof of concept.

4
Introduction

Key Points:

- Cardiovascular disease continues to be one of the leading causes of disease burden in Wales;
- The gap between supply and demand of health services, as well as unwarranted variation, is having an impact on the efficiency and value of health services; and
- Identifying unwarranted variation in cardiovascular care can help ensure that resources are allocated to where there is greatest value.

Disease burden in Wales

Cardiovascular disease continues to be one of the leading disease burdens in Wales and over the last few decades there has been a significant reduction in the amount of death and disability in the population of Wales due to cardiovascular disease. The Public Health Wales report 'Health and its Determinants in Wales' showed a 42% reduction in disability-adjusted life-years (DALYs)[1] caused by cardiovascular disease since 1990[2]. This is a trend that has been seen across many similar countries, which can be explained by improvements in cardiovascular prevention and treatment programmes[3].

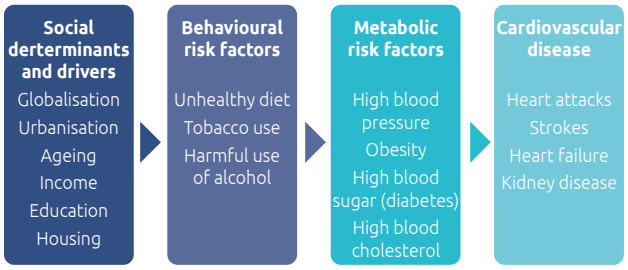
Despite these improvements, cardiovascular disease is still one of the leading causes of death and disability in Wales. There are a number of factors which contribute to the large amount of disease burden related to cardiovascular disease in Wales. Figure 1 summarises these factors which are divided into four main areas:

1. Social determinants and drivers;
2. Behavioural risk factors;
3. Metabolic risk factors; and
4. Cardiovascular disease.

In Wales, the age structure of the population is expected to change in the coming years, with a substantial rise in the older population. As the population of Wales lives longer, the number of people living with chronic conditions such as cardiovascular disease is predicted to increase.

A large amount of the burden is also associated with lifestyle factors, including smoking, high blood pressure and obesity. This in turn leads to a high rate of cardiovascular disease, including heart attacks, stroke and heart failure. It is important to note these lifestyle factors can be modified and often co-exist.

Furthermore, these lifestyle factors make a significant contribution to the overall burden of cardiovascular disease; diet accounts for a third of the attributable DALYs for cardiovascular disease, with high blood pressure accounting for a quarter of the attributable DALYs for cardiovascular disease[4].



DALY- disability adjusted life year, is a measure of disease burden in a population. It takes into account the number of years lost and also the number of years lived in poor health linked to a particular disease state

SOURCE: World Health Organisation 2016[1]

Figure 1. *Factors contributing to the development of cardiovascular disease and complications*

Supply and demand

The gap between supply and demand of health services, as well as unwarranted variation, is having an impact on the efficiency and value of health services. A greater number of people in the population are living longer and with more comorbidities, which includes cardiovascular disease. Therefore, despite improvements in cardiovascular disease management across recent decades, there has been a steady increase in service demand related to cardiovascular disease due the changing demographic and disease profile of the population[2].

In the Parliamentary Review of Health and Social Care in Wales[4], a strong case for change was made. It reported that across the Organisation for Economic Co-operation and Development (OECD) countries in the last two decades, growth in the economy has not matched increasing healthcare costs, with a call made for increasing focus on effectiveness and efficiency is key for future sustainability. Furthermore, whilst there has been improvements in health outcomes, there continues to be a wide gap in health outcomes between different population groups[5].

Variation in the provision of health services is a phenomenon that has been recognised for several decades, and it occurs in health services across the world irrespective of the method of financing.

There are two main types of variation in health-service provision:

1. Warranted; and
2. Unwarranted (sometimes referred to as unintended).

Warranted variation usually reflects differences in health-service provision based on patient-centred care and clinical responsiveness to the assessed need of the population being served. It can also reflect innovation and improvement in a particular area or organisation that has yet to be disseminated throughout a service.

Wennberg defined unwarranted variation as:

> *"… variation in the utilisation of health care services that cannot be explained by variation in patient illness or patient preferences.[6]"*

Unwarranted variation helps to uncover two of the main problems in healthcare:

- Overuse, in particular of lower-value interventions but also in treating people who are only mildly affected and would derive little benefit from that treatment; and
- Underuse of effective interventions which would benefit people in need.

Unwarranted variation represents a waste of resources, and highlights the provision of poor-quality and lower-value healthcare. As Berwick observed:

> *"Variation is a thief. It robs from processes, products and services the qualities that they are intended to have. ... Unintended variation is stealing healthcare blind today[7]."*
>
> (Berwick, 1991)

In the context of population ageing, increasing need and increasing demand for healthcare, and efficiency targets, the NHS in Wales needs to identify and reduce unwarranted variation in order to improve outcomes and increase value for individual patients and populations.

Identifying unwarranted variation

Identifying unwarranted variation in cardiovascular care can help ensure that resources are allocated to where there is greatest value. In the NHS Wales Heart Conditions Delivery Plan published in January 2017, unwarranted variation in practice and the delivery of services was identified as one of the key remaining challenges in cardiac care in Wales[8]. In addition, it was noted that comparisons, benchmarks and clinical audit have been difficult to establish and maintain in many areas of the country[7].

The aim of publishing the NHS Wales Cardiovascular Atlas of Variation is to identify unwarranted variation in key aspects of cardiac care and thereby to investigate the reasons for unwarranted variation, whether of overuse, underuse or both.

For indicators where unwarranted variation represents overuse, changes can be made in the allocation of resources to increase value, that is, shifting resource from the overuse of interventions into:

- Increasing the use of effective interventions currently being underused;
- Introducing innovations of proven effectiveness; and
- Meeting currently unmet need in the population being served.

These changes in allocation can occur:

- Within a system of care, for instance, within the system of care for people with heart failure assessing whether the balance of expenditure is appropriate between different treatments or across the care pathway from prevention, treatment, rehabilitation to end-of-life care; and
- Across systems of care within cardiac care, that is an appropriate balance in allocation between people with coronary heart disease, people with rhythm problems and people with heart failure.

The principles underpinning value-based healthcare are already embedded in the values that have informed current legislation and policy in Wales, which include the following:

- Wellbeing of Future Generations (Wales) Act[9];
- Social Services and Wellbeing (Wales) Act[10];
- The Quadruple Aim[11]; and
- Prudent Healthcare[12].

These have helped to inform the Welsh Government's Plan for Health and Social Care. This outlines a whole system approach to health and social care, with a focus on wellbeing and prevention and seamless services, delivered as close to home as possible (see Figure 2[2]). From this, a set of five whole system values were developed (see Box 1[1]).

Figure 2. *Future vision of health and social care in Wales*[1]

Co-ordinating health and social care services seamlessly, wrapped around the needs and preferences of the individual, so that it makes no difference who is providing individual services.

Measuring the health and wellbeing outcomes which matter to people, and using that information to support improvement and better collaborative decision making.

Proactively supporting people throughout the whole of their lives, and through the whole of Wales, making an extra effort to reach those most in need to help reduce the health and wellbeing inequalities that exist.

Driving transformative change through strong leadership and clear decision making, adopting good practice and new models nationally, more open and confident engagement with external partners.

Promoting the distinctive values and culture of the Welsh whole system approach with pride, making the case for how different choices are delivering more equitable outcomes and making Wales a better place in which to live and work.

Box 1 - *Future vision of Health and Social Care in Wales and Government*[4]

In 2015/16, 7.4% of the overall budget for NHS Wales' expenditure of £6.1 billion was allocated to Circulation Problems, which includes cardiovascular disease, amounting to £454.5 million; this was divided into £84.6 million on Cerebrovascular Disease, £105.4 million on Coronary Heart Disease and £264.8 million on Other Problems of Circulation[13]. These figures give some indication of the resources available for reallocation within and across systems of care for cardiovascular disease to increase value for people with heart problems who are in need.

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Developing a Cardiovascular Atlas of Variation for Wales

Key Points:

- 22 indicators were identified across four areas:
  - Risk Factors;
  - Acute Coronary Syndrome;
  - Heart Failure; and
  - Atrial Fibrillation.
- These indicators have been displayed in map form, which shows the degree of variation across different geographies;
- Along with each map is a brief interpretation of what might explain the variation in each scenario, with suggestions of evidence-based resources to address these areas; and
- NHS Wales Cardiovascular Atlas of Variation is aimed at starting the discussions around what may be causing unwarranted variation, which will help inform a value-based cardiovascular care programme for Wales.

Selection of indicators

Indicators were selected following discussions amongst members of the Wales Cardiac Network, which included those with experience across primary, secondary and tertiary cardiac services. The principles of value-based healthcare were used when trying to ensure the suitability of indicators to inform a value-based cardiovascular care programme for Wales. It was agreed that the indicators would sit within four main areas:

- Risk factors;
- Acute Coronary Syndrome;
- Heart Failure; and
- Atrial Fibrillation.

Display of indicators

It was felt that a vast amount of data is already collected on cardiovascular health in Wales, which could not all be placed into a single document. However, it was recognised that the breadth of data available was extremely useful, and being able to visualise the data in different perspectives, e.g. over time, over different geographical areas etc. would be useful to accompany the final product.

In this document, one or more maps are displayed for each indicator, with the most recently available data displayed. A decision was reached on the most appropriate geographical layer to be displayed in the document, with other levels available in Health Maps Wales - https://www.healthmapswales.wales.nhs.uk/IAS/. Where possible readily available data has been used, to aid ease of comparison with any future published datasets.

For each of the four areas, the following is displayed:

- Background information on the group of indicators;
- Thematic mapping indicating the magnitude of variation for each indicator;
- A bar chart (if applicable) displaying the data in order, from highest to lowest value;
- Description of the magnitude of variation and possible explanations for this variation; and
- Suggested options for action and useful resources.

Interpretation of maps

It is important to recognise that while the maps display the magnitude of variation across a particular indicator, it does not indicate what the 'correct' value is (unless explicitly stated alongside the map). It also does not indicate whether the variation is one which is either warranted or unwarranted. Other information is required to be able to answer these questions and to fully interpret the maps. Some of this will be guided by the narrative accompanying the map, but it is also important to consider the importance of local interpretation and subject expertise when deciding on actions based on these maps.

Map classification

Geographical areas in the maps have been grouped into one of five classes with each class containing an approximately equal number of areas. This is called Quantile (or Equal Count) classification. Indicator data is ordered by area from highest to lowest and the total number of areas divided to create five classes. For example, in Wales, there are 64 Primary Care Clusters and so for Cluster maps, each class will contain approximately 13 Clusters. An advantage of quantile classification is it is appropriate for ordered data and is simple for map users to understand. A disadvantage of quantile classification is that it does not consider how the data are distributed and areas with very similar values may be forced into different classes depending on where they come in the ordered set of data.

Health Maps Wales has the ability to switch between a choice of 5 classification methods.

Data sources

The following data sources were used:

- Quality and Outcomes Framework (Wales)[14];
- National Survey for Wales[15];
- Public Health Outcomes Framework[16];
- National Heart Failure Audit Data;
  - https://www.hqip.org.uk/a-z-of-nca/heart-failure-audit/
- Admitted Patient Care Data;
  - http://www.datadictionary.wales.nhs.uk/index.html#!WordDocuments/admittedpatientcaredatasetapcds.htm
- Outpatient Data Set;
  - http://www.datadictionary.wales.nhs.uk/index.html#!WordDocuments/outpatientdatasetopds.htm
- Critical Care Data Set;
  - http://www.datadictionary.wales.nhs.uk/index.html#!WordDocuments/criticalcaredatasetccds.htm
- Annual Mortality Extract, Office for National Statistics (ONS); and
  - https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/methodologies/userguidetomortalitystatisticsjuly2017
- Welsh Index of Multiple Deprivation.
  - https://gov.wales/statistics-and-research/welsh-index-multiple-deprivation/?lang=en

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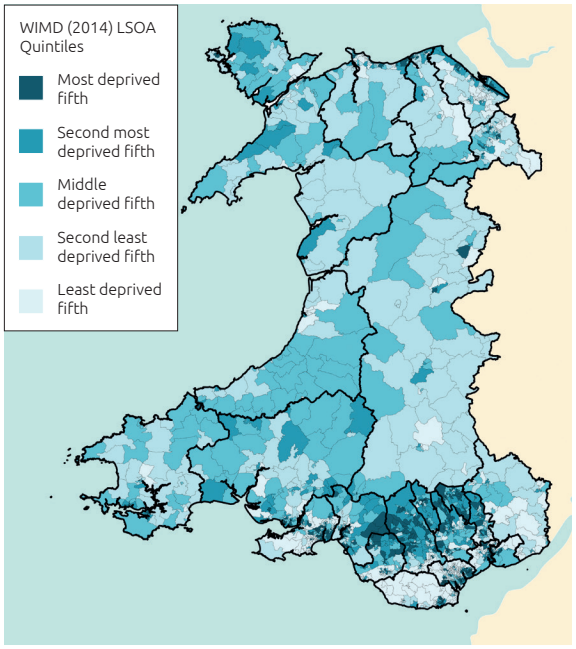
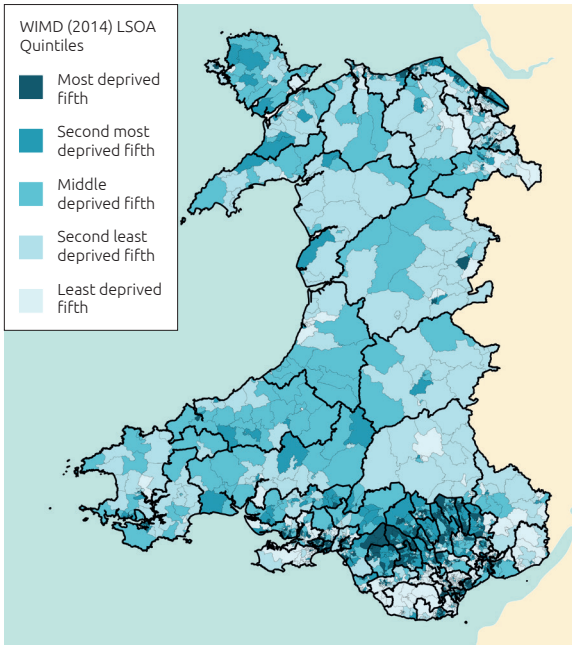
Welsh Index of Multiple Deprivation

The Welsh Index of Multiple Deprivation (WIMD) is the Welsh Government's official measure of relative deprivation for small areas in Wales. It is designed to identify those small areas where there are the highest concentrations of several different types of deprivation. WIMD ranks all small areas in Wales from 1 (most deprived) to 1,909 (least deprived). More information on the WIMD can be found at: https://gov.wales/statistics-and-research/welsh-index-multiple-deprivation/?lang=en

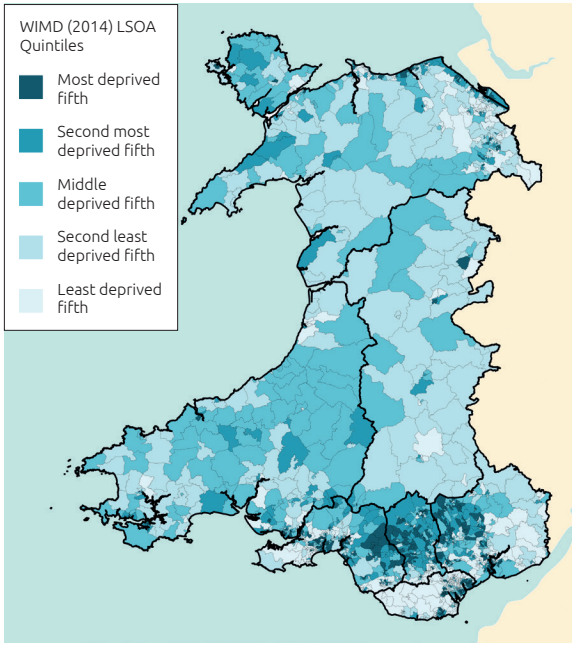
The maps displayed illustrate the WIMD data by Primary Care Cluster, Local Authority and Health Board level.



Local Authority Level



Primary Care Cluster Level



Health Board Level

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Maps and Summary Tables

Key Points:

- 22 indicators were identified across four areas:
  - Risk Factors;
  - Acute Coronary Syndrome;
  - Heart Failure; and
  - Atrial Fibrillation.
- Each area includes the following information:
  - Context;
  - Maps and interpretation for each indicator;
  - Options for action; and
  - Resources.

The information is presented at the Primary Care Cluster level where possible to demonstrate variation at a local level. The Primary Care Cluster boundaries shown in the maps contained within this document are purely notional, and in reality these boundaries are unclear with a small but significant number of individuals being registered with a Primary Care Cluster outside of the displayed geographic boundary.

Wales has a population of over 3.1 million individuals distributed over 64 Primary Care Clusters averaging around 50,000 people in each cluster. These 64 "notional" Primary Care Cluster boundaries were derived through the grouping together of Lower Super Output Areas (LSOAs), of which there are 1,909 in Wales.

These boundaries may not reflect the areas deemed to be covered by each cluster due to the method used to allocate LSOAs to Clusters. The mapping is purely for statistical purposes and has not been agreed nationally as official geography mapping in Wales.

Individual GP registration and residence data from the Welsh Demographics Service (WDS) was used to inform the allocation of LSOAs to Primary Care Clusters.

LSOAs were assigned to Primary Care Clusters on a first past the post (FPTP) basis, e.g. if LSOA 1 had 80% individuals registered with a Primary Care Cluster in Cluster A and 20% registered with a Primary Care Cluster in Cluster B, LSOA 1 was allocated to Cluster A.

Similarly, if LSOA 1 had 40% individuals registered with a Primary Care Cluster in Cluster A, 35% registered with a Primary Care Cluster in Cluster B, and 25% registered with a Primary Care Cluster in Cluster C, LSOA 1 was allocated to Cluster A.

All maps contained within the Acute Coronary Syndrome, Heart Failure and Atrial Fibrillation sections are available by Primary Care Cluster, Local Authority and Local Health Board Levels via Health Maps Wales, which also provides metadata information on how the indicators were derived: https://www.healthmapswales.wales.nhs.uk/IAS/dataviews/

Appendix 1, 2, 3 and 4 illustrates the geographical areas in Wales of Health Boards, Local Authorities, Primary Care Clusters and Major Hospitals respectively. Health Board populations are illustrated in Appendix 5.

Summary Tables

Risk Factors					
Map number	**Title**	**Standardisation**	**Level of reporting**	**Range %**	**Fold difference**
1	Prevalence of hypertension	None	Primary Care Cluster	8.2 – 19.3	2.35
2	Prevalence of diabetes	None	Primary Care Cluster	4.1 – 7.7	1.87
3	Percentage of adults who smoke	Age	Primary Care Cluster	12.9 - 26.2	2.03
4	Percentage of working age adults of healthy weight	Age	Primary Care Cluster	34.2 – 45.7	1.33
5	Percentage of adults meeting physical activity guidelines	Age	Primary Care Cluster	47.4 – 58.9	1.23
6	Percentage of adults eating five fruit or vegetable portions a day	Age	Primary Care Cluster	19.9 – 27.3	1.37
7	Percentage of adults drinking above guidelines	Age	Primary Care Cluster	16.7 – 21.4	1.28

Table 1

Acute Coronary Syndrome (ACS)					
Map number	**Title**	**Standardisation**	**Level of reporting**	**Range %**	**Fold difference**
1	Prevalence of coronary heart disease	Age	Primary Care Cluster	2.4 – 4.1	1.71
2a	Rate of non-ST elevation acute coronary syndrome (NSTEACS) admissions	Age	Primary Care Cluster	6.9 – 30.0	4.35
2b	Median length of stay (in days) for non-ST elevation acute coronary syndrome (NSTEACS)	None	Local Authority & Admitting Hospital	LA: 1.0 – 5.0 AH: 2.0 – 7.0	LA: 5 AH: 3.5
3	Percentage of non-ST elevation acute coronary syndrome (NSTEACS) admissions who received an angiography within 3 days of admission date	None	Primary Care Cluster	10.8 – 44.7	4.14
4	Rate of mortality from coronary heart disease (CHD) in people aged under 75 years	Age	Primary Care Cluster	20.2 – 73.4	3.63
5	Median call to balloon time for patients with ST elevation myocardial infarction (STEMI) who underwent a primary percutaneous coronary intervention (PCI)	None	Health Board of Residence & Admitting Hospital	HB: 186.0 – 455.0 AH: 200.0 – 383.0	HB: 1.06 AH: 1.92

Table 2

Table Key: LA – Local Authority | AH – Admitting Hospital | TT – Travel Time

Heart Failure (HF)					
Map number	**Title**	**Standardisation**	**Level of reporting**	**Range**	**Fold difference**
1	Rate of emergency heart failure admissions	Age	Primary Care Cluster	1.9 – 23.7	12.4
2	Median length of stay (in days) for emergency heart failure admissions	None	Local Authority & Health Board	LA: 4.0 – 10.0 LHB: 5.0 – 9.0	LA: 2.5 LHB: 1.8
3	Percentage of heart failure discharges with an emergency readmission for any heart condition within 30 days of discharge date	None	Primary Care Cluster	4.4 – 22.1	5.0
4	Percentage of heart failure admissions where echocardiography activity was undertaken	None	Primary Care Cluster	11.4 – 82.1	7.2
5	Rate of implanted cardiac resynchronisation therapy (CRT) devices	Age	Local Authority	43.6 – 152.9	3.51

Table 3

Atrial Fibrillation (AF)					
Map number	**Title**	**Standardisation**	**Level of reporting**	**Range**	**Fold difference**
1	Prevalence of atrial fibrillation	Age	Primary Care Cluster	1.30 – 2.1	1.62
2	Percentage of AF patients treated with anti-coagulation drug therapy	None	Primary Care Cluster	71.4 – 91.4	1.28
3	Rate of emergency stroke admissions	Age	Primary Care Cluster	4.1 – 28.3	6.9
4	Rate of atrial fibrillation (AF) ablation procedures	Age	Local Health Board	16.1 – 21.5	1.34

Table 4

Table Key: LA – Local Authority | LHB – Local Health Board

8
Risk Factors

Context

Cardiovascular disease (CVD) is a term that covers a broad range of conditions that affect the heart and circulatory systems, including coronary heart disease, angina, heart attack and stroke. There are several risk factors for CVD, including:

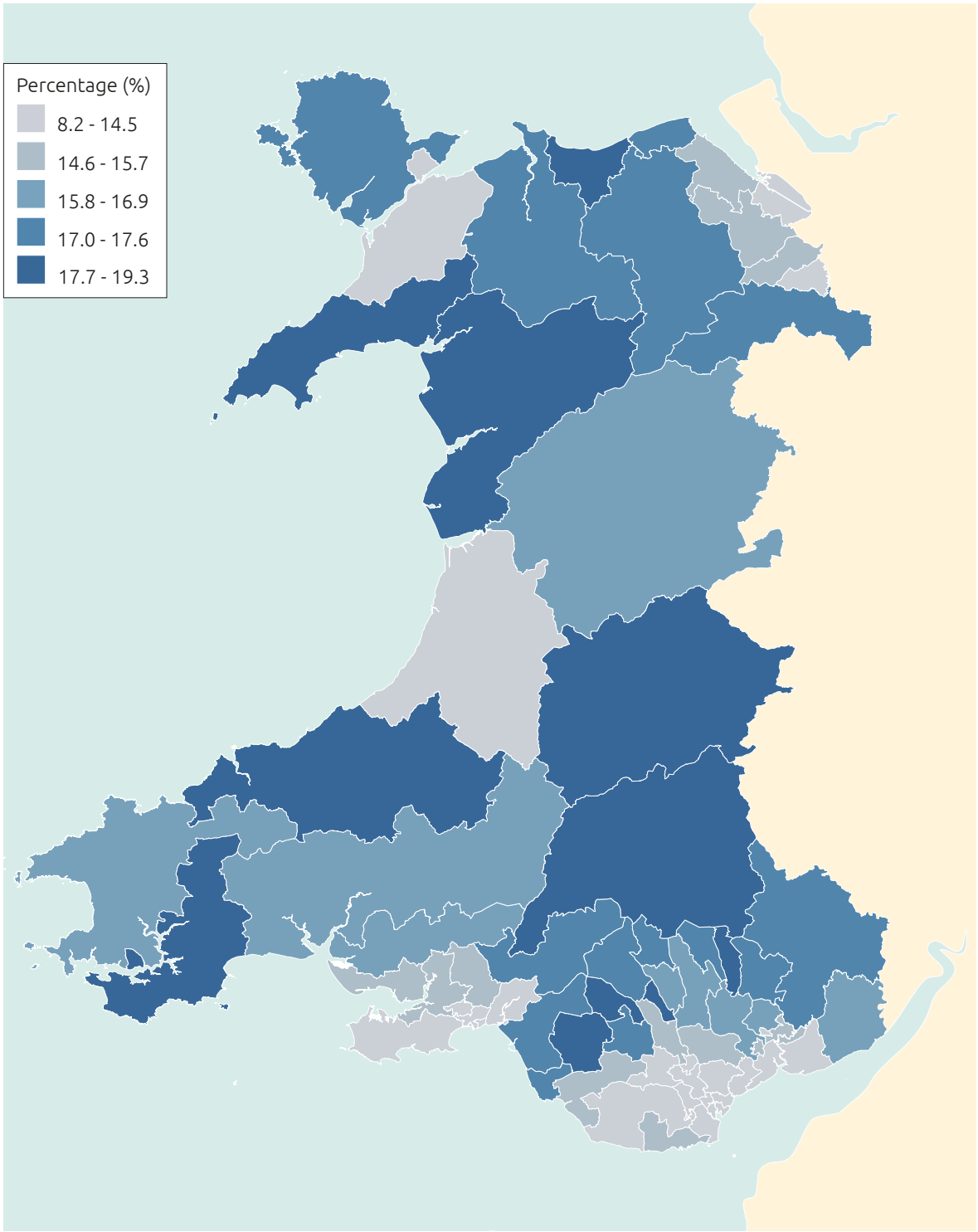
- High blood pressure (hypertension);
- Diabetes;
- Smoking;
- Overweight or obesity;
- Physical inactivity;
- Poor diet and nutrition; and
- Excess alcohol consumption.

It is also worth noting that these risk factors are often linked. For example, obese individuals are approximately seven times more likely to develop type 2 diabetes, whilst those who are overweight are three times more likely to develop the condition, than those of healthy weight[18,19].

In Wales, the Quality and Outcomes Framework (QOF) reports on hypertension and diabetes prevalence. The Public Health Wales Observatory has developed the Public Health Outcomes Framework, which are a set of indicators across a number of health outcomes, including lifestyle factors such as those mentioned above.

Risk 1: Prevalence of hypertension

Map by Primary Care Cluster - 1 yr. 2017/18



Context

One in five adults in Wales report being treated for high blood pressure or hypertension and there are many more undiagnosed and untreated. High blood pressure is one of the leading risk factors for premature death and disability in Wales, according to the Global Burden of Disease study.

At least half of all heart attacks and strokes are associated with high blood pressure. This includes thousands of acute events in Wales, and is a major risk factor for chronic kidney disease, heart failure and cognitive decline.

Nearly one in five people diagnosed with high blood pressure in Wales are not treated to target levels. Treatment for high blood pressure significantly reduces the risk of heart attack, stroke, heart failure and all-cause mortality. Every 10 mmHg reduction in systolic blood pressure reduces the risk of major cardiovascular events by 20%. Treatment is very effective at lowering blood pressure and at improving outcomes.

More than 500,000 people are diagnosed and living with high blood pressure in Wales. However, analysis elsewhere in the UK suggests that for every 10 people diagnosed with high blood pressure, 7 others remain undiagnosed and untreated. There could therefore be hundreds of thousands of people in Wales with high blood pressure who are undiagnosed and untreated.

High blood pressure rarely causes symptoms and detection generally relies on opportunistic testing or late presentation by individuals with conditions or complications related to high blood pressure. Diagnosis of high blood pressure depends on accurate measurement, but measurement technique could be improved amongst health care professionals and the public.

Magnitude of variation

For Primary Care Clusters in Wales, the proportion of adults with hypertension ranged from 8.2% to 19.3% (2.35-fold variation).

Reasons for the degree of variation may include:

- Variation in levels of deprivation in different areas (risk factors for hypertension are higher in more deprived areas);
- Differences in the quality of reporting in different areas; and
- Differences in access to services to reduce risk factors for hypertension.

Options for action

- Support for behaviour change, targeting modifiable risk factors – such as dietary salt intake, physical inactivity, being overweight, smoking and excess alcohol consumption is a core element of treatment for hypertension, and can be as effective as adding another drug;
- Most people with high blood pressure require combination treatment with two or more anti-hypertensives in order to achieve satisfactory blood pressure control;
- Across the long term conditions more than half of all patients do not take their medication as prescribed. Patients may also take some over-the-counter medication that can raise blood pressure;
- Evidence from the large SPRINT study[20] suggests that more intensive treatment with a target systolic blood pressure of 120 mmHg is associated with improved survival and fewer cardiovascular events;
- A recent meta-analysis by Ettehad *et al* (2015)[21] found that every 10 mmHg drop in blood pressure was associated with a 20% reduction in cardiovascular events. People are placed at the heart of diabetes care with their individual needs identified and met to feel supported, informed and able to manage the effects of diabetes; and
- Drug treatment should be tailored to the individual taking into account cardiovascular risk, co-morbidity, adverse effects of medication and patient preference.

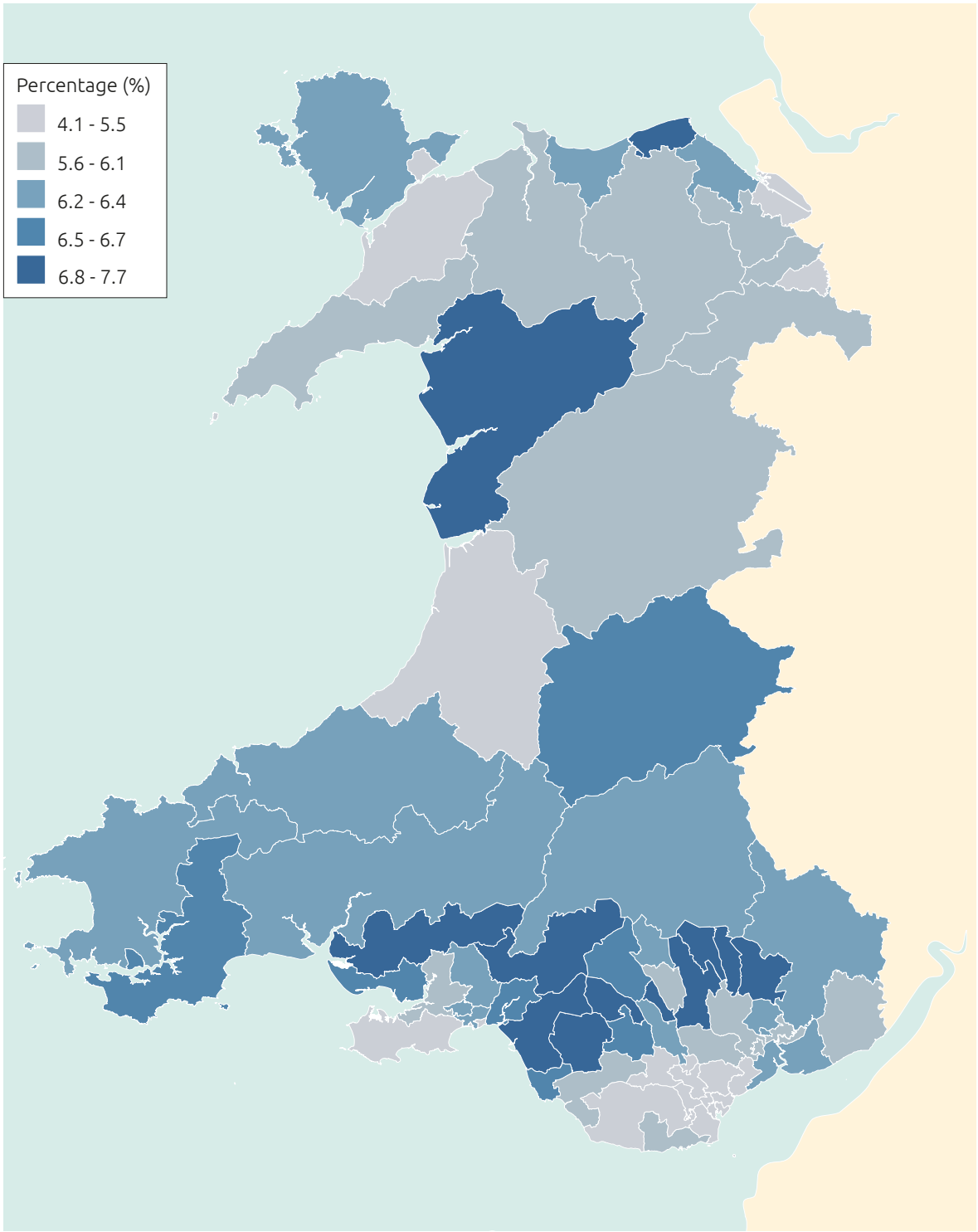
Resources

Public Health Wales Observatory (2016). Map of NICE guidance relating to inequalities[22].

NICE Guidelines: Hypertension in adults: Diagnosis and Management (CG127)[23].

Risk 2: Prevalence of diabetes

Map by Primary Care Cluster - 1 yr. 2017/18



Context

In Wales 7.3% of the population aged 17 or over live with diabetes (2015-16), the highest prevalence in the UK. Diabetes affects a wide cross section of society from babies to pregnant women to the elderly and may affect so many different body systems that it touches most areas of health and social care.

Preventing diabetes by reducing modifiable risk factors is a key goal for health and social care providers. Such interventions have the additional benefit of reducing the risk of various other chronic conditions such as cardiovascular and respiratory disease. Diabetes prevalence is higher in areas of greatest deprivation, and amongst minority ethnic communities. Services should be designed to reduce this health inequality. Effective self-management of diabetes is crucial. Information, structured education and empowerment are essential to enable this.

Nearly 17% of hospital inpatients in England and Wales have diabetes and hospitals need to be safe environments for people with diabetes, free from harm and disempowerment. More pregnancies are affected with diabetes than ever before and it is important to ensure services redesign to accommodate this. Children living with diabetes should receive the best possible support and care in all environments, including schools.

Magnitude of variation

For Primary Care Clusters in Wales, the proportion of adults with diabetes ranged from 4.1% to 7.7% (1.87-fold variation).

Reasons for the degree of variation may include:

- Variation in levels of deprivation in different areas (diabetes prevalence is higher in more deprived areas);
- Differences in the quality of reporting in different areas; and
- Differences in access to preventative services.

Options for action

- Ensure children and young people with diabetes have the best possible start in life and are given the opportunity to fulfil their potential;
- People are aware how to live a healthy lifestyle, make healthy choices that minimise their risk of developing diabetes and understand the consequences of not doing so;
- Diabetes is detected quickly where it does occur;
- People receive fast, effective treatment and care so they have the best chance of living a long and healthy life, with patients taking responsibility for lifestyle choices that contribute positively to their treatment and care; and
- People are placed at the heart of diabetes care with their individual needs identified and met to feel supported, informed and able to manage the effects of diabetes.

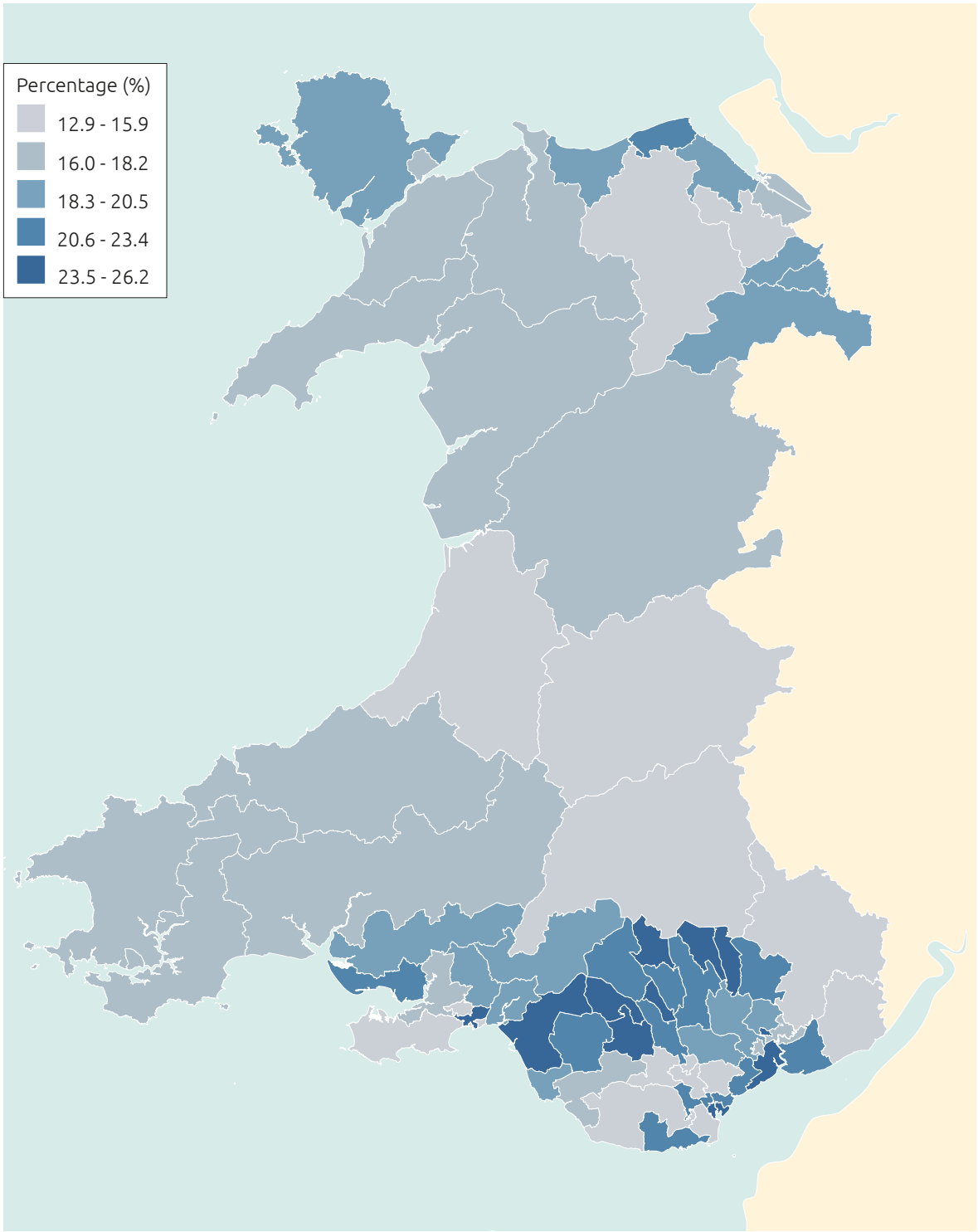
Resources

NICE Guidelines: Type 2 diabetes prevention: population and community-level interventions (PH35)[24].

Welsh Government: Diabetes Delivery Plan for Wales[25].

Risk 3: Percentage of adults who smoke

Age Standardised Map by Primary Care Cluster – 2 yr. 2016/18



Context

Smoking is the leading cause of preventable death and disease in Wales and the leading factor for disability-adjusted life years. Every year around 5,000 people in Wales die from smoking, with many more living with debilitating smoking related illnesses. Smoking increases the risk of developing more than 50 serious health conditions including cancer, heart disease, other vascular diseases and chronic obstructive pulmonary disease (COPD). In pregnant women who smoke there are the associated risks of miscarriage, premature birth, stillbirth, low birth weight and neonatal complications.

Smoking is a modifiable lifestyle risk factor. Effective tobacco control measures can reduce the prevalence of smoking in the population. The Welsh Government's Tobacco Control Delivery Plan[26] (2017) sets out the Government's strategy to reduce smoking prevalence among adults, young people and pregnant women through continuing to implement interventions that prevent and reduce tobacco related harm.

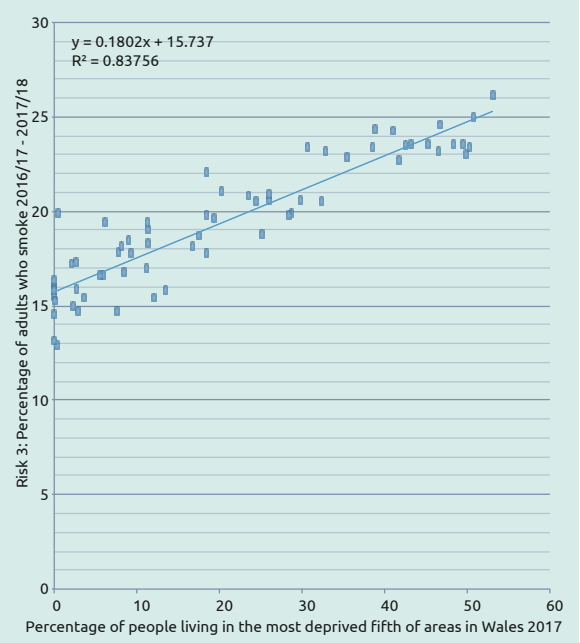
These interventions include a reduction in exposure to second-hand smoke, increased support for those wanting to quit smoking, and action to help prevent the uptake of smoking amongst young people. In addition, the plan not only seeks to strengthen smoking cessation opportunities for those with mental health conditions, but it also highlights the need to address smoking related inequalities between occupational groups and geographic areas.

Magnitude of variation

For Primary Care Clusters in Wales, the proportion of adults who smoke ranged from 12.9% to 26.2% (2.03-fold variation).

Reasons for the degree of variation may include:

- Variation in levels of deprivation in different areas (smoking prevalence is higher in more deprived areas);
- Differences in the quality of reporting in different areas; and
- Differences in access to and/or effectiveness of smoking cessation services.



From the graph it appears that individuals living in more deprived communities are more likely to smoke.

Options for action

- Providing smoking intervention and services which meet local needs;
- Identify and prioritise specific groups who are at higher risk of tobacco-related harm e.g. pregnant women who smoke, people with mental health problems etc.;
- Evaluating stop smoking services and identifying areas for improvement; and
- Engaging with people who smoke, using every opportunity to advise on services to help with smoking cessation e.g. Making Every Contact Count.

Resources

Public Health Wales. Making Every Contact Count[27].

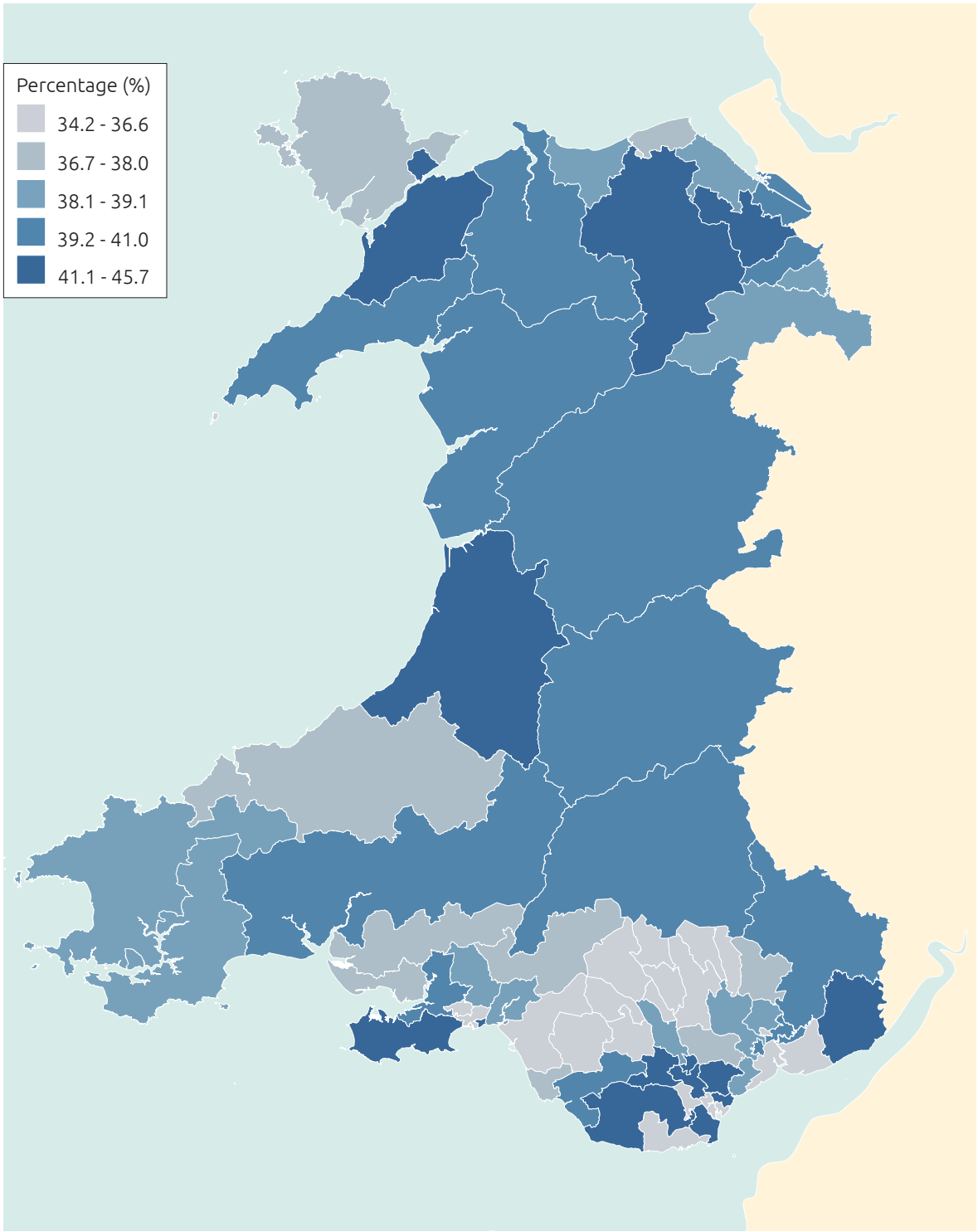
NHS Guidelines: NG92 (2018). Stop smoking interventions and services[28].

NHS Wales. Help Me Quit[29].

Tobacco Control Delivery Plan for Wales[30].

Risk 4: Percentage of working age adults of healthy weight

Age Standardised Map by Primary Care Cluster – 2 yr. 2016/18



Context

Obesity prevalence is rising in Wales, as it is globally, and the healthcare costs associated with treating obesity are high and continuing to increase.

Being overweight or obese increases the risk of a wide range of chronic diseases, principally type 2 diabetes, hypertension, cardiovascular disease including stroke, as well as some types of cancer, kidney disease, obstructive sleep apnoea, gout, osteoarthritis, and liver disease, among others. Obesity is also associated with and contributes to a shortened lifespan. It can also impair a person's well-being, quality of life and ability to earn. Poor diet and a sedentary lifestyle are the main causes of overweight and obesity. Some people may also experience psychological problems such as low self-esteem, poor self-image, and low confidence levels.

Weight loss reduces all of these diseases in a dose-related manner: the more weight lost, and the closer to a healthy weight the individual becomes, the better the outcome. Obesity leads to an increased number of years of life lived with a disability and lowers life expectancy.

The proportion of children and adults in Wales who are of a healthy weight is decreasing:

- Between 2003 to 2015 there was a 4% increase in levels of obesity among adults, and a 3.6% decrease in those of a healthy weight; and
- Around 60% of adults (16 +) are overweight or obese – with a quarter of those classified as obese.

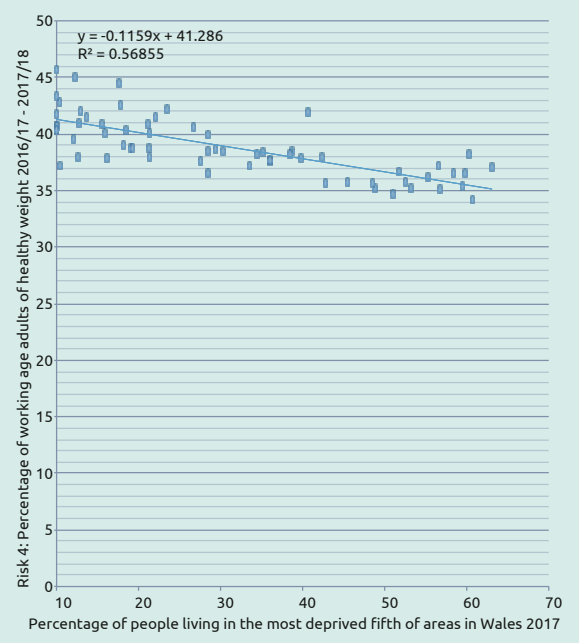
Many sedentary behaviours start in childhood. For example, many primary and secondary school children are taken to school by car, which sets in place patterns of behaviour that then repeat throughout life.

Magnitude of variation

For Primary Care Clusters in Wales, the proportion of working age adults of healthy weight ranged from 34.2% to 45.7% (1.33-fold variation).

Reasons for the degree of variation may include:

- Variation in levels of deprivation in different areas;
- Differences in the quality of reporting in different areas; and
- Differences in the environment in which people live which impact on their ability to maintain a healthy weight.



From the graph it appears that individuals living in more deprived communities are less likely to be a healthy weight.

Options for action

- Working with different agencies to help ensure a healthy living and working environment for the population, including local authorities, community partners, workplaces, healthcare settings, schools and early years' settings;
- Developing community programmes to help promote healthy lifestyles, which should also address the concerns of local people as part of the process;
- Working with different agencies to ensure there is choice of healthy food options in different settings, such as schools, workplaces and the wider community; and
- Identifying and assessing obesity in individuals, along with offering evidence-based management of these individuals.

Resources

Public Health Wales Observatory. Evidence Summary: Working age adults of a healthy weight[31].

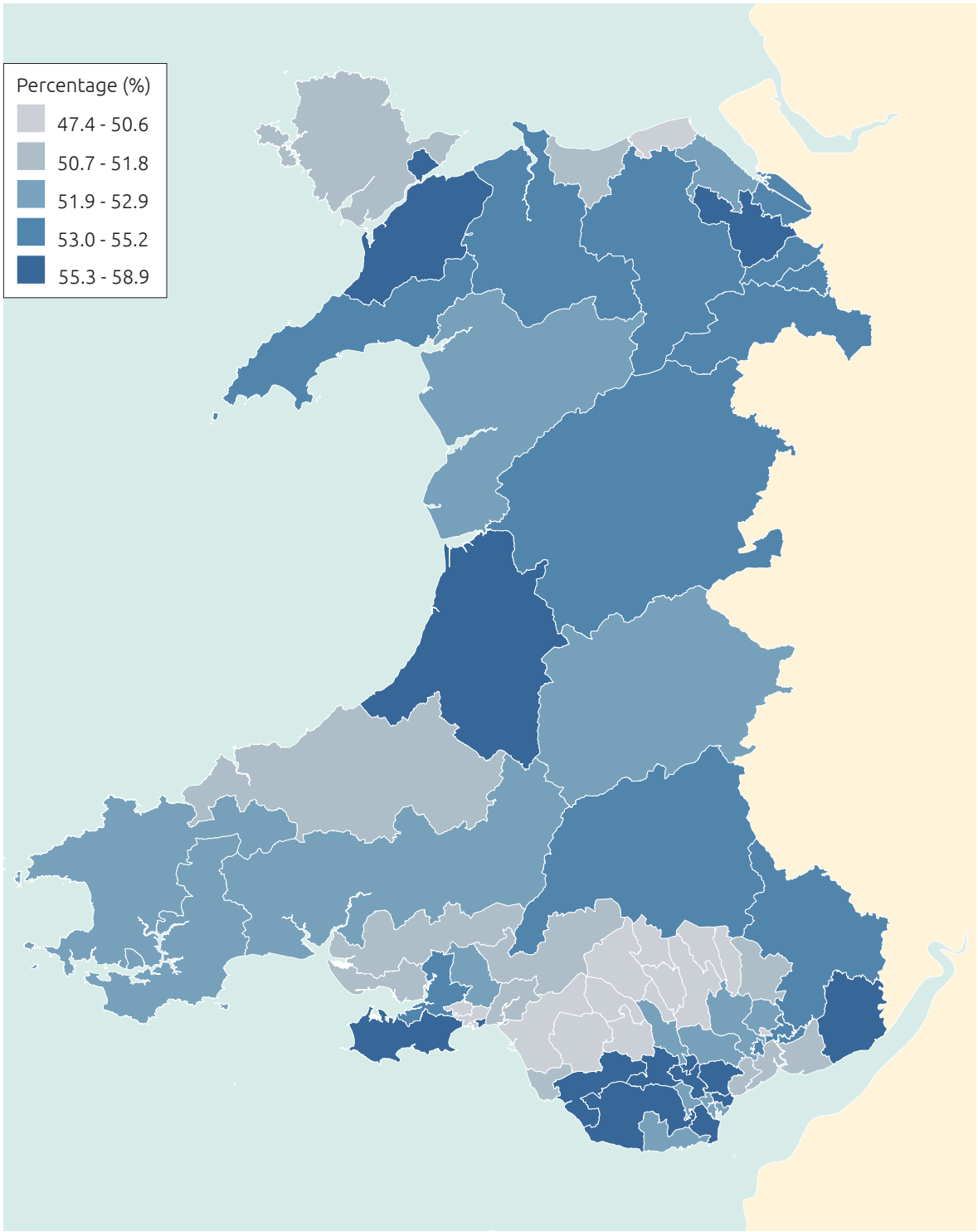
NICE Guidelines: Obesity Prevention (CG43)[32].

Welsh Government: Healthy Weight, Healthy Wales[33].

Public Health Wales: Overweight and Obesity[34].

Risk 5: Percentage of adults meeting physical activity guidelines

Age Standardised Map by Primary Care Cluster – 2 yr. 2016/18



Context

Regular physical activity is an essential part of healthy living. A lack of physical activity is among the leading causes of avoidable illness and premature death.

Outdoor activity has clear benefits for mental and physical health. Whilst more than 80% of adults in Wales take part in some type of outdoor recreation at least once a year, only about a quarter do so regularly.

High quality natural resources and ecosystems play a key role in supporting health outcomes. Urban green infrastructure can support physical and mental health. People living closer to good-quality green space are more likely to have higher levels of physical activity, and are more likely to use it more frequently.

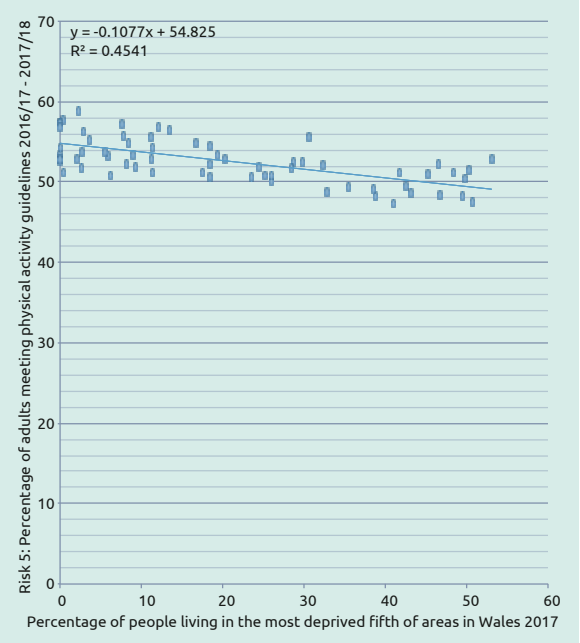
The Active Travel (Wales) Act 2013 is a landmark Welsh law to make it easier for people to walk and cycle in Wales. The Act requires local authorities to continuously improve facilities and routes for pedestrians and cyclists and to prepare maps identifying current and potential future routes for their use. This aims to enable positive behavioural change in our daily routines to reduce the need for car usage, to connect us with access to sustainable transport modes (such as buses and trains) and which also provides opportunities to strengthen community cohesion and improve physical activity.

Magnitude of variation

For Primary Care Clusters in Wales, the proportion of adults meeting physical activity guidelines ranged from 47.4% to 58.9% (1.23-fold variation).

Reasons for the degree of variation may include:

- Variation in levels of deprivation in different areas;
- Differences in the quality of reporting in different areas; and
- Differences in the environment in which people live which impact on their ability to maintain an active lifestyle.



From the graph it appears that individuals living in more deprived communities are less likely to meet the physical activity guidelines.

Options for action

- Ensuring that local health and well-being strategies support and encourage active travel;
- Plans that involve a change to the built environment should involve local communities and experts to maximise the potential for physical activity;
- Offering brief advice in primary care to those identified as physically inactive;
- Implementing and evaluating exercise referral schemes; and
- Supporting workplaces to enable employees to become more physically active.

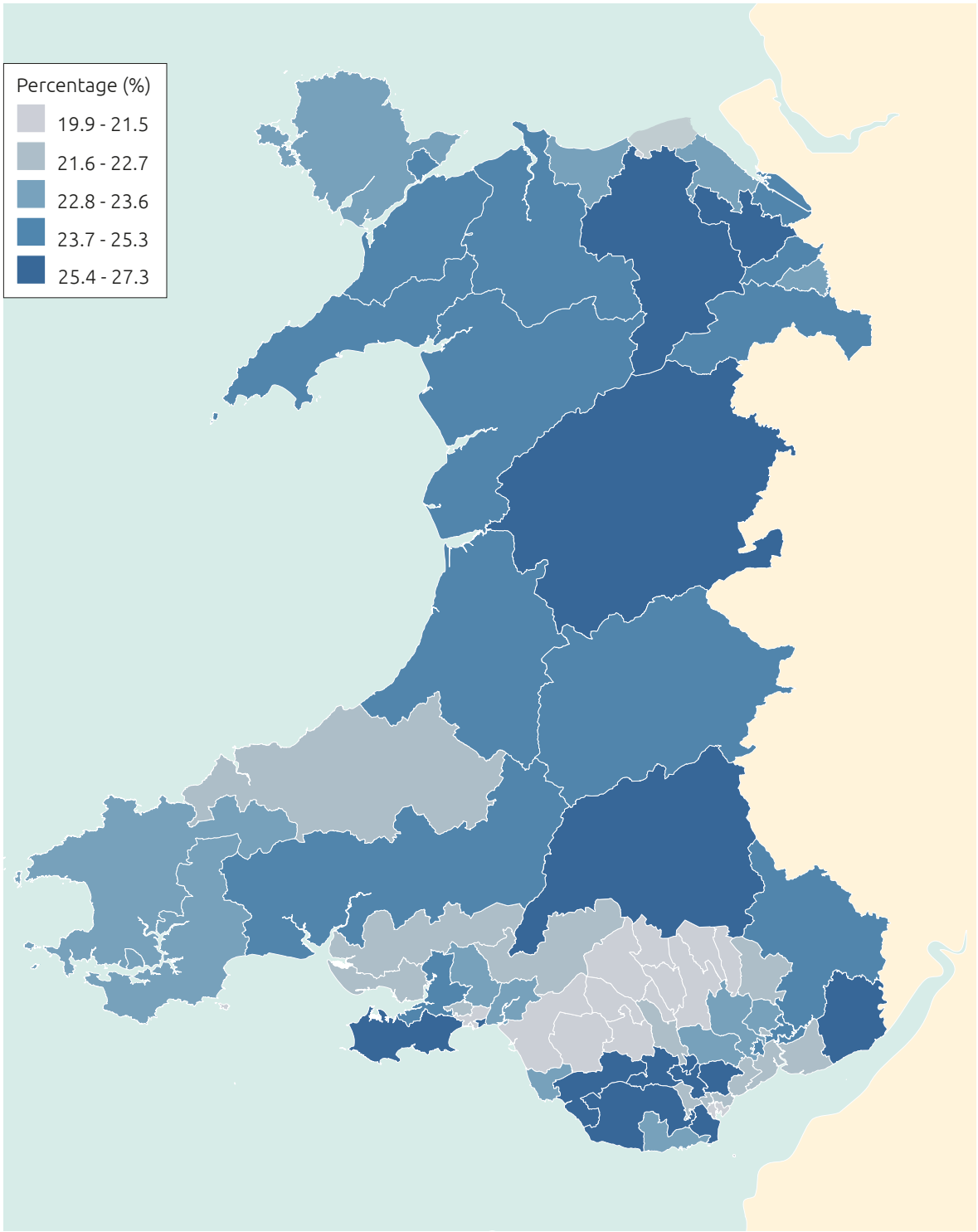
Resources

Public Health Wales Observatory. Evidence Summary: Adults meeting physical activity guidelines[31].

Welsh Government (2019). Healthy Weight, Healthy Wales[32].

Risk 6: Percentage of adults eating five fruit or vegetable portions a day

Age Standardised Map by Primary Care Cluster – 2 yr. 2016/18



Context

The prevalence of obesity is 7% higher in adults eating no portions of fruit or veg compared to those eating five or more portions of fruit or vegetables.

Less than a third of adolescents in Wales report eating a portion of vegetables once a day. Less than a quarter of adults in Wales report eating five portions of fruit and vegetables a day.

Nearly 10% of adults prepare food themselves less than once a week; over 20% reported that they ate ready meals at least once a week.

Welsh residents spent 18% less on fruit and vegetables in 2015-17 compared to 2006-08.

One in ten Welsh residents reported that they could not always afford to eat a balanced diet.

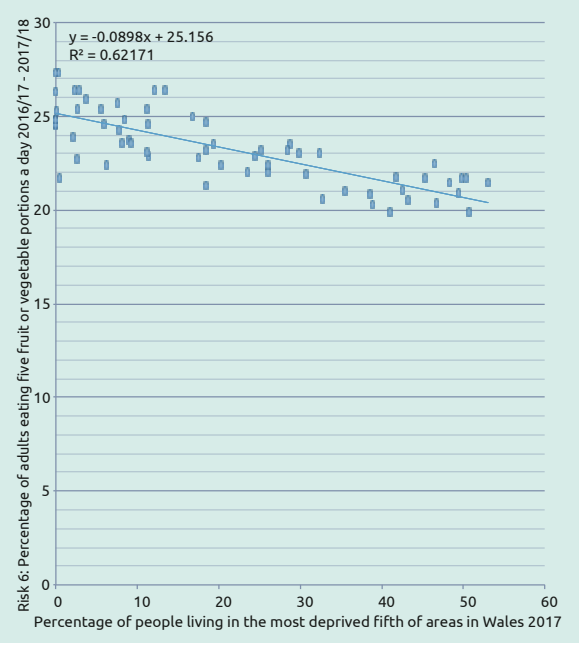
One in twenty Welsh residents often worried that they would run out of food before having enough money to buy more.

Magnitude of variation

For Primary Care Clusters in Wales, the proportion of adults eating five fruit or vegetables a day ranged from 19.9% to 27.3% (1.37-fold variation).

Reasons for the degree of variation may include:

- Variation due to chance;
- Variation in levels of deprivation in different areas;
- Differences in the quality of reporting in different areas; and
- Differences in access to healthy food options in different areas.



From the graph it appears that individuals living in more deprived communities are less likely to eat five fruit or vegetable portions a day.

Options for action

- Engage with the local community to identify and address environmental barriers to healthy eating;
- Ensure that local health and well-being strategies improve access to food that can contribute to a healthier diet;
- Improve access to affordable fruit and vegetables;
- Help workplaces to provide opportunities for staff to eat a healthy diet e.g. availability of healthy food and drink options; and
- Interventions delivered by health professionals to individuals should be multicomponent e.g. targeted advice, family involvement and goal setting.

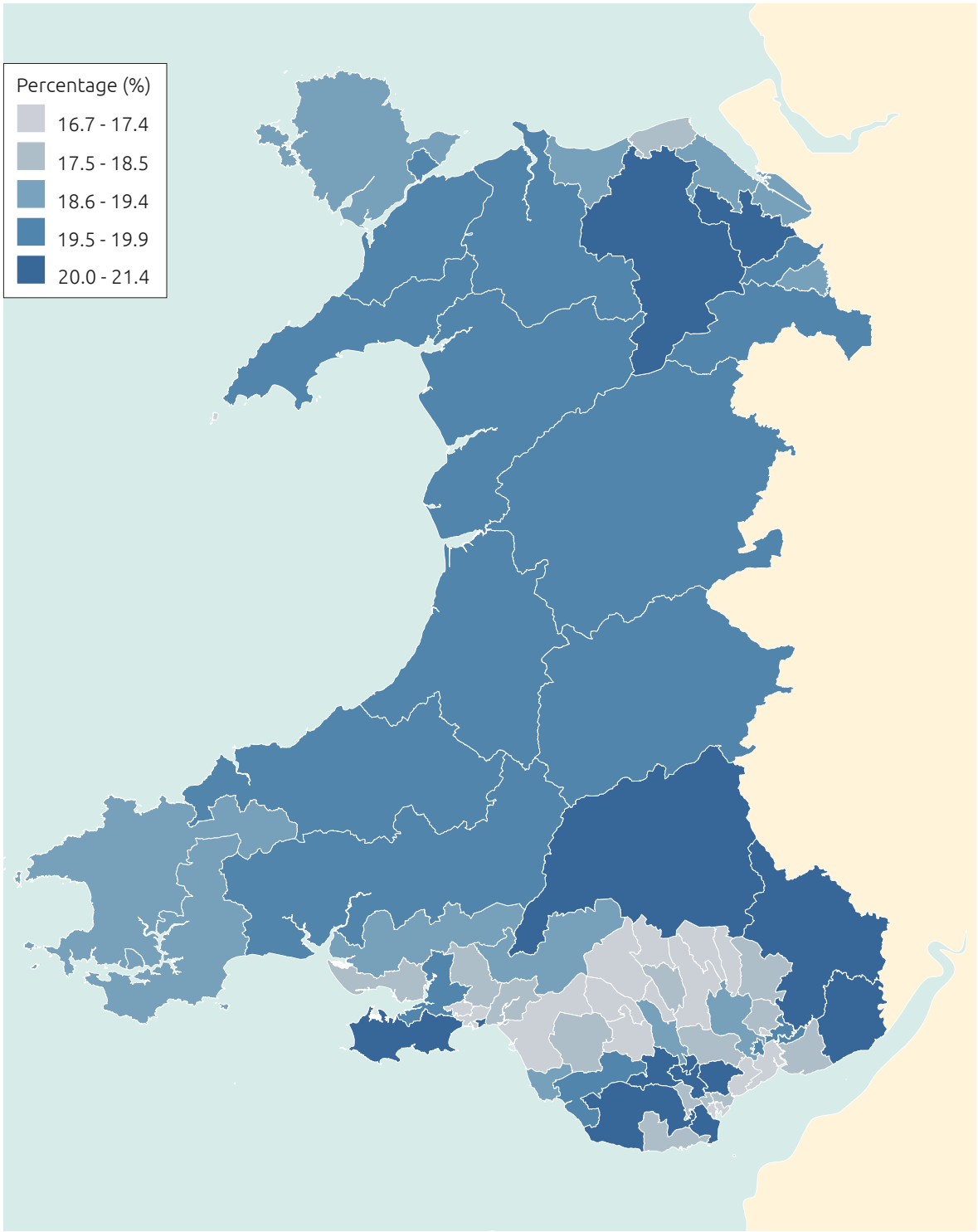
Resources

Public Health Wales Observatory: Evidence Summary: Adults eating five fruit or vegetable portions a day[37].

Welsh Government: Healthy Weight, Healthy Wales[38].

Risk 7: Percentage of adults drinking above guidelines

Age Standardised Map by Primary Care Cluster – 2 yr. 2016/18



Context

Alcohol is a major cause of death and illness in Wales with around 1,500 deaths attributable to alcohol each year (1 in 20 of all deaths).

Drinking in children and young people remains a particular concern with 1 in 6 boys and 1 in 7 girls aged 11-16 drinking alcohol at least once a week. Around 400 young people under 18 are admitted for alcohol-specific conditions per year, although the rate has been decreasing for several years.

Generally, consumption of alcohol has slightly decreased and adults under 45 now drink less. Whilst this decrease is good news, it masks persistent or increased drinking in over 45 year olds.

Mortality and hospital admission due to alcohol are strongly related to deprivation with rates in the most deprived areas much higher than in the least deprived. There is no sign of improvement in the inequality gap in mortality over time.

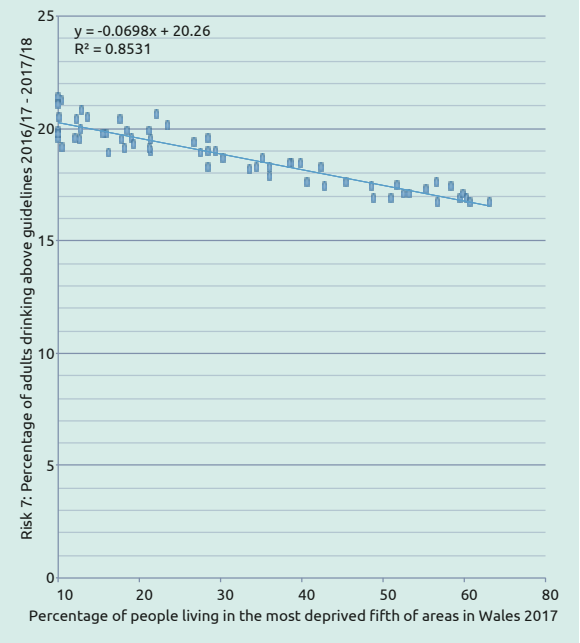
Magnitude of variation

For Primary Care Clusters in Wales, the proportion of adults drinking above guidelines ranged from 16.7 to 21.4% (1.28-fold variation).

Reasons for the degree of variation may include:

- Variation due to chance;
- Differences in the quality of reporting in different areas; and
- Differences in levels of deprivation in different areas (adults reporting drinking above guidelines is highest in the least deprived fifth of Wales).

However, alcohol-related mortality rates are much higher in the most deprived fifth compared to the least deprived fifth of Wales, despite the opposite relationship for drinking above guidelines.



Options for action

- Using local crime and related trauma data to map the degree of alcohol-related problems, which can then help to inform the development of a statement of licensing policy;
- Ensure that alcohol education is included in the school curriculum;
- Ensure that alcohol screening and structured brief advice is adequately resourced and evaluated; and
- Ensure there is appropriate referral and access to specialist services.

Resources

NICE Guidelines: Alcohol-use disorders: Prevention (PH24)[39].

Public Health Wales: Alcohol overview[40].

9
Acute Coronary Syndrome (ACS)

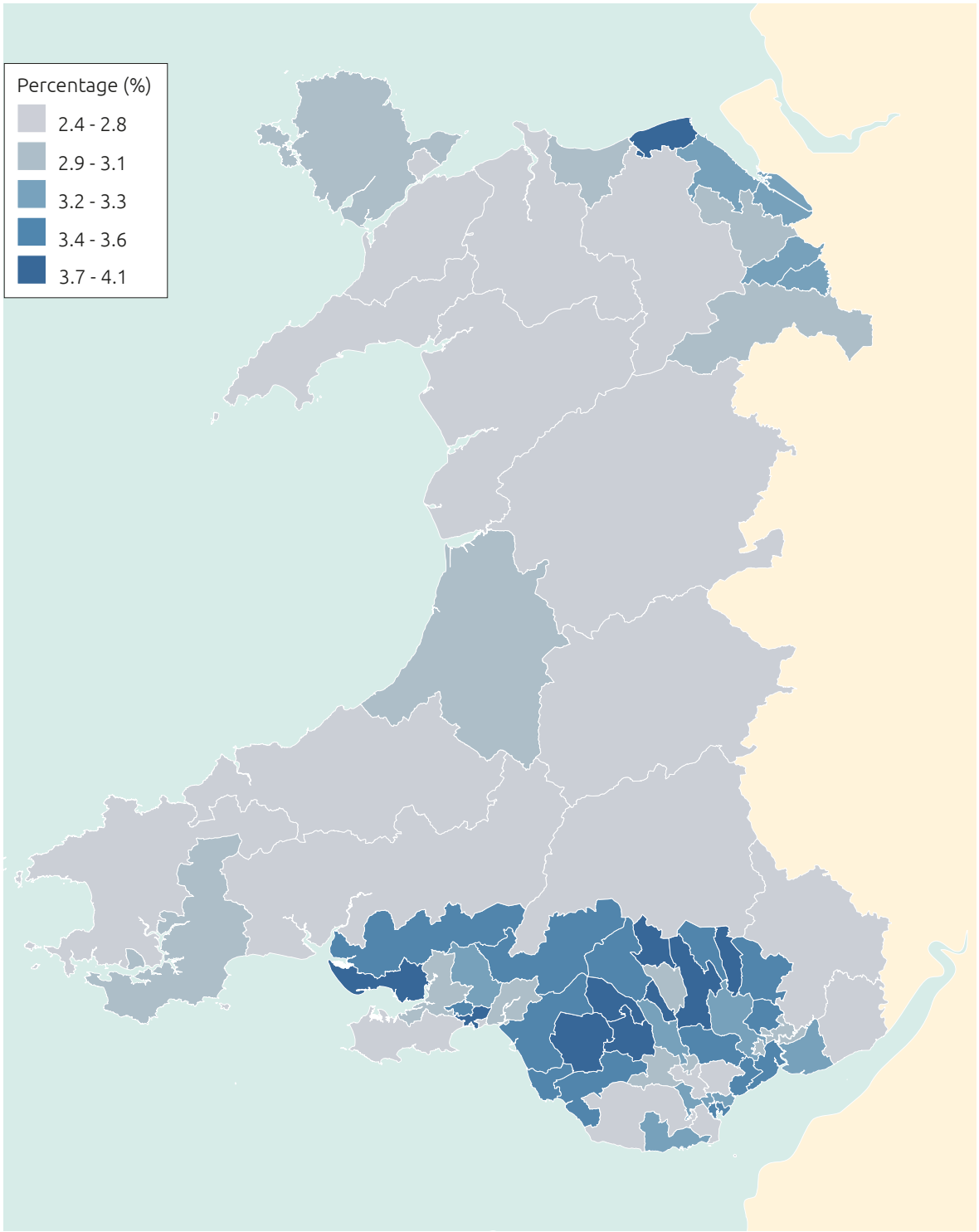
The coronary arteries supply the heart muscle with oxygen-rich blood. In coronary heart disease (CHD) these arteries become narrowed due to a gradual build-up of fatty material deposited in the walls. These deposits are known as atheroma or atheromatous plaques, and the process is called atherosclerosis. Over time this narrowing can lead to symptoms because the coronary arteries cannot deliver enough oxygen-rich blood to meet the heart muscle's needs. This results in pain and discomfort known as angina. The symptoms are often predictable, occurring after a defined amount of exertion or effort and are relieved by rest. This is known as stable angina.

In contrast, the term acute coronary syndrome commonly describes the situation that arises when an atheromatous plaque ruptures, leading to the formation of a blood clot within the coronary artery. This process can occur spontaneously and progress rapidly. If the clot fully occludes the coronary artery, blood flow to the heart muscle is obstructed resulting in myocardial cell death and a heart attack. This can occur without warning causing severe chest pain and the diagnosis is confirmed by a rise in cardiac biomarkers (usually Troponin I or T) and the 12-lead electrocardiogram (ECG) will often demonstrate characteristic pathognomonic changes of ST elevation, hence the term ST elevation myocardial infarction (STEMI). If the clot partially or intermittently occludes the artery it can still result in myocardial cell death and raised biomarkers, but the ECG changes are different with ST depression or T wave inversion. Hence the term non-ST elevation acute coronary syndrome (NSTEACS) or non-STEMI.

Atheromatous plaque rupture in a coronary artery leading to clot formation and the development of unstable symptoms is a medical emergency and it is the main cause of death from coronary heart disease. The term acute coronary syndrome covers all presentations where the underlying pathology is acute atheromatous plaque rupture and intracoronary clot formation.

ACS 1: Prevalence of coronary heart disease

Age Standardised Map by Primary Care Cluster – 1 yr. 2017/18



Context

Despite a dramatic reduction in death rates from coronary heart disease (CHD) in the past 20 years, CHD remains the major single cause of death in Wales with 3,857 deaths in 2016.

Wales has a higher prevalence of CHD than the UK as a whole (3.7% c.f. 3.3%) and there were more than 22,000 hospital admissions with CHD in Wales in 2016/17.

Premature CHD is a largely preventable condition, significantly influenced by poverty and socio-economic health determinants. Given that many people who present with CHD have had the disease for some years prior to presentation, the challenge is to identify people with a high risk of developing CHD or with established CHD and offer them comprehensive lifestyle advice and appropriate treatment. A lack of treatment increases the risks of morbidity, mortality and hospitalisation for people with CHD.

Although the risk of CHD increases with age, some of the main risk factors for CHD are modifiable by individuals with the support of health professionals:

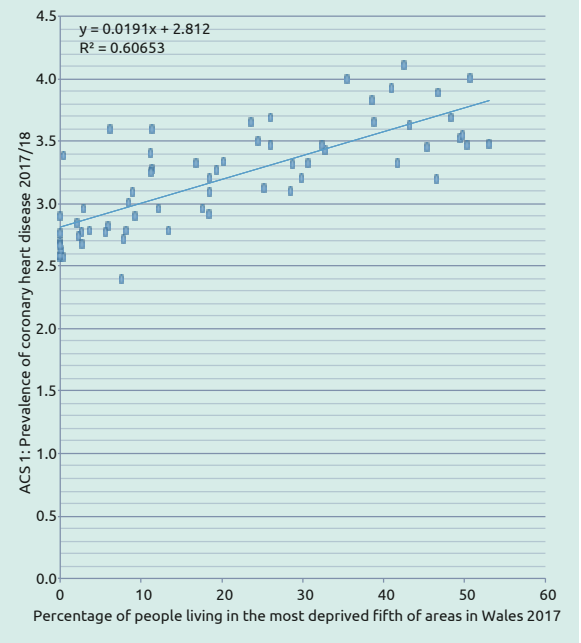
- Smoking/tobacco use;
- Poor diet and nutrition;
- High blood cholesterol;
- High blood pressure;
- Insufficient levels of physical activity;
- Overweight/obesity;
- Diabetes;
- Psychosocial stress; and
- Excess alcohol consumption.

Magnitude of variation

For Primary Care Clusters in Wales, the prevalence of coronary heart disease ranged from 2.4% to 4.1% (1.7-fold variation).

There is considerable geographical variation in the prevalence of CHD in Wales, both between and within communities. Reasons for the degree of variation may include differences in:

- The prevalence of risk factors in different local areas;
- The level of service provision;
- Levels of deprivation in different areas;
- The quality of reporting in different areas; and
- Differences in the identification of people with CHD in different local areas.



When prevalence of CHD is plotted against deprivation score there is a significant correlation between high levels of deprivation and the presence of CHD.

Options for action

The reduction in death rates from CHD in Wales over the past 20 years is a trend that has been seen across many similar countries, which can be explained by improvements in cardiovascular prevention and treatment programmes.

The National Survey for Wales 2016-17, which includes information on lifestyle, reveals that 20% of adults reported drinking above the weekly guidelines. It also reports the prevalence of overweight and obese adults as 59%, including 23% obese. 19% of adults are reported as being smokers, however in areas of highest deprivation this increases to 28%. Over 300,000 people are registered with their GP as having a BMI of 30 or over.

Clinicians need to take advantage of opportunities to assess the risk for CHD when people present for other reasons. The Heart Conditions Delivery Plan published in January 2017 focusses on the prevention of cardiovascular disease and the development of safe and effective pathways of care for patients with CHD:

- Planners should consider the social determinants such as poor housing, education, low income, access to unhealthy foods e.g. proliferation of fast food outlets in socially deprived areas;

- New integrated prevention services targeted to areas of high deprivation and prevalence of CHD; including diet, smoking cessation services, lifestyle advice, social prescribing and equitable access to care may help to drive down socio-economic and geographical variation in outcomes; and
- Community cardiology services need to be developed to deliver equitable access to diagnosis and treatment of CHD in high deprivation areas which may also help to drive down socio-economic and geographical variation in outcomes.

Resources

NHS Wales: Coronary Heart Disease[41].

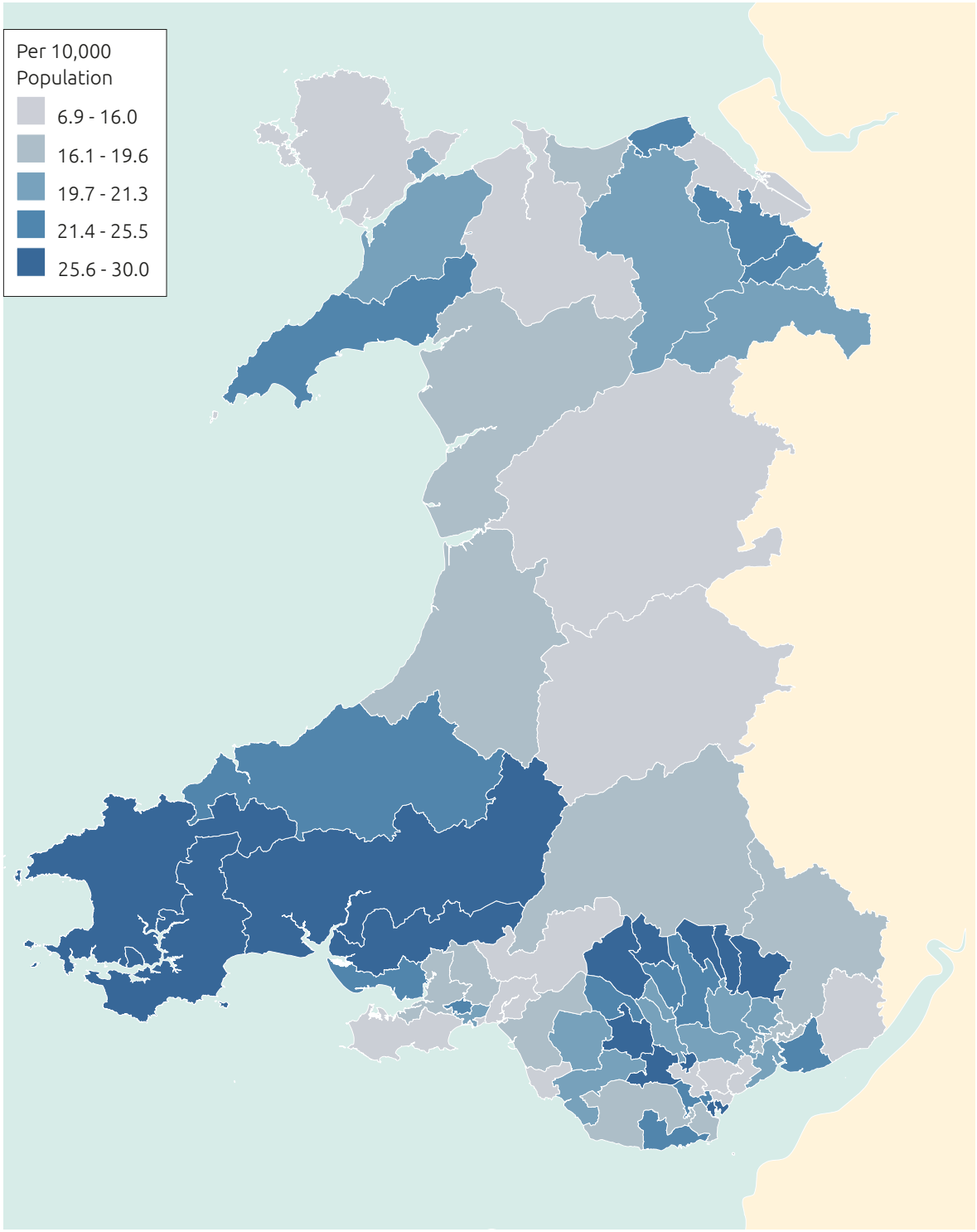
Welsh Government: National Survey For Wales[42].

Public Health Wales: Making Every Contact Count[43].

Welsh Government: Heart Conditions Delivery Plan[44].

ACS 2a: Rate of non-ST elevation acute coronary syndrome (NSTEACS) admissions

Age standardised map by Primary Care Cluster per 10,000 population – 1 yr. 2017/18



Context

Patients admitted to hospital with chest pain undergo a rapid initial assessment to determine whether the chest pain may be cardiac. The term 'acute coronary syndromes' encompasses a range of conditions including unstable angina, non-ST-segment-elevation myocardial infarction collectively termed non- ST elevation acute coronary syndrome (NSTEAC) and ST-segment-elevation myocardial infarction (STEMI). All are due to a sudden reduction of blood flow to the heart muscle, usually caused by the rupture of an atherosclerotic plaque within the wall of a coronary artery, and may cause the formation of a blood clot which can partially or totally occlude the vessel.

The most common symptom of acute coronary syndromes is severe pain in the chest and/or in other areas (for example, the arms, back or jaw), which can last for several hours. Other symptoms include sweating, nausea and vomiting, breathlessness and feeling faint. These symptoms are independent of gender and ethnic group.

People with acute coronary syndromes may have a poor prognosis without prompt and accurate diagnosis. Treatments are available to help ease the pain, improve the blood flow and to prevent any future complications.

A 12-lead ECG and a blood sample for high sensitivity Troponin I or T are taken on arrival in hospital, as soon as the diagnosis of unstable angina or NSTEACS is made, and aspirin and antithrombin therapy have been offered. A formal assessment of the individual's risk of future adverse cardiovascular events is undertaken using an established risk scoring system that predicts 6-month mortality (for example, GRACE).

Hospitals must ensure that local pathways are in place for adults with NSTEACS or unstable angina who have an intermediate or higher risk of future adverse cardiovascular events to be seen by cardiac specialists and offered coronary angiography (with follow-on PCI if indicated) within 72 hours of first admission to hospital.

Magnitude of variation

For Primary Care Clusters in Wales, the rate of non-ST elevation acute coronary syndrome (NSTEACS) admissions ranged from 6.9 – 30.0 (a 4.35-fold variation).

Reasons for the degree of variation may include:

- Variances in the quality of reporting in different local areas;
- The prevalence of risk factors in different local areas; and
- Variation in levels of deprivation in different areas.

Options for action

There is significant variation in the rate of NSTEACS admissions across Wales. To a large degree this probably reflects a failure to routinely submit all relevant patient data to the Myocardial Ischaemia National Audit Project (MINAP):

- Improved detection and treatment of risk factors for CHD in primary care and communities working with Primary Care Clusters;
- Improved equity of patient access to diagnosis and treatment of CHD working with community cardiology services in areas of high deprivation within Primary Care Clusters and Health Boards;
- Adopt a standard care pathway for NSTEACS across Wales, to deliver evidence-based best practice and improve standards of care and patient outcomes; and
- Development of an IT solution to automate data collection across the ACS patient pathway to facilitate and improve national audit submissions to MINAP.

Resources

NICE Guidelines: Unstable angina and NSTEMI: early management CG94[46].

NICE Guidelines: Chest pain recent onset: assessment and diagnosis CG95[47].

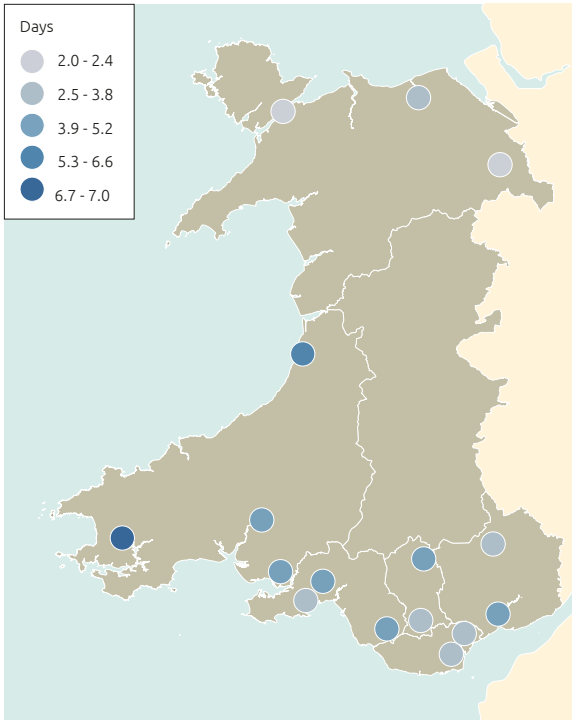
NICE Guidelines: Cardiovascular disease prevention PH25[48].

Wales Cardiac Network ACS Workplan[49].

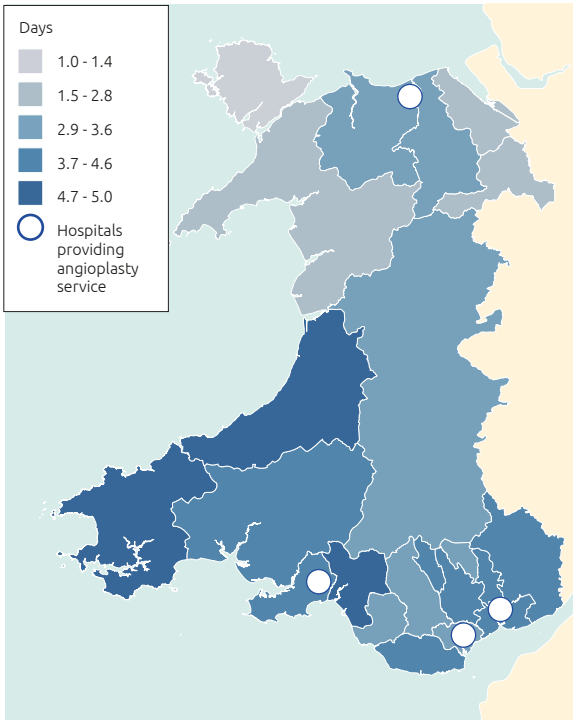
Welsh Government: Heart Conditions Delivery Plan[50].

ACS 2b: Median length of stay (in days) for non-ST elevation acute coronary syndrome (NSTEACS)

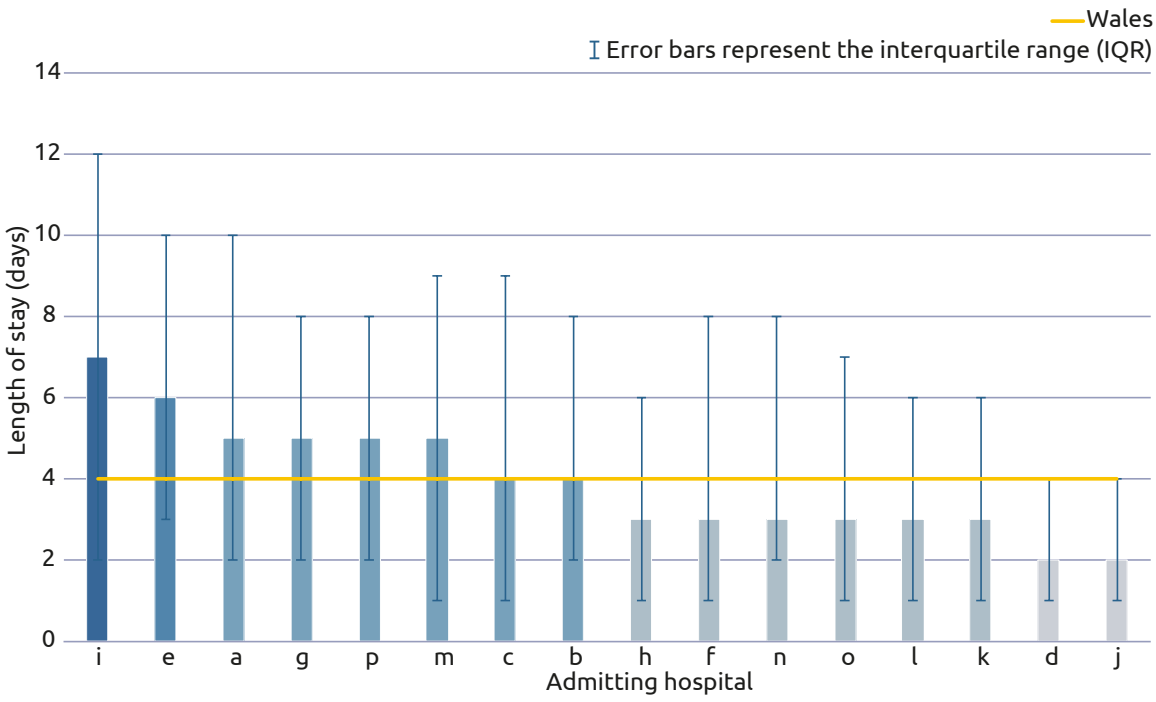
Map by admitting hospital and local authority of residence - 1 yr. 2017/18



By Admitting Hospital



Local Authority Area



Context

The term 'acute coronary syndromes' encompasses a range of conditions including unstable angina, non-ST-segment-elevation myocardial infarction (STEMI) and are collectively termed non-ST-segment-elevation acute coronary syndromes (NSTEACS) and ST-segment elevation myocardial infarction (STEMI). All are due to a sudden reduction of blood flow to the heart muscle, usually caused by the rupture of an atherosclerotic plaque within the wall of a coronary artery, with formation of a blood clot which may be partially or completely occlusive.

The most common symptom of acute coronary syndromes is severe pain in the chest and/or in other areas (for example, the arms, back or jaw), which can last for several hours. Other symptoms include sweating, nausea and vomiting, breathlessness and feeling faint.

People with acute coronary syndromes may have a poor prognosis without prompt and accurate diagnosis.

Hospitals must ensure that local pathways are in place for adults with NSTEACS who have an intermediate or higher risk of future adverse cardiovascular events to be seen by cardiac specialists and offered coronary angiography (with follow-on Percutaneous Coronary Intervention (PCI) if indicated) within 72 hours of first admission to hospital.

Magnitude of variation

For Local Health Boards in Wales, the median length of stay for NSTEACS admissions ranged from 2 to 7 days (a 3.5-fold variation).

There is significant variation in median length of stay when comparing the individual hospitals in Wales.

Further analysis of length of stay has shown a significant increase in length of stay (2–fold increase) if a patient is admitted to one Health Board then has to transfer to another for treatment (e.g. angiography +/- PCI) (see Finance 1: Average Length of Stay for NSTEAC Admissions - Welsh Registered Patients).

Reasons for the degree of variation may include:

- Differences in the quality of reporting in different local areas; and
- The access to angiography and PCI.

Options for action

For NSTEACS patients who have an intermediate or higher risk of adverse cardiovascular events (predicted 6-month mortality above 3.0%), coronary angiography (with follow-on PCI if indicated) within 72 hours of first admission to hospital should be offered if they have no contraindications to angiography (such as active bleeding or comorbidity). Angiography should be performed as soon as possible for patients who are clinically unstable or at high ischaemic risk:

- All hospitals implement a national care pathway for ACS patients to deliver quality National Institute for Health and Care Excellence (NICE) standards;
- Adults with NSTEACS are assessed for their risk of future adverse cardiovascular events using an established risk scoring system that predicts 6-month mortality to guide clinical management;
- NSTEACS patients with an intermediate or higher risk of future adverse cardiovascular events should be seen by cardiac specialists and offered coronary angiography (with follow-on PCI if indicated) within 72 hours of first admission to hospital;
- Move to a treat and repatriate model in the angioplasty centres to eliminate delays due to dependence on bed availability in the angioplasty centres;
- Provide cardiac ambulances to service the treat and repatriate model to deliver the quality standard of treatment within 72 hours; and
- Consider developing angioplasty services in district general hospitals with cardiac catheter labs that currently provide diagnostic angiography only.

Resources

NICE Guidelines: Unstable angina and NSTEMI: early management CG94[51].

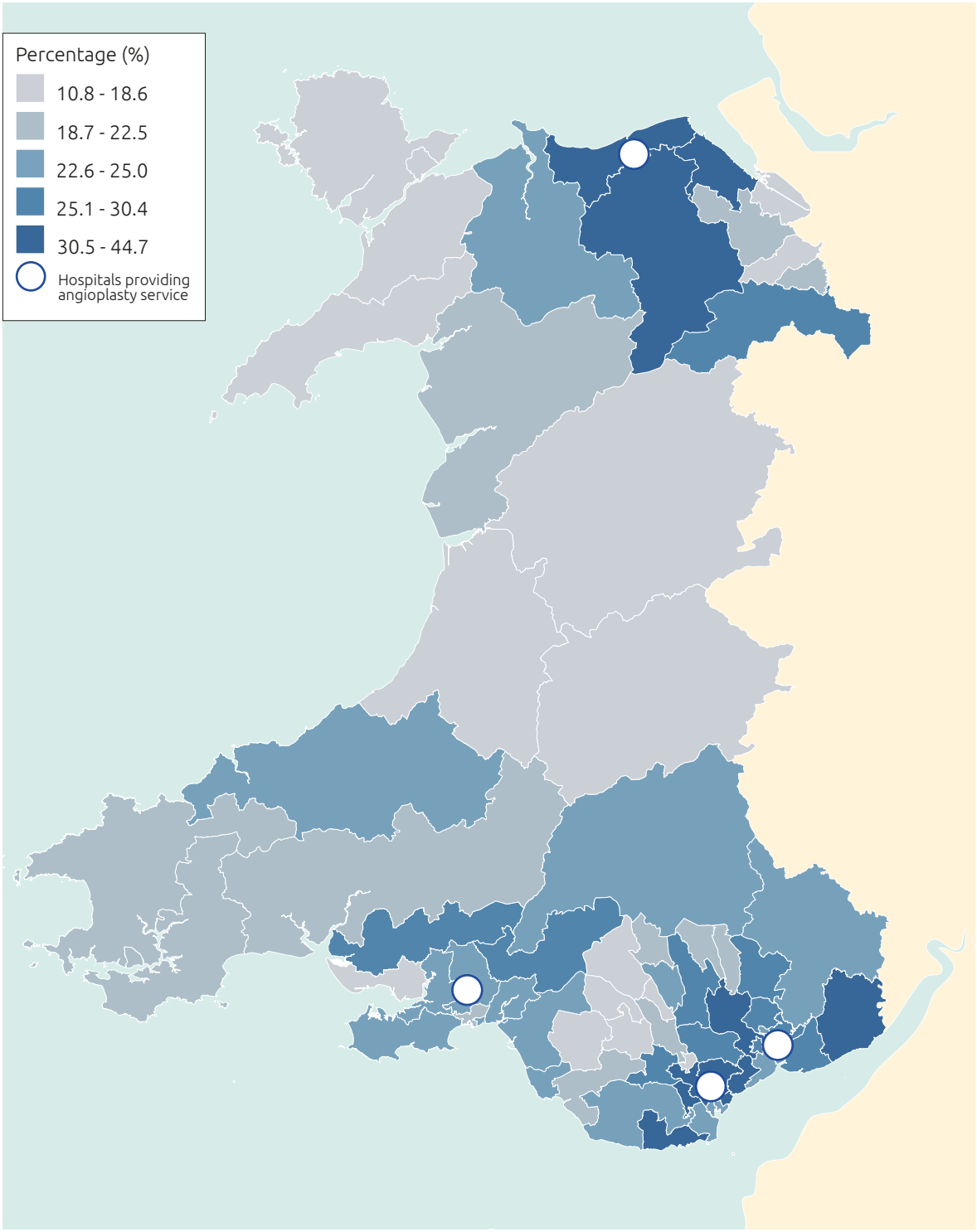
NICE Guidelines: Chest pain recent onset: assessment and diagnosis CG95[52].

Wales Cardiac Network ACS Workplan[53].

Welsh Government: Heart Conditions Delivery Plan[54].

ACS 3: Percentage of non-ST elevation acute coronary syndrome (NSTEACS) admissions who received a coronary angiogram within 3 days of admission date

Percentage by Primary Care Cluster per 10,000 population – 2 yr. combined 2016/17 – 2017/18



Context

Atheromatous plaque rupture in a coronary artery leading to clot formation and the development of unstable symptoms is a medical emergency and it is the main cause of death from coronary heart disease.

Hospitals must ensure that local pathways are in place for adults with NSTEACS or unstable angina who have an intermediate or higher risk of future adverse cardiovascular events. These patients are to be seen by cardiac specialists and offered coronary angiography (with follow-on PCI if indicated) within 72 hours of first admission to hospital.

Coronary angiography is important to define the extent and severity of coronary disease. In people with an intermediate or higher risk of future adverse cardiovascular events, coronary angiography within 72 hours of admission to hospital offers advantages over an initial conservative strategy, provided there are no contraindications to angiography (such as active bleeding or comorbidity).

Magnitude of variation

For Primary Care Clusters in Wales the percentage of non-ST elevation acute coronary syndrome (NSTEACS) admissions who received a coronary angiogram within 3 days of admission date ranged from 10.8% - 44.7% (a 4.1 – fold variation).

Currently in Wales we do not deliver evidence-based best practice, which is treatment with an angiogram +/- PCI or revascularisation within 72 hours of first admission to hospital for the majority of patients who present with a NSTEACS. Performance deteriorates with increasing distance from the centres providing angioplasty.

Reasons for the degree of variation may include:

- Differences in the quality of reporting in different local areas; and
- The access to angiography and PCI.

Options for action

The University Hospital of Wales have implemented a robust solution to deliver timely transfers and angiography (see appendix 6).

The current NICE quality standard states: For patients who have an intermediate or higher risk of adverse cardiovascular events (predicted 6-month mortality above 3.0%), coronary angiography (with follow-on PCI if indicated) within 72 hours of first admission to hospital is offered if they have no contraindications to angiography (such as active bleeding or comorbidity). Angiography should be performed as soon as possible for patients who are clinically unstable or at high ischaemic risk.

Currently for the majority of patients in Wales there is a failure to meet this standard:

- All hospitals implement a national care pathway for ACS patients to deliver the NICE quality standards;
- Local pathways are in place for adults with NSTEACS or unstable angina who have an intermediate or higher risk of future adverse cardiovascular events to be seen by cardiac specialists and offered coronary angiography (with follow-on PCI if indicated) within 72 hours of first admission to hospital;
- Move to a treat and repatriate model in the angioplasty centres to eliminate delays due to dependence on bed availability in the angioplasty centres (see example from UHW);
- Provide cardiac ambulances to service the treat and repatriate model with reduction in length of stay and treatment within 72 hours. Better outcomes at lower cost; and
- Consider developing angioplasty services in district general hospitals with catheter labs and diagnostic angiography.

Resources

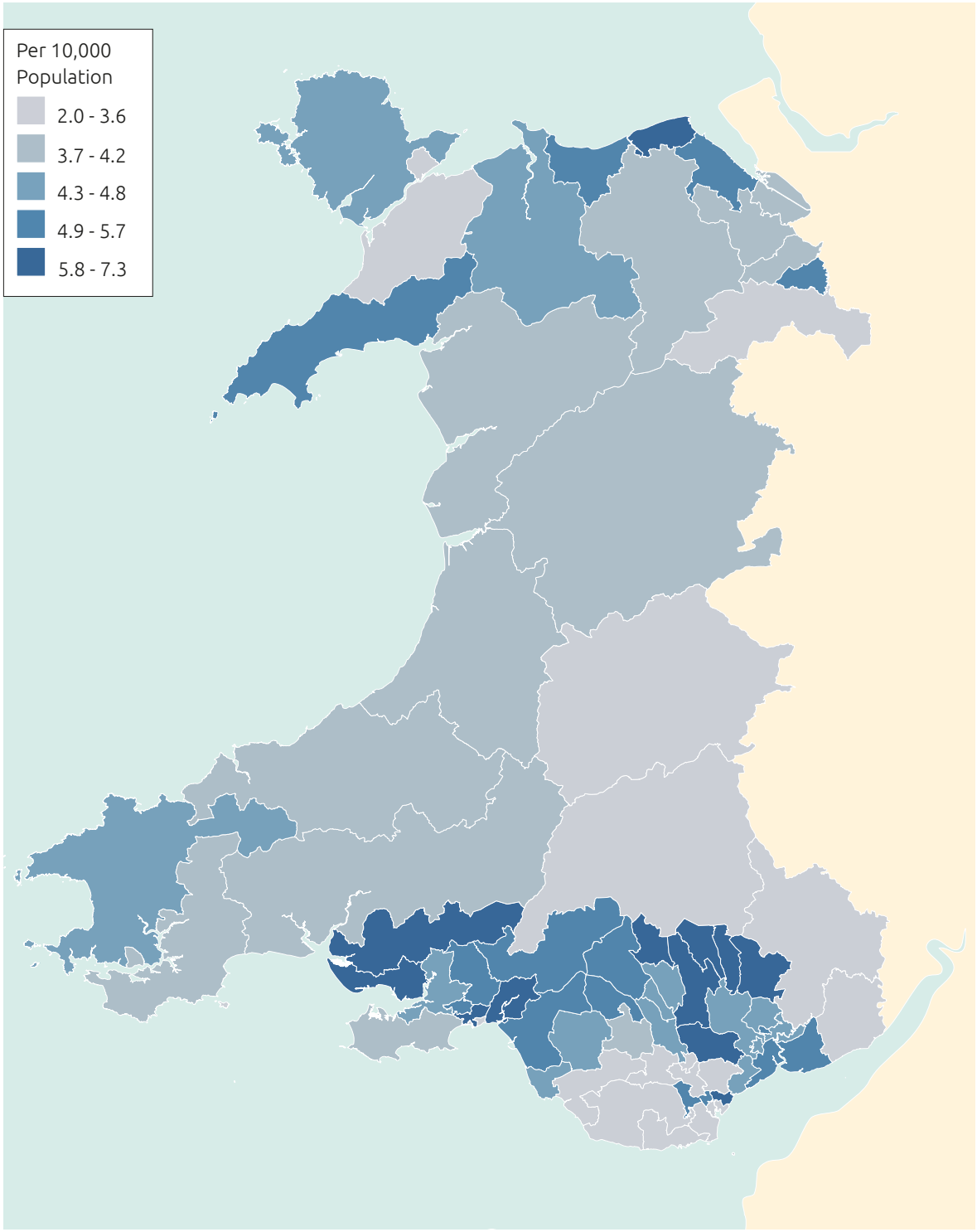
NICE Guidelines: Unstable angina and NSTEMI: early management [Recommendation 1.5.1] CG94[55].

NICE Guidelines: Chest pain recent onset: Assessment and diagnosis [Recommendation 1.5.1] CG95[56].

Welsh Government: Heart Conditions Delivery Plan[57].

ACS 4: Rate of mortality from coronary heart disease (CHD) in people aged under 75 years

Age-standardised map by Primary Care Cluster per 10,000 population – 3 yr. combined 2015 -17



Context

Coronary heart disease (CHD) remains a major cause of ill health and death in Wales: more than 1 in 7 men and nearly 1 in 10 women die from CHD. There has been a 67% reduction in death rates from CHD in people aged under 75 years in the past 20 years: from 145 per 100,000 population in 1996 to 48 per 100,000 population in 2016.

Despite this CHD remains the major single cause of death in Wales with 3,857 deaths in 2016.

This reduction in death rate probably reflects improved treatment uptake, hence continued improvements in both primary prevention and the diagnosis and treatment of CHD are likely to further reduce mortality.

Premature CHD is a largely preventable condition, significantly influenced by poverty and socio-economic health determinants.

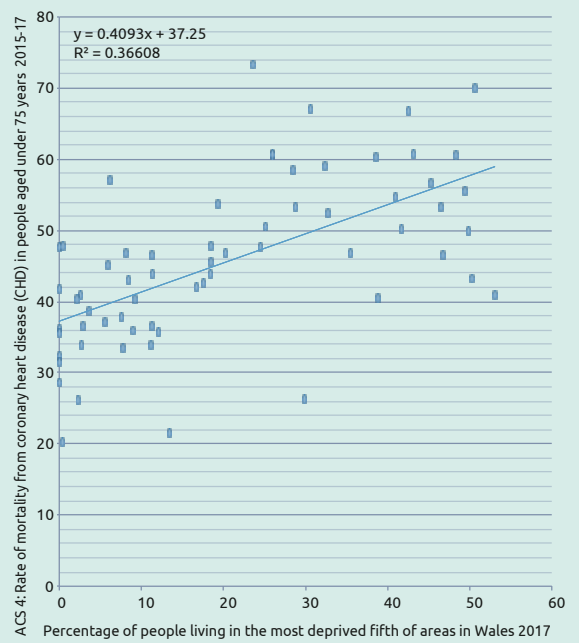
Given that many people who present with CHD have had the disease for some years prior to presentation, the challenge is to identify people with a high risk of developing CHD or with established CHD and offer them comprehensive lifestyle advice and appropriate treatment. A lack of treatment increases the risks of morbidity, mortality and hospitalisation for people with CHD.

Magnitude of variation

For Primary Care Clusters in Wales the rate of mortality from coronary heart disease (CHD) in people aged under 75 years ranged from 2.0–7.3 (a 3.65–fold variation).

There is considerable geographical variation in the rate of mortality from coronary heart disease (CHD) in people aged under 75 years, both between and within communities. Reasons for the degree of variation may include differences in:

- The prevalence of CHD risk factors in different local areas;
- Differences in the identification of people with CHD in different local areas;
- Differences in access to diagnosis and treatment; and
- The level of deprivation and associated health inequalities in different localities. Mortality rates from CHD are lower in less-deprived populations when compared with more-deprived populations.



Options for action

The reduction in death rates from CHD in Wales over the past 20 years is a trend that has been seen across many similar countries, which can be explained by improvements in cardiovascular prevention and treatment programmes.

Health boards, WHSSC and service providers should focus on the prevention of cardiovascular disease and the development of safe and effective pathways of care for patients with CHD as reflected in NICE Guidelines and the Heart Conditions Delivery Plan published in January 2017:

- Planners should consider the social determinants such as poor housing, education, low income, access to unhealthy foods e.g. proliferation of fast food outlets in socially deprived areas;
- New integrated prevention services targeted to areas of high deprivation and prevalence of CHD; including diet, smoking cessation services, lifestyle advice, social prescribing and equitable access to care may help to drive down socio-economic and geographical variation in outcomes;
- Improved equity of patient access to diagnosis and treatment of CHD working with community cardiology services in areas of high deprivation within Primary Care Clusters and Health Boards; and
- Adopt a standard care pathway for NSTEACS across Wales, to deliver evidence-based best practice and improve standards of care and patient outcomes.

Resources

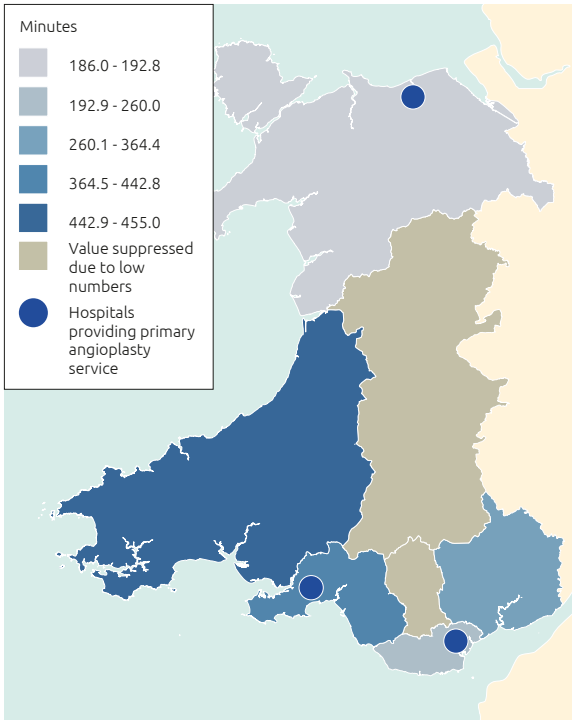
Welsh Government: Heart Conditions Delivery Plan[58].

NICE Guidelines: Cardiovascular disease prevention PH25[59].

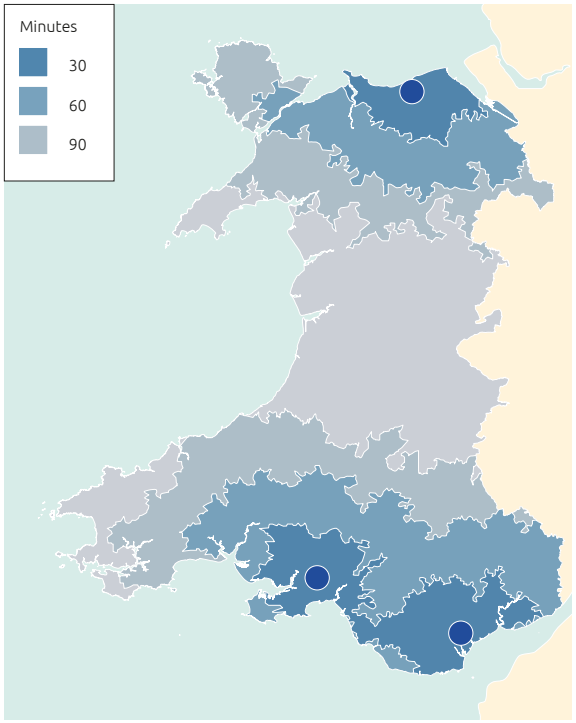
Wales Cardiac Network ACS Workplan[60].

ACS 5: Median call to balloon time for patients with ST elevation myocardial infarction (STEMI) who underwent a primary percutaneous coronary intervention (PCI)

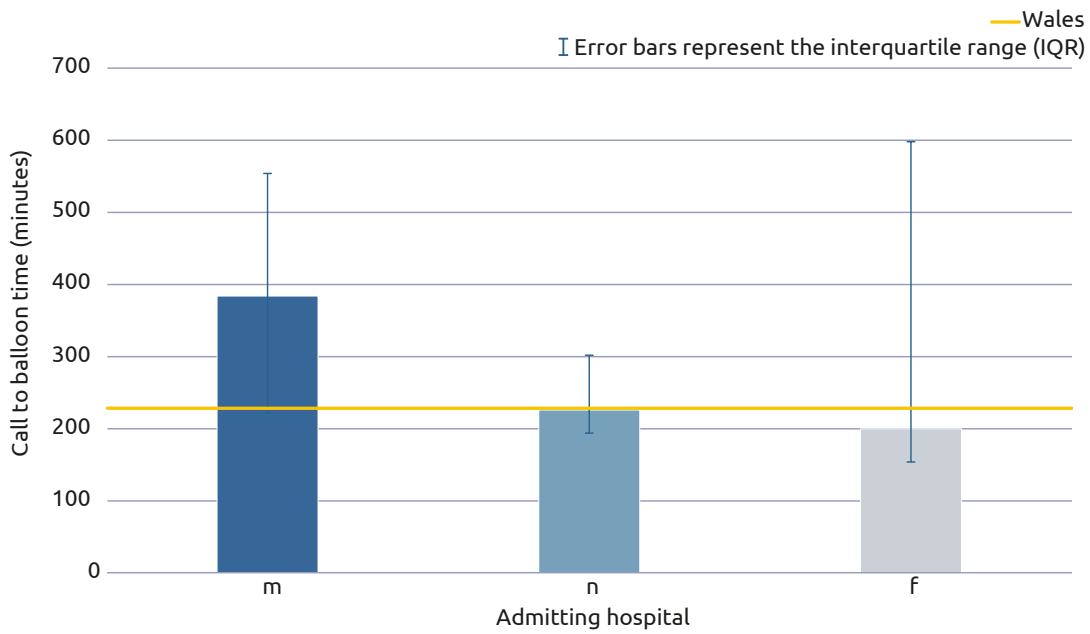
Map by health board of residence - 2 yr. combined 2016/17 - 2017/18



Local Health Board Area



30, 60 and 90-minute travel times from hospital providing primary angioplasty service



Context

The term ST elevation myocardial infarction (STEMI) describes the situation that arises when an atheromatous plaque ruptures, leading to the formation of a blood clot that occludes the coronary artery, resulting in myocardial cell death and a heart attack. This process can occur spontaneously and progress rapidly without warning causing severe chest pain. The diagnosis is confirmed by a rise in cardiac biomarkers (usually Troponin I or T) and the 12-lead electrocardiogram (ECG) will often demonstrate characteristic pathognomonic changes of ST elevation, hence the term ST elevation myocardial infarction (STEMI).

The incidence of STEMI has been declining over the past 20 years and in-hospital mortality after acute coronary syndromes has fallen from around 20% to nearer 5%. This has been attributed to various factors, including improved drug therapy and speed of access to effective treatments.

Nearly half of potentially salvageable myocardium is lost within 1 hour of the coronary artery being occluded, and two-thirds are lost within 3 hours. Apart from resuscitation from any cardiac arrest, the highest priority in managing STEMI is to restore an adequate coronary blood flow as quickly as possible. In the 1980s and 1990s, the best way to restore flow was to administer a fibrinolytic drug. However, fibrinolysis was not suitable for use in some people because of bleeding complications. In around 20–30% of people, fibrinolysis failed to result in coronary reperfusion, and in a few (1.0%) it caused haemorrhagic stroke.

To improve outcomes, attention turned to mechanical techniques to restore coronary flow (for example, coronary angioplasty, thrombus extraction catheters and stenting), which are grouped under the overarching term primary percutaneous coronary intervention (primary PCI).

Primary PCI is both feasible and cost effective, and that it should be the treatment of choice for STEMI, provided it can be delivered 'in a timely fashion'.

Magnitude of variation

For Local Health Board areas in Wales the median call to balloon time for patients with ST elevation myocardial infarction (STEMI) who underwent a primary percutaneous coronary intervention (PCI) ranged from 186 – 455 minutes (a 2.44 – fold variation).

The highest priority in managing STEMI is to restore an adequate coronary blood flow as quickly as possible using drug treatment and/or revascularisation. This applies to all people with STEMI, including those who have been resuscitated after cardiac arrest. The time taken to restore coronary blood flow is very important because heart muscle starts to be lost as soon as the coronary artery is blocked.

Adults with acute STEMI who present within 12 hours of onset of symptoms have primary PCI as the preferred coronary reperfusion strategy, as soon as possible, but within 120 minutes of the time when fibrinolysis could have been given.

Options for action

Primary PCI is a form of reperfusion therapy which should be done as soon as possible. This is because heart muscle starts to be lost once a coronary artery is blocked and the sooner reperfusion therapy is delivered the better the outcome for the patient. If too much time elapses the benefits of primary PCI may be lost. Because of the difficulty in timely delivery, in some areas primary PCI is no longer the preferred coronary reperfusion strategy over fibrinolysis. However, when performed early, primary PCI is more effective.

To ensure the best outcomes for adults with STEMI, the ambulance service and hospitals delivering primary PCI should work together to minimise delays in treatment:

- Adults with acute STEMI who present within 12 hours of onset of symptoms have primary PCI, as the preferred coronary reperfusion strategy, within 120 minutes of the time when fibrinolysis could have been given;
- Adults with acute STEMI have access to primary PCI 24 hours a day; and
- Develop a nationally agreed single care pathway for coronary reperfusion.

Resources

NICE Guidelines: Myocardial infarction with ST-segmented elevation: acute management CG167[61].

Welsh Government: Heart Conditions Delivery Plan[62].

ACS Financial Impact: Average length of stay for non-ST elevation acute coronary syndrome (NSTEAC) Admissions - Welsh Residence Patients

Welsh Resident Analysis 2016/17

Resident Local Health Board	Number of 'Person' Spells (Inc. Cross-Provider)	Average Length of Stay	Average Cost per Patient Spell	Total Cost per LHB (£)
Aneurin Bevan	995	6.6	£3,576	£3,558,120
Abertawe Bro Morgannwg	781	7.7	£4,523	£3,532,463
Betsi Cadwaladr	1,349	4.3	£2,800	£3,777,200
Cwm Taf	542	7.2	£3,716	£2,014,072
Cardiff and Vale	514	7.4	£4,381	£2,251,834
Hywel Dda	843	7.7	£4,507	£3,799,401
Powys	326	6.5	£4,306	£1,403,756
Grand Total	**5,350**	**-**	**£27,809**	**£20,336,846**
Total Average	**764**	**6.8**	**£3,973**	**£2,905,263**

Table 5

This table shows the number of non-ST elevation acute coronary syndrome (NSTEAC) 'Person Spells' for Welsh Resident Patients.

Spells in this table relate to 'Person Spells' which are continuous periods of inpatient care for a single patient which could take place under any number of different providers.

The average costs and length of stay therefore reflect the totals across all providers for the 'Person Spell'.

The data is an analysis of Welsh Residents and so will include spells for Welsh Residents treated in Wales and also Welsh Residents treated in England, according to the information that has been received from NHS digital. English Residents treated in Wales are not included in the analysis.

The table below helps to further understand the impact on cost and length of stay for patients transferring providers during their spell by splitting out two cohorts:

- Admissions where the entire spell (single or multiple admissions) took place in the resident LHB; and
- The first admission was within the resident LHB and then the second was a different provider.

Spell Category	Resident LHB	Average Length of Stay	Average Cost per Patients Spell
Entire 'Person Spell' within resident LHB	Aneurin Bevan	6.4	£3,210
	Abertawe Bro Morgannwg	7.8	£4,566
	Betsi Cadwaladr	4.3	£2,830
	Cwm Taf	7.0	£3,259
	Cardiff and Vale	7.7	£4,553
	Hywel Dda	6.6	£3,346
Grand Total		**-**	**£21,764**
Total Average		**6.6**	**£3,627**
First admission within resident LHB and then changed provider	Aneurin Bevan	19.0	£14,376
	Betsi Cadwaladr	5.0	£4,119
	Cwm Taf	15.3	£10,558
	Hywel Dda	12.0	£7,842
Grand Total		**-**	**£36,895**
Total Average		**13.0**	**£9,224**

Table 6

The data indicates that patients who have a first admission within the resident LHB and then change provider for subsequent treatment have a longer length of stay and average cost per spell than those who spend the entire spell within their resident HB. It is understood that some, but not all, patients will undergo a procedure (CABG, PCI) during the course of the super-spell, but this has not been identified within the data at present.

Outcome data is not available at present, but this would also significantly add to the analysis.

When assessing the opportunity, please bear in mind that "costs per spell' are "fully absorbed" and as they include an element of fixed costs (e.g. estates, rates), semi fixed costs (most staff costs), and variable costs (e.g. drugs, prosthetics), fully absorbed costs are not fully releasable.

10
Heart Failure

Heart failure is a clinical syndrome characterised by a complex of symptoms and signs that suggest impaired efficiency of the heart muscle caused by a structural and/or functional abnormality of the heart. The most common cause of heart failure in the UK is coronary heart disease (CHD), with many people having had a myocardial infarction. Other main conditions that can cause heart failure include:

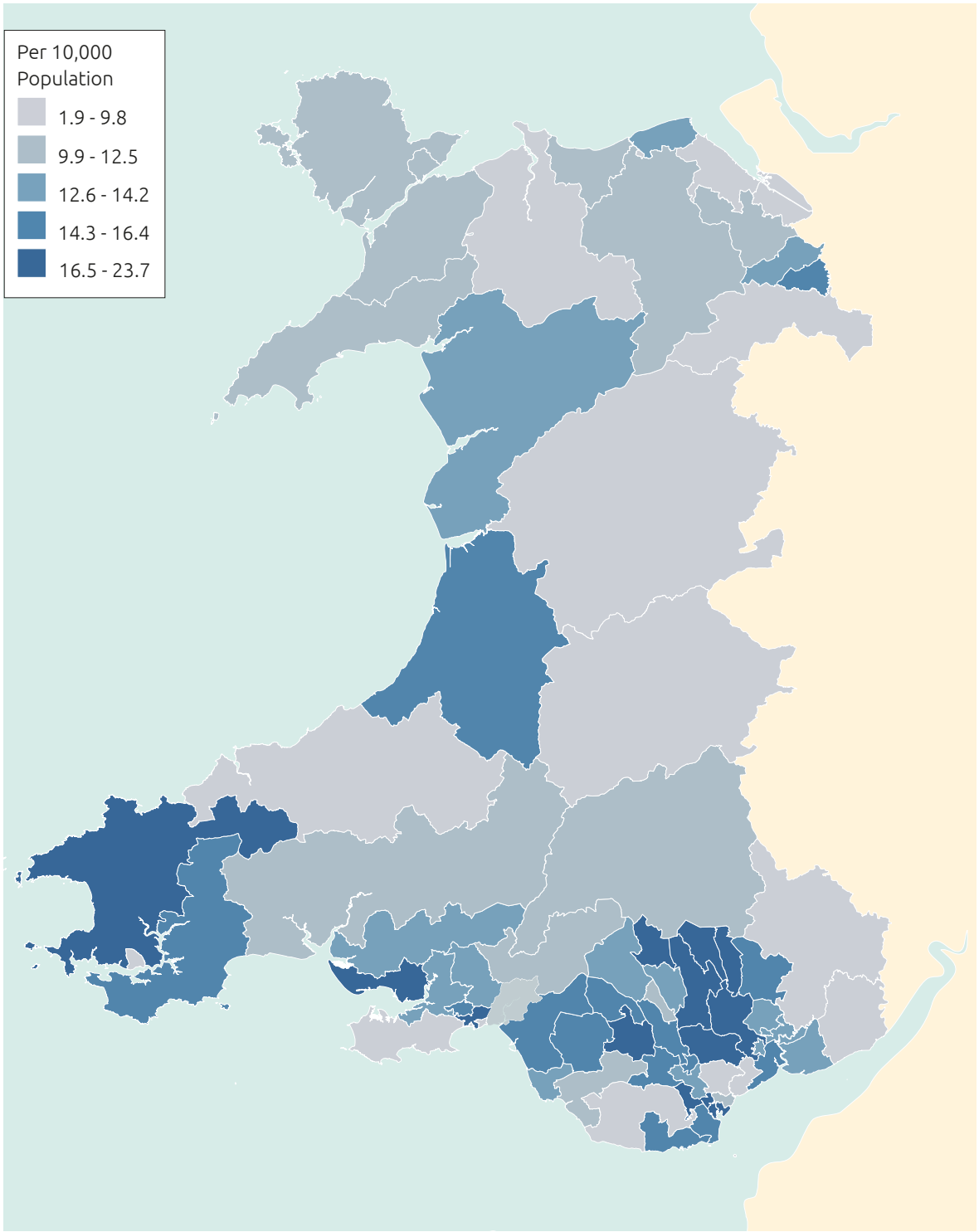
- Hypertension;
- Cardiomyopathy;
- Arrhythmias, such as atrial fibrillation;
- Damage to or other problems with the heart valves; and
- Congenital heart disease.

Heart failure can also be caused by anaemia, cardiotoxic drugs/radiation, and excessive consumption of alcohol, hyperthyroidism and pulmonary hypertension. The incidence and prevalence of heart failure increase with age. Prevalence is likely to increase in future due to the population ageing, improved survival of people with ischaemic heart disease, and increased effectiveness of treatments for heart failure.

Over 32,000 people in Wales have been diagnosed with heart failure. The most common symptoms are breathlessness, fatigue and swollen ankles and legs. People with heart failure can experience acute exacerbations of their condition which may require emergency admission to hospital. Acute heart failure can also present as new-onset heart failure in people without known cardiac dysfunction. Acute heart failure is a common cause of admission to hospital in England and Wales, and is the leading cause of hospital admission in people aged 65 years and older accounting for 5% of all emergency medical admissions to hospital. In Wales, the aim is to set up Local Heart Failure Teams – comprising a lead consultant cardiologist or physician with a special interest in heart failure, a lead heart failure specialist nurse, a clinical physiologist and a pharmacist, to serve primary care clusters. Each of these teams will link to a Tertiary Heart Failure Team able to provide specialist diagnosis and care.

HF 1: Rate of emergency heart failure admissions

Age standardised map by primary care cluster per 10,000 population - 1 yr. 2017/18



Context

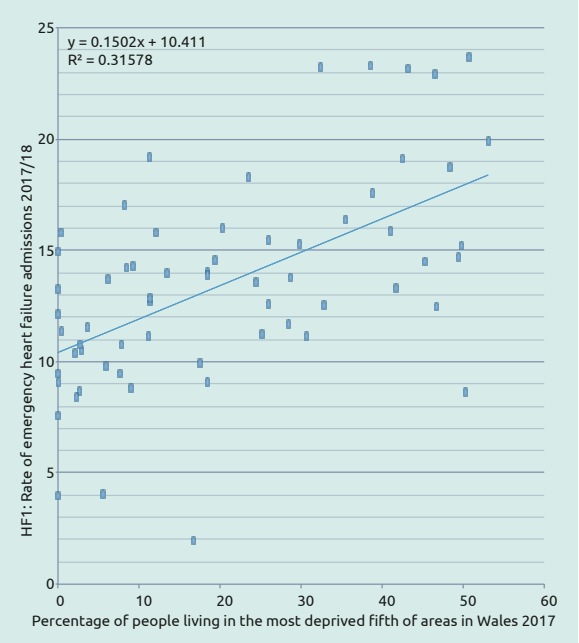
Acute heart failure can present as a new diagnosis in patients with no previous heart disease or as an episode of worsening of chronic heart failure, triggered by other co-existing conditions. These conditions are commonly reversible or treatable events such as infections, arrhythmias or acute coronary syndromes. Acute heart failure is the commonest emergency admission in >65 year olds causing 5% of all emergency admissions.

For patients admitted to hospital with acute heart failure, guidelines recommend that hospitals provide an acute heart failure team and that patients have early and continuing input from this team. Access to investigation to confirm the diagnosis and to guide treatment is also recommended in patients with suspected acute heart failure. National audit data has shown both an increasing frequency of appropriate investigation (with echocardiography) and use of disease modifying drugs when patients are seen by the heart failure team and/or looked after on cardiology wards and this is associated with improved outcomes (40% reduction in mortality).

The most common cause of heart failure in the UK is coronary heart disease (CHD), with many people having had a myocardial infarction. Hence appropriate treatment and investigation of CHD including primary prevention is important in reducing the development of heart failure in those individuals at risk.

Magnitude of variation

For Primary Care Clusters in Wales, rate of emergency admissions with heart failure ranged from 1.9 to 23.7 per 10,000 population (12.47-fold variation).



Reasons for the degree of variation observed may include differences in:

- Prevalence and severity of heart failure in different local areas;
- Identification of, and referral rates for, people with suspected heart failure;
- Timely access to diagnostic tests;
- Access to local heart failure teams and specialist care;
- Access to rehabilitation programmes specifically designed for people with heart failure;
- The level of care and support in the community; and
- Competency for self-care among people with heart failure.

Options for action

To reduce the rate of emergency admissions to hospital for people with heart failure, it is necessary:

- To increase the rates of diagnosis of heart failure by use of natriuretic peptides and echocardiography;
- To improve access to these tests in the community, particularly in areas of high deprivation and high rates of acute heart failure admissions;
- To improve access to specialist advice and treatment, including optimising medical and device treatments for patients with confirmed heart failure;
- To improve access of patients to community heart failure specialist nurses to improve people's ability to manage their heart failure symptoms; and
- To improve access to palliative care specialist teams.

Resources

NICOR: Heart failure audit[63].

NICE Pathways: Acute heart failure[64].

NICE Pathways: Chronic heart failure[65].

NICE Guidelines: Acute heart failure: diagnosis and management (CG187)[66].

NICE Guidelines: Chronic heart failure in adults: management (CG108)[67].

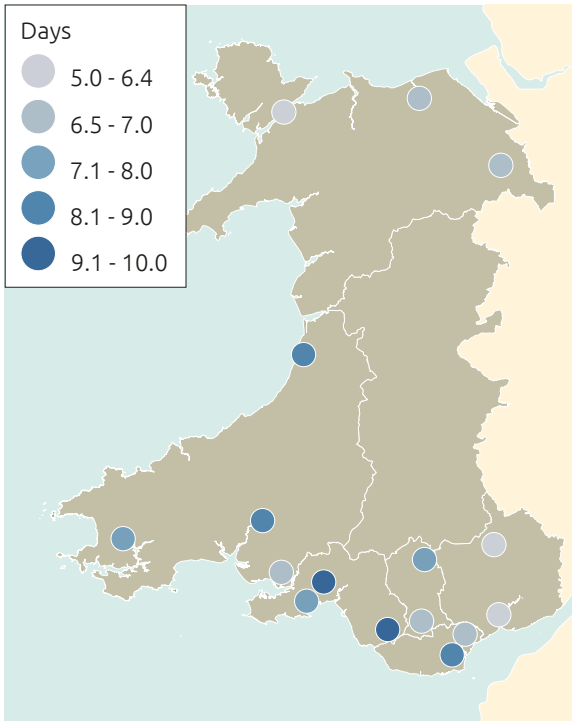
NICE Guidelines: Cardiovascular disease prevention PH25[68].

NICE Quality Standards: Acute Heart Failure (QS103)[69].

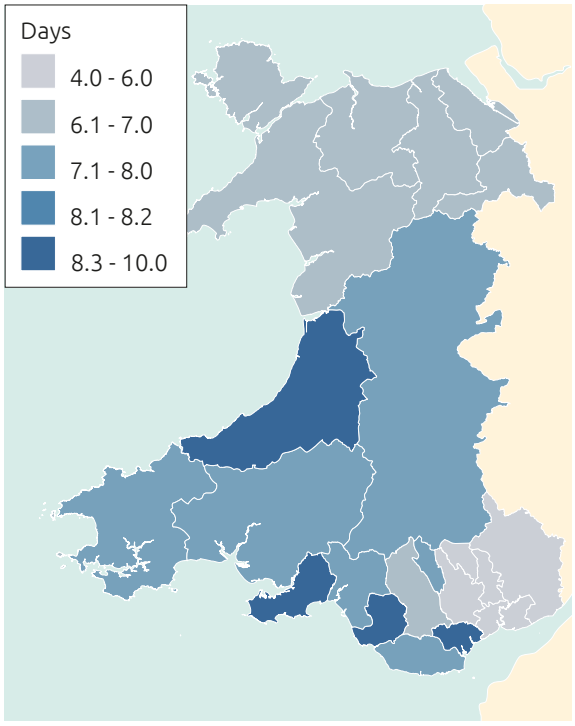
NICE Quality Standards: Chronic heart failure in adults (QS9)[70].

HF 2: Median length of stay (in days) for emergency heart failure admissions

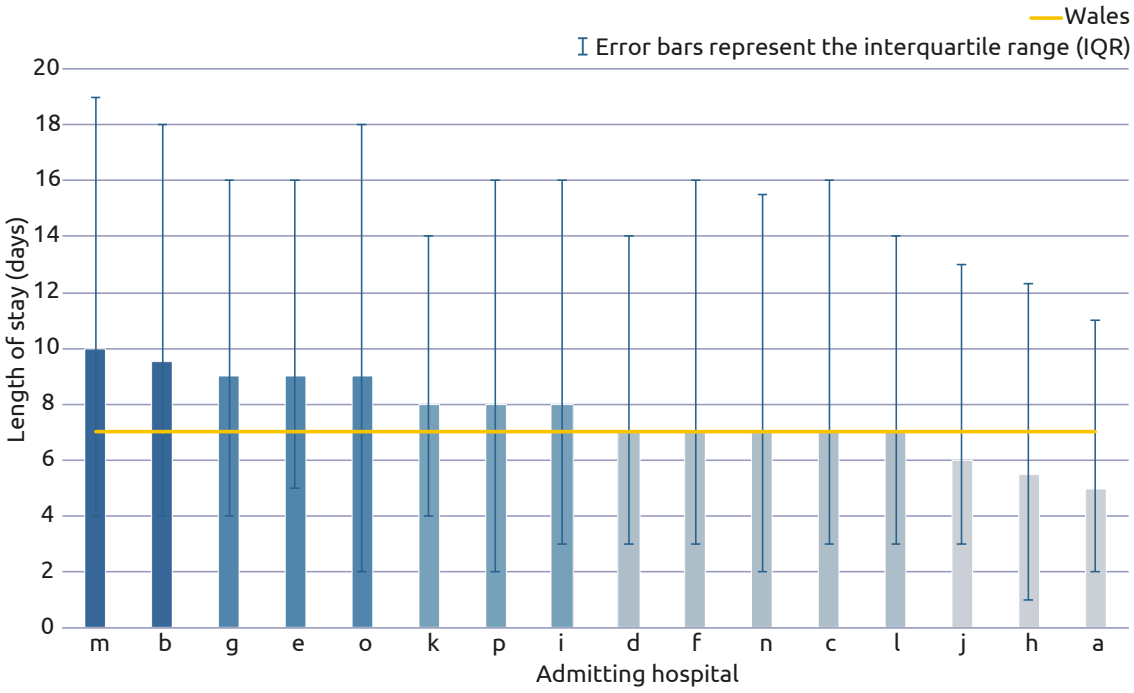
Map by admitting hospital and local authority of residence - 1 yr. 2017/18



By Admitting Hospital



Local Authority Area



Context

In the National Heart Failure Audit for 2016/17 the median length of stay (LOS) was 9 days for those admitted to Cardiology wards and 6 days for those in General Medicine. Those receiving specialist care also had a higher median LOS at 9 days compared to 4 days for patients not seeing specialists. LOS has remained static for Cardiology wards and those seeing specialists, but is becoming shorter for those in general medical wards and those not being reviewed by specialists.

The data presented in this Atlas is derived from admitted patient care data and does not differentiate between care provided by cardiologists, heart failure specialists and general medicine. It does however depend on a diagnosis of heart failure and appropriate coding.

As a result, interpreting the LOS must be undertaken with caution, however a longer length of stay for patients receiving specialist care might reflect referral of more severe cases for expert care, higher rates of implementation of disease modifying therapies and greater care to ensure that the patient is stable prior to discharge.

Magnitude of variation

For admitting hospitals in Wales, median length of stay (in days) for emergency heart failure admissions ranged from 4 to 10 days (2.5-fold variation).

Reasons for the degree of variation observed may include differences in:

- Prevalence and severity of heart failure in different local areas;
- Identification of people with suspected heart failure;
- Timely access to diagnostic tests;
- Access to acute heart failure teams and specialist care;
- Access to rehabilitation programmes specifically designed for people with heart failure;
- The level of care and support in the community to facilitate earlier discharge; and
- Competency for self-care among people with heart failure.

Options for action

In the National Heart Failure Audit 2016/17 the median age of patients was just over 80 years. For many of these elderly patients arriving in the emergency department acutely unwell the diagnosis of heart failure is not clear. Their symptoms frequently overlap with other conditions and this can lead to inappropriate treatments being given and poor outcomes. This patient group has a high degree of co-morbidities with 30% having diabetes and nearly 20% having COPD.

Access to a specialist heart failure team has been shown to be critical in improving patient outcomes, along with timely measurement of serum brain natriuretic peptide (BNP) followed by an echocardiogram if the BNP is positive. This is an important way to tell the difference between heart failure and, for example, pneumonia, and to ensure that the right treatment pathway is followed:

- All hospitals implement a national care pathway for acute heart failure patients to deliver quality standards (NICE, National Confidential Enquiry into Patient Outcome and Death (NCEPOD) recommendations);
- Improve access to acute Heart Failure teams to review patients in the emergency department and Acute Medical Units;
- Improve access to timely BNP and echocardiography;
- To improve access to specialist advice and treatment, including optimising medical and device treatments for patients with confirmed heart failure;
- To improve access of patients to community heart failure specialist nurses to improve people's ability to manage their heart failure symptoms; and
- To improve access to palliative care specialist teams.

Resources

NICOR: Heart failure audit[71].

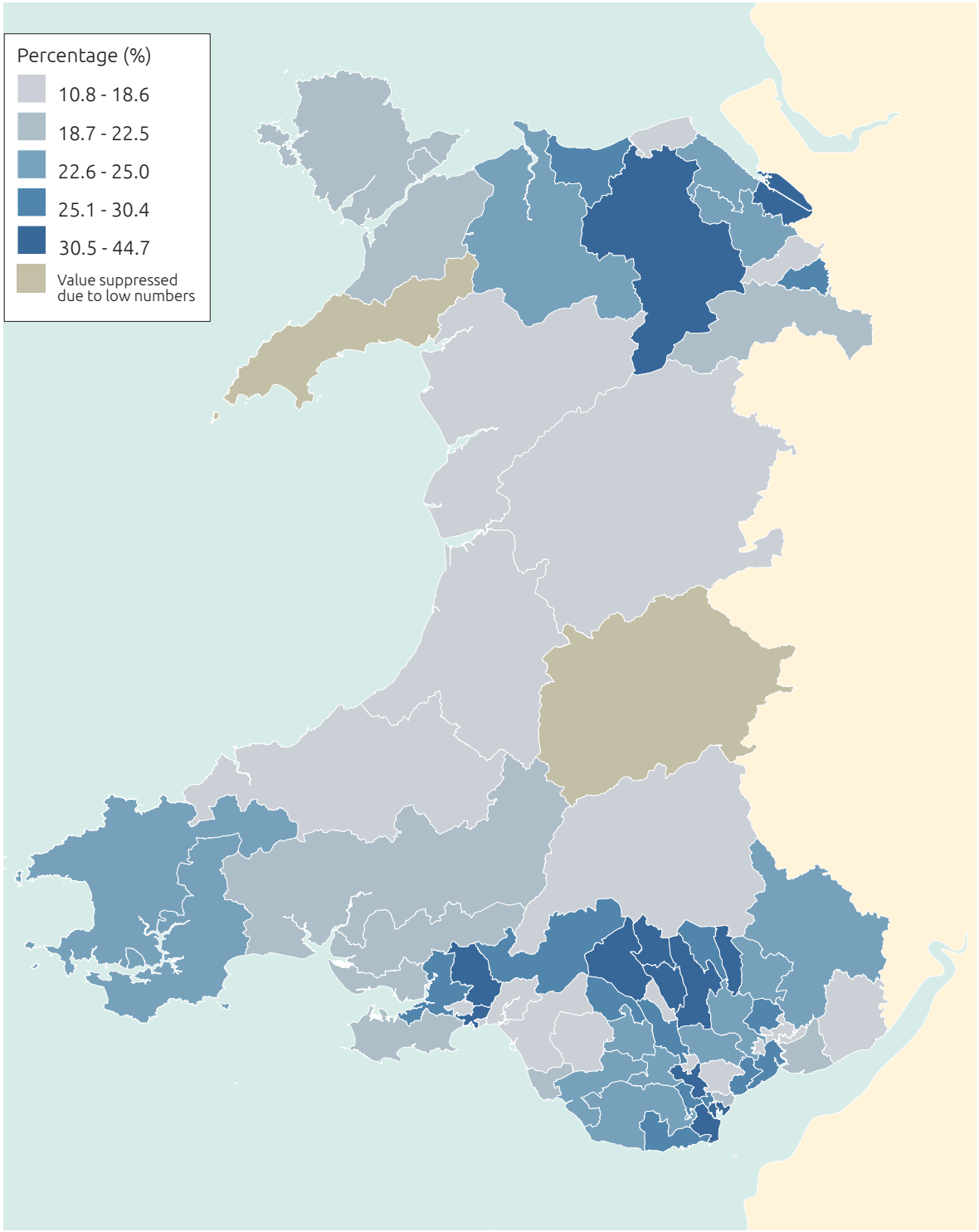
NICE Pathways:
Acute heart failure[72].
Chronic heart failure[73].

NICE Guidelines:
Acute heart failure: diagnosis and management (CG187)[74].
Chronic heart failure in adults: management (CG108)[75].

Quality Standards:
Acute heart failure (QS103)[76].
Chronic heart failure in adults (QS9)[77].

HF 3: Percentage of heart failure discharges with an emergency readmission for any heart condition within 30 days of discharge date

Map by Primary Care Cluster - 2 yr. combined 2016/17 – 2017/18



Context

The National Heart Failure Audit has consistently demonstrated an improved survival for patients cared for on cardiology wards rather than general medicine, with similar improvement seen if care was delivered by a heart failure specialist team compared to general medicine. The median length of stay (LOS) was 9 days for those admitted to Cardiology wards and 6 days for those in General Medicine. Those receiving specialist care also had a higher median LOS at 9 days compared to 4 days for patients not seeing specialists.

The rate of prescription of all three disease-modifying medicines in combination is higher in patients discharged from cardiology wards or if seen by a heart failure specialist, compared to patients discharged from medical wards who had not seen a specialist.

The longer length of stay for patients receiving specialist care might reflect referral of more severe cases for expert care, higher rates of implementation of disease modifying therapies and greater care to ensure that the patient is stable prior to discharge.

Magnitude of variation

For Primary Care Clusters in Wales, the percentage of heart failure discharges with an emergency readmission for any heart condition within 30 days of discharge date ranged from 4.4% to 22.1% (5.02-fold variation).

Reasons for the degree of variation may include:

- The level of service provision;
- The quality of reporting in different areas;
- Whether the patient was discharged from a cardiology ward or a heart failure specialist rather than a medical ward;
- Availability of a community heart failure nurse; and
- Ability to review patient within 2 weeks of discharge.

Options for action

Heart failure patients who have been discharged who then require an emergency readmission for any heart condition within 30 days of discharge is clearly undesirable for the patient and increases pressure on unscheduled care and cost to the NHS:

- All hospitals implement a national care pathway for acute heart failure patients to deliver quality standards (NICE, National Confidential Enquiry into Patient Outcome and Death (NCEPOD) recommendations);
- Improve access to Acute Heart Failure teams to review patients in the emergency department and Acute Medical Units;
- Improve access to timely BNP and echocardiography;
- People admitted to hospital because of heart failure should be discharged only when stable and should receive a clinical assessment from a member of a multidisciplinary heart failure team within 2 weeks of discharge;
- Patients admitted with heart failure should be cared for on a cardiology ward, or have heart failure specialist team involvement if on a medical ward;
- Mortality post-discharge is highly dependent upon the prescribing of each of three disease modifying drugs, with the greatest cumulative benefit seen in those who leave hospital on all three key modifying drugs;
- To improve access of patients to community heart failure specialist nurses to facilitate safe early discharge; and
- More focus on outcomes that matter most to patients with routine collection of Patient Reported Outcome Measures (PROMs).

Resources

NICOR: Heart failure audit[85].

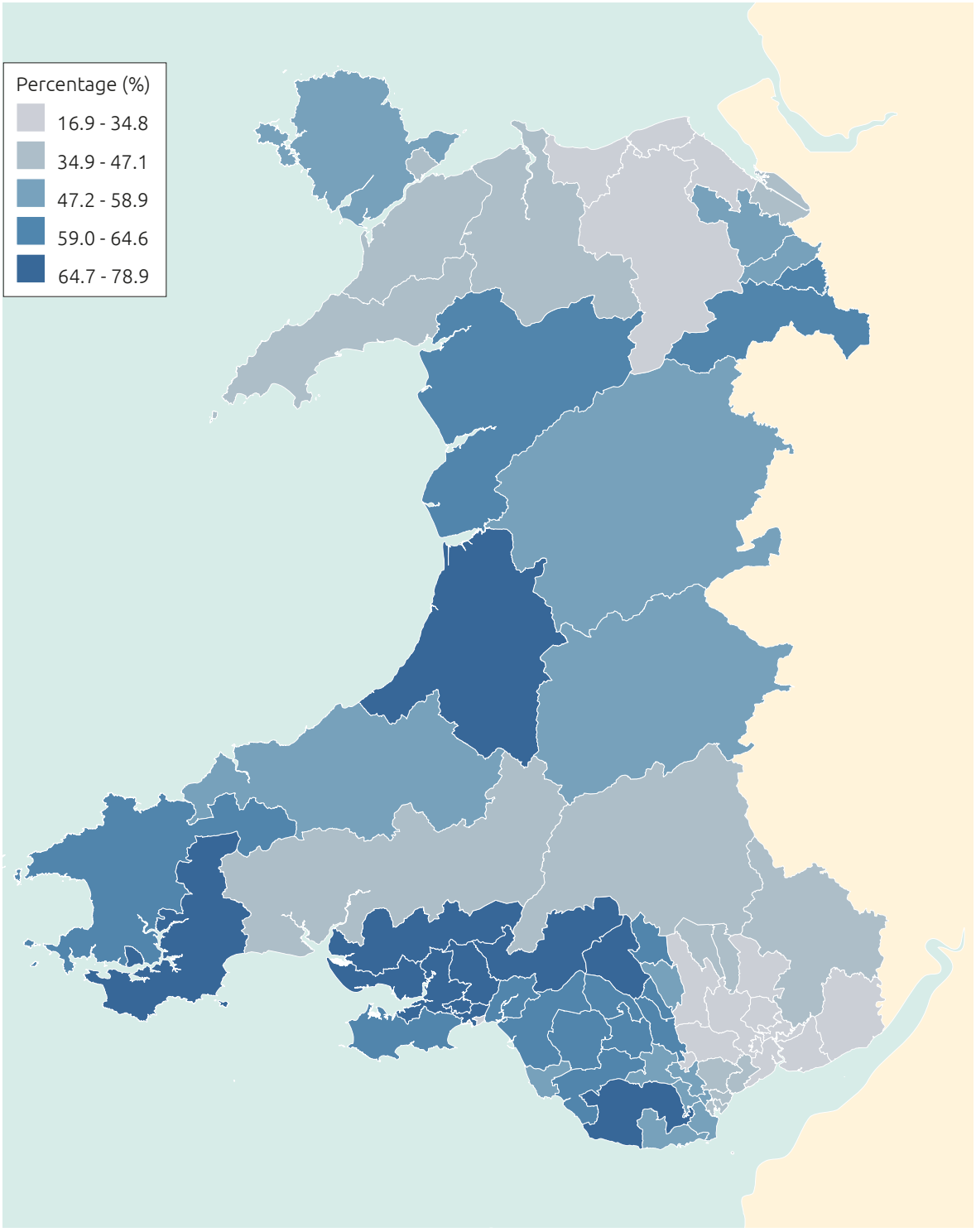
NICE Pathways:
Acute heart failure[86].
Chronic heart failure[87].

NICE Guidelines:
Acute heart failure: diagnosis and management (CG187) [88].
Chronic heart failure in adults: management (CG108)[89].

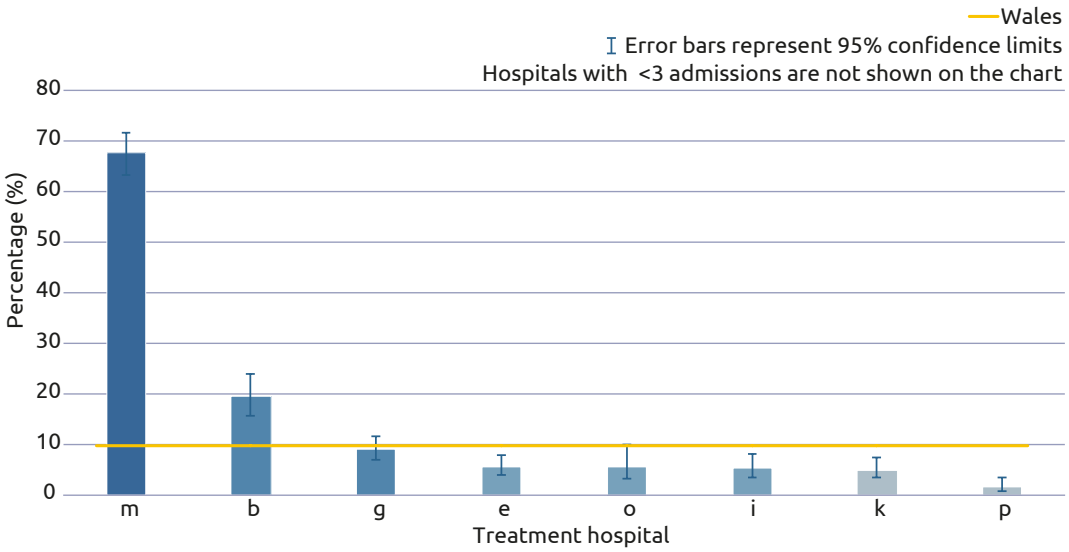
Quality Standards:
Acute heart failure (QS103)[90].
Chronic heart failure in adults (QS9)[91].

HF 4: Percentage of heart failure admissions where echocardiography activity was undertaken

Map by Primary Care Cluster - 2 yr. combined 2016/17 – 2017/18



Percentage of heart failure admissions where a B-type natriuretic peptide (BNP) or a N-terminal-pro-BNP (NT-pro-BNP) test was used for diagnosis of heart failure



Context

Patients admitted to hospital with suspected acute heart failure should have access to investigations to confirm the diagnosis and to guide treatment.

In people presenting with new suspected acute heart failure, a single measurement of serum natriuretic peptides (B type natriuretic peptide [BNP] or N terminal pro B type natriuretic peptide [NT proBNP]) can be used to rule out the diagnosis of heart failure if BNP is less than 100 ng/litre or NT proBNP is less than 300 ng/litre. If the levels are raised above these thresholds, then the recommendation is to perform transthoracic Doppler 2D echocardiography to establish the presence or absence of cardiac abnormalities.

In people presenting with new suspected acute heart failure, the recommendation is to consider performing transthoracic Doppler 2D echocardiography within 48 hours of admission to guide early specialist management.

In Wales between the years 2016-2018 only one hospital was routinely using natriuretic peptides in acute heart failure admissions.

Magnitude of variation

For Primary Care Clusters in Wales, the percentage of heart failure admissions where echocardiography activity was undertaken ranged from 16.9% to 78.9% (a 4.66-fold variation).

Reasons for the degree of variation may include:

- Access to acute heart failure teams and specialist care;
- Timely access to diagnostic tests; and
- Availability of serum natriuretic peptide measurement.

Options for action

Access to a specialist heart failure team has been shown to be critical in improving patient outcomes, along with timely measurement of serum brain natriuretic peptide (BNP) followed by an echocardiogram if the BNP is positive. This is an important way to tell the difference between heart failure and, for example, pneumonia, and to ensure that the right treatment pathway is followed:

- All hospitals implement a national care pathway for acute heart failure patients to deliver quality standards (NICE, NCEPOD recommendations);
- Improve access to acute Heart Failure teams to review patients in the emergency department and Acute Medical Units;
- Improve access to timely BNP and echocardiography; and
- Improve access to specialist advice and treatment.

Resources

NICOR: Heart failure audit[92].

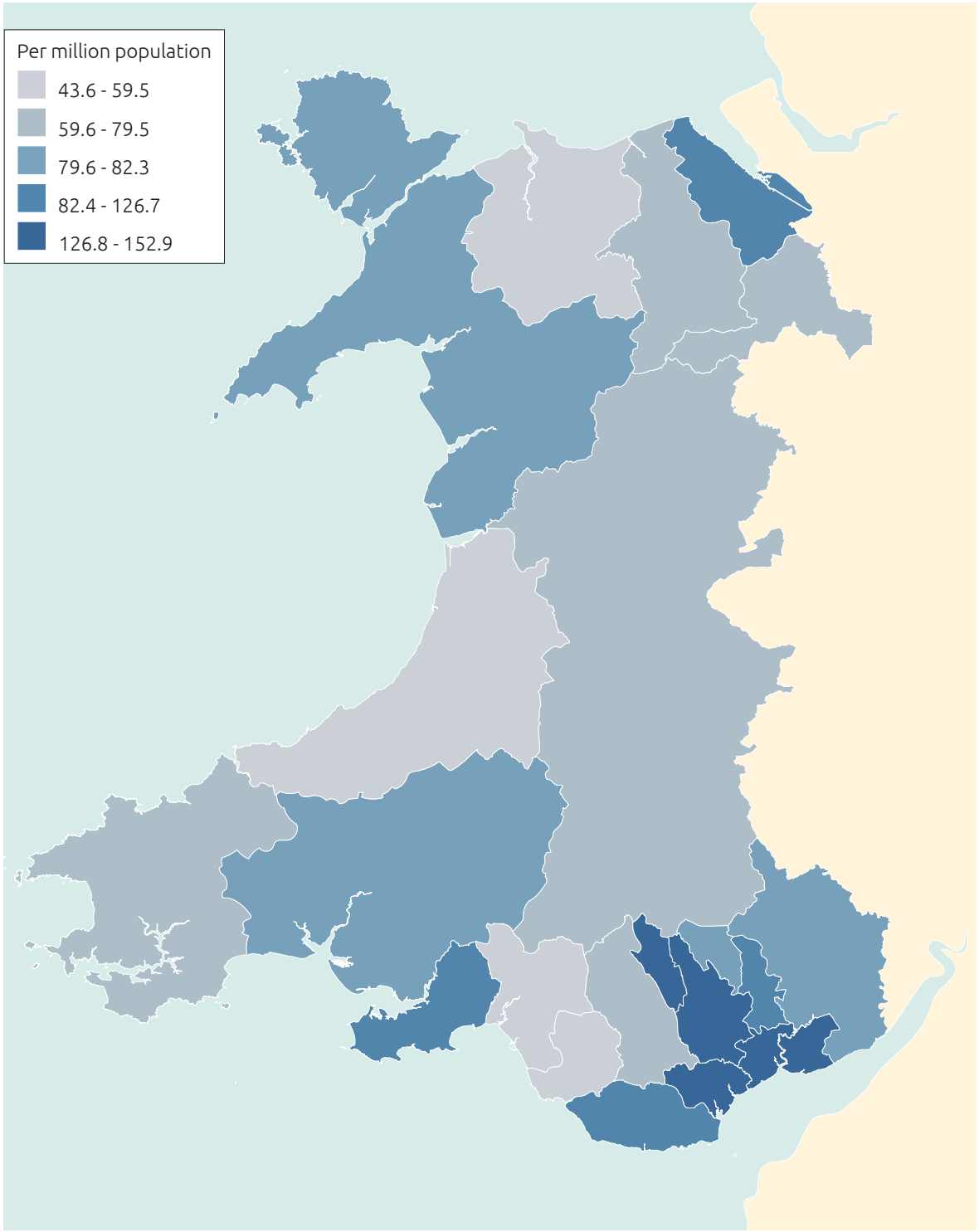
NICE Pathways:
Acute heart failure[93].
Chronic heart failure[94].

NICE Guidelines:
Acute heart failure: diagnosis and management (CG187)[95].
Chronic heart failure in adults: management (CG108)[96].

Quality Standards:
Acute heart failure (QS103)[97].
Chronic heart failure in adults (QS9)[98].

HF 5: Rate of implanted cardiac resynchronisation therapy (CRT) devices

Age Standardised Map by Local Authority per million population - 3 yr. combined 2015/16 - 2017/18



Context

In some heart failure patients with specific characteristics related to a combination of their symptoms, the degree of left ventricular impairment, and the presence of broad QRS (<140 ms) on their ECG, the left ventricular function may be improved by special pacemaker devices (cardiac re-synchronisation therapy or CRT). These devices may also be able to monitor the patient's heart rhythm and provide special pacing techniques or shock treatment should any life-threatening rhythms occur e.g. implantable cardioverter defibrillators (ICDs). Hence, these devices may be cardiac resynchronisation alone (CRT-P), or also have the ability to act as an implantable cardioverter defibrillator (CRT-D).

Most of the research for improved outcomes has been on patients with heart failure with reduced ejection fraction (HFrEF). Ongoing research is looking to see whether new treatments other than that aimed at the causative mechanism might improve outcomes for patients with heart failure with preserved ejection fraction (HFpEF).

Magnitude of variation

For Local Authorities in Wales, the rate of implanted cardiac resynchronisation therapy (CRT) devices ranged from 43.6 to 152.9 (a 3.50-fold variation).

Reasons for the degree of variation may include:

- Failure to identify patients who may benefit from CRT; and
- Access to heart failure specialists that implant CRT devices.

Options for action

Cardiac resynchronisation therapy (CRT) with defibrillator (CRT D) or CRT with pacing (CRT P) are recommended as treatment options for people with heart failure who have left ventricular dysfunction with a left ventricular ejection fraction (LVEF) of 35% or less (according to NYHA class, QRS duration and presence of LBBB):

- Improve identification of patients who may benefit from CRT; and
- Access to heart failure specialists that implant CRT devices.

Resources

NICOR: Heart Failure Audit[99].

NICE Pathways: Acute Heart Failure[100].

NICE Pathways: Chronic heart Failure[101].

NICE Guidelines: Acute Heart Failure: diagnosis and management (CG187)[102].

NICE Guidelines: Chronic Heart Failure in adults: management (CG108)[103].

NICE Quality Standards: Acute Heart Failure (QS103)[104].

NICE Quality Standards: Chronic Heart Failure in adults (QS9)[105].

NICE Guidelines: Implantable cardioverter defibrillators and cardiac resynchronisation therapy for arrhythmias and heart failure. Technology appraisal guidance (TA314)

- https://www.nice.org.uk/guidance/ta314

HF Financial Impact: Heart Failure Spells that had an Emergency Readmission for any Heart Condition within 30 days of Discharge Date

Welsh Resident Analysis 2016/17

Summary Table Heart Failure Spells within 16/17				**Hospital Spells with Readmission**	**Hospital Spells without Readmission**	**Hospital Spells with Readmission**	**Hospital Spells without Readmission**
Resident LHB	**Hospital Spells with Readmission**	**Hospital Spells**	**Readmission Rate**	**Average LoS**		**Average Spell Cost**	
Aneurin Bevan	105	948	11.1	6.4	10.3	£2,453	£4,061
Abertawe Bro Morgannwg	73	733	10.0	13.6	14.5	£4,989	£5,754
Betsi Cadwaladr	96	956	10.0	10.6	11.7	£4,539	£4,951
Cwm Taf	67	453	14.8	8.8	10.8	£3,980	£4,680
Cardiff and Vale	74	556	13.3	8.3	13.6	£2,927	£4,567
Hywel Dda	59	634	9.3	10.1	12.3	£4,323	£5,882
Powys	16	208	7.7	7.8	12.0	£3,812	£5,905
Grand Total	**490**	**4,488**	**-**	**-**	**-**	**£27,023**	**£35,800**
Total Average	**70**	**641**	**10.9**	**9.4**	**12.1**	**£3,860**	**£5,114**

Table 7

Table 7 compares the number of 'Hospital Spells' where patients were admitted for heart failure and had an emergency readmission for any heart condition within 30 days of the discharge date. This was against those that were admitted for heart failure and did not require a readmission. It also shows the total number of spells and the calculated readmission rate per resident cohort.

Average length of stays are compared between the two cohorts of HF admissions (those with and without readmissions). The average spell costs are also compared.

The data tends to suggest a relationship between length of stay and the likelihood of having a readmission.

The data is an analysis of Welsh Residents and so will include spells for Welsh Residents treated in Wales and also Welsh Residents treated in England according to the information that has been received from NHS digital. English Residents treated in Wales are not included here.

This table does not contain information relating to the 'readmission' spells. Combining length of stay, patient outcome and cost of the spells requiring resubmission and the subsequent 'readmission' spell could give an insight to an available opportunity. Outcome data is not available at present, but this would also significantly add to the analysis.

When assessing the opportunity, please bear in mind that "costs per spell' are "fully absorbed" and as they include an element of fixed costs (e.g. estates, rates), semi fixed costs (most staff costs), and variable costs (e.g. drugs, prosthetics), fully absorbed costs are not fully releasable.

11
Atrial Fibrillation (AF)

Despite good progress in the management of patients with atrial fibrillation (AF), this arrhythmia remains one of the major causes of stroke, heart failure, sudden death, and cardiovascular morbidity in the world. Furthermore, the number of patients with AF is predicted to rise steeply in the coming years as the elderly population increases.

Atrial Fibrillation (AF) can cause symptoms such as: palpitations (awareness of the heartbeat), feeling faint at times, being breathless, being tired or less able to exercise. Some people with atrial fibrillation – especially older people – do not have any symptoms at all (known as silent AF). Also, over time, some people get used to being in atrial fibrillation, so their symptoms become less troublesome. AF may be discovered during a routine medical check whilst checking a pulse. Sometimes atrial fibrillation is diagnosed after a person goes to see their doctor because they can feel their heart beating fast or with an irregular rhythm. Confirmation that the rhythm is AF is obtained from an electrocardiogram.

There are three types of atrial fibrillation:

- Paroxysmal atrial fibrillation is atrial fibrillation that comes and goes. It usually lasts for less than two days and can last for up to seven days, but it is not there all the time. The heart goes back to a normal rhythm on its own in between episodes, without any medical treatment;
- Persistent atrial fibrillation lasts longer than seven days at a time and usually needs treatment with medicines or with a procedure called cardioversion; and
- Permanent atrial fibrillation is there all the time, and the heart never returns to a normal sinus rhythm.

Atrial Fibrillation can occur at any age but there is a greater prevalence in older persons and in patients with conditions such as hypertension, heart failure, coronary artery disease, valvular heart disease, obesity, diabetes mellitus, or chronic kidney disease. The increase in AF prevalence can be attributed both to better detection of silent AF, alongside increasing age and conditions predisposing to AF.

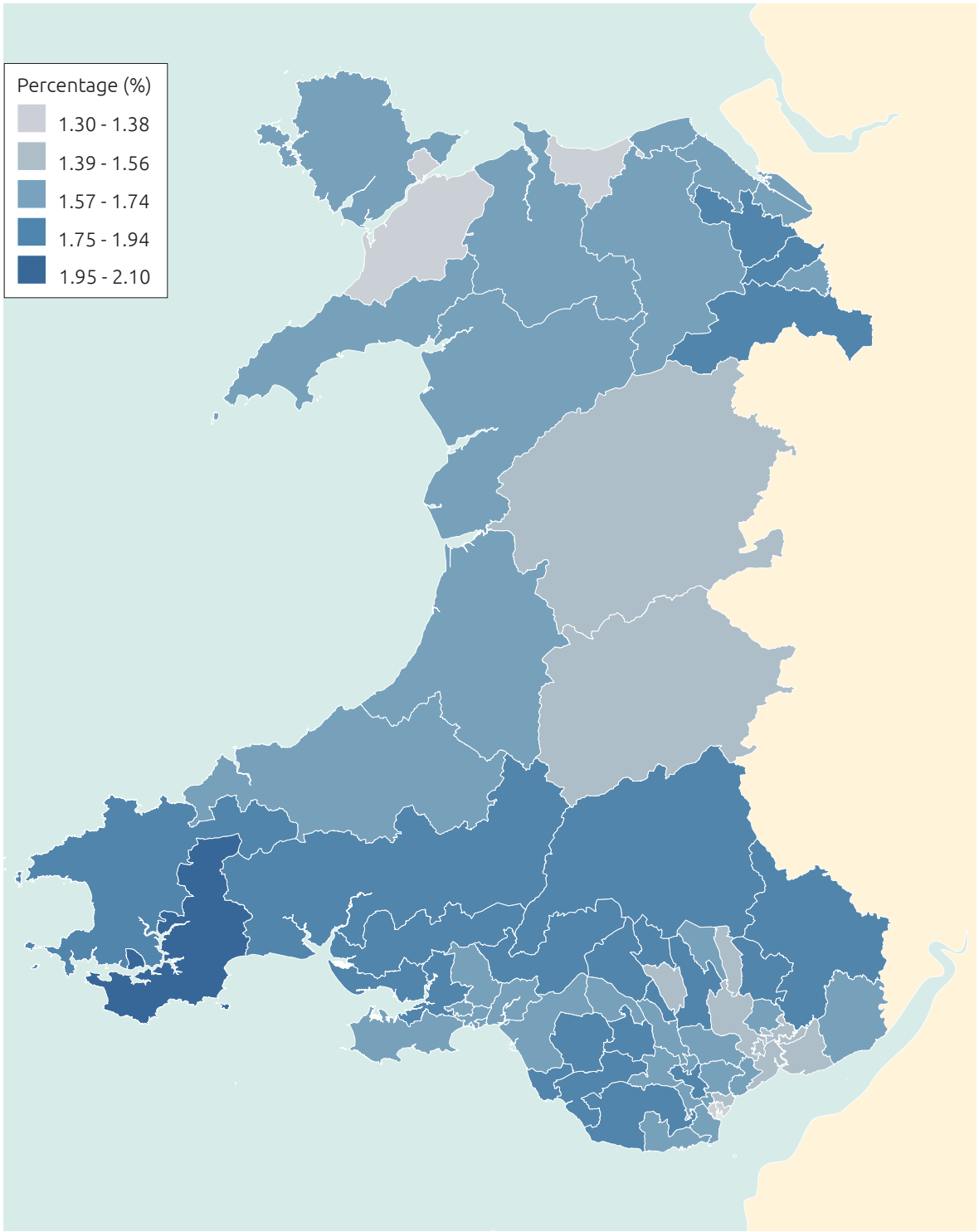
Atrial Fibrillation is independently associated with a two-fold increased risk of all-cause mortality in women and a 1.5-fold increase in men. Death due to stroke can largely be mitigated by anticoagulation, while other cardiovascular deaths, for example due to heart failure and sudden death, remain common even in AF patients treated according to the current evidence base.

Atrial Fibrillation is also associated with increased morbidity, such as heart failure and stroke. It is estimated that 20–30% of all strokes are due to AF, with a growing number of patients with stroke diagnosed with 'silent' paroxysmal AF. It is a major cause of hospital admission, 10–40% of AF patients are hospitalised every year. Quality of life is impaired in AF patients independent of other cardiovascular conditions. Left ventricular dysfunction and heart failure is found in 20–30% of all AF patients. AF may cause or aggravate LV dysfunction in many AF patients, while others have completely preserved LV function despite long-standing AF. Cognitive decline and vascular dementia can develop even in anticoagulated AF patients. Brain white matter lesions are more common in AF patients than in patients without AF.

Hence the detection and treatment of AF is an important healthcare issue.

AF 1: Prevalence of atrial fibrillation

Age Standardised percentage by Primary Care Cluster – 1 yr. 2017/18



Context

Atrial fibrillation (AF) remains one of the major causes of stroke, heart failure, sudden death, and cardiovascular morbidity.

AF can occur at any age but there is a greater prevalence in older persons and in patients with conditions such as hypertension, heart failure, coronary artery disease (CHD), valvular heart disease, obesity, diabetes mellitus, or chronic kidney disease. The increase in AF prevalence can be attributed both to better detection of silent AF, alongside increasing age of the population and conditions predisposing to AF.

Atrial fibrillation is usually a silent condition although sometimes people have symptoms of palpitations, shortness of breath or reduced ability to exercise. The pulse is irregular in AF and it is often diagnosed when an irregular pulse is noticed by the individual or a health professional. The diagnosis of AF requires rhythm documentation using an electrocardiogram (ECG) showing the typical pattern of AF: absolutely irregular RR intervals and no discernible, distinct P waves.

The number of patients with AF is predicted to rise steeply in the coming years as the population age increases.

Magnitude of variation

For Primary Care Clusters in Wales, the prevalence of atrial fibrillation ranged from 1.3 % to 2.1% (1.61-fold variation).

There is considerable geographical variation in the prevalence of AF in Wales, both between and within communities. Reasons for the degree of variation may include differences in:

- The identification of people with AF in different local areas;
- The prevalence of risk factors in different local areas;
- Levels of deprivation in different areas; and
- The quality of reporting in different areas.

Options for action

Given that AF remains one of the major causes of stroke, heart failure, sudden death, and cardiovascular morbidity, its detection and treatment are of major importance.

The simplest way to detect heart rhythm disorders like AF is through a simple pulse check. Increase detection of AF through:

- Routine pulse checks in doctors' surgeries and during flu clinics to detect AF in the most at risk groups in the community;
- To improve detection of silent AF, opportunistic screening for AF in all patients ≥ 65 years by taking the pulse;
- Education for the primary care nurses and physicians, including understanding of the disease and related risks, and empowering of the patient in his or her disease management;
- Systematic screening using automated BP monitors that detect irregular pulse;
- Use of hand held ECG monitors;
- Use of smartphone apps;
- Use of implanted devices eg pacemakers/ICD – check for atrial high rate events (AHRE) to direct further investigation for AF; and
- Use Professional Patient Organisations (PPO's) such as British Heart Foundation, Arrhythmia Alliance and AF Association to raise awareness of AF and provide support, deliver information and education.

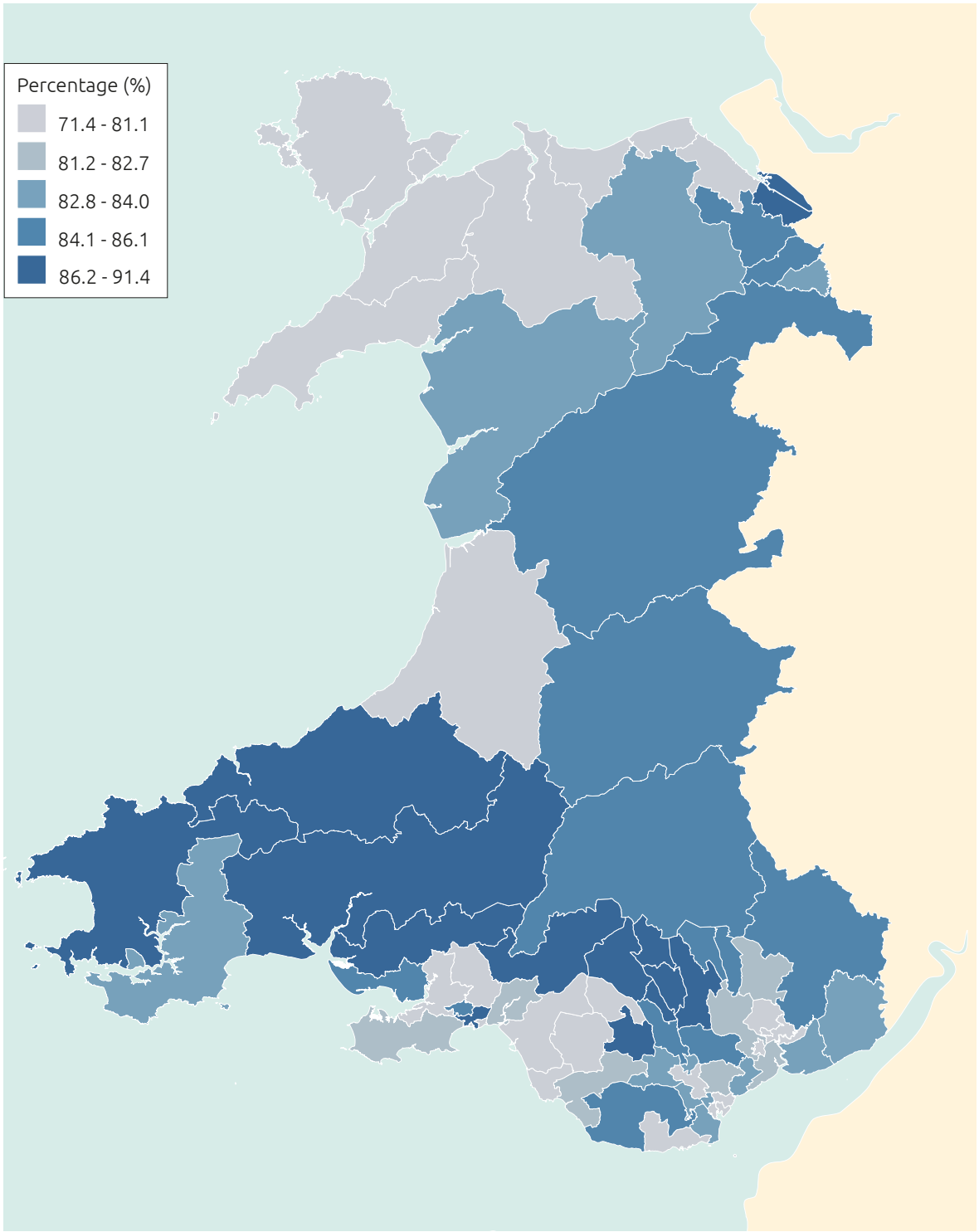
Resources

NICE Guidelines: Acute Heart Failure: diagnosis and management (CG180)[106].

European Society of Cardiology Guidelines: Management of AF developed in collaboration with EACTS[107].

AF 2: Percentage of AF patients treated with anti-coagulation drug therapy

Percentage by Primary Care Cluster – 1 yr. 2017/18



Context

Atrial fibrillation (AF) is a type of irregular heartbeat, which is more common in older people and in people with heart disease or previous high blood pressure.

People that have AF are at significantly higher risk of stroke: AF is the cause of one in five strokes, and as well as being a major cause of stroke, AF tends to lead to more severe strokes than strokes from other causes, with worse longer-term outcomes and a higher risk of death. There is good evidence that if people with AF receive anticoagulation with warfarin or similar drugs it can reduce the risk of stroke by two-thirds. Aspirin is no longer recommended as suitable treatment to reduce the risk of stroke in people with AF.

The data presented is from Primary Care Clusters and reflects patients in GP practices with a CHADS2Vasc score of ≥2 who have a diagnosis of AF and who are on anticoagulation treatment (warfarin or DOAC).

Magnitude of variation

For Primary Care Clusters in Wales, the percentage of AF patients treated with anti-coagulation drug therapy ranged from 71.4 – 91.4% (a 1.28-fold variation).

There is considerable geographical variation in the percentage of AF patients treated with anti-coagulation drug therapy in Wales. Reasons for the degree of variation may include differences in:

- General Practices' ability to identify patients with atrial fibrillation and their current anticoagulant medication.

Options for action

The principal aim of treating AF is to ensure that people receive the best management to help prevent harmful complications, in particular stroke and bleeding. The Cardiac Network and Stroke Network in Wales have identified AF and stroke prevention as key areas for maintaining healthcare quality and improvements. A key feature of both is the early identification of patients at risk of thromboembolic events and the prompt initiation of an oral anticoagulant as this has been shown to reduce the risk of stroke by 2/3rds:

- NHS Wales Informatics Service has developed a software module (Audit+) to enable General Practices' to identify patients with atrial fibrillation and their current anticoagulant medication;
- Cardiac and Stroke networks work together with Primary Care Clusters to identify and review known AF patients currently not anticoagulated who would benefit from anticoagulation;
- Identify those AF patients on warfarin who have a total time in therapeutic range < 60% and switch them to DOAC agents;
- Improve detection of AF in primary care by opportunistic screening for AF in all patients ≥ 65 years by taking the pulse; and
- Develop systematic screening utilising technology e.g. automated BP monitors that record irregular rhythm; hand held ECG devices, use of smartphone apps.

Resources

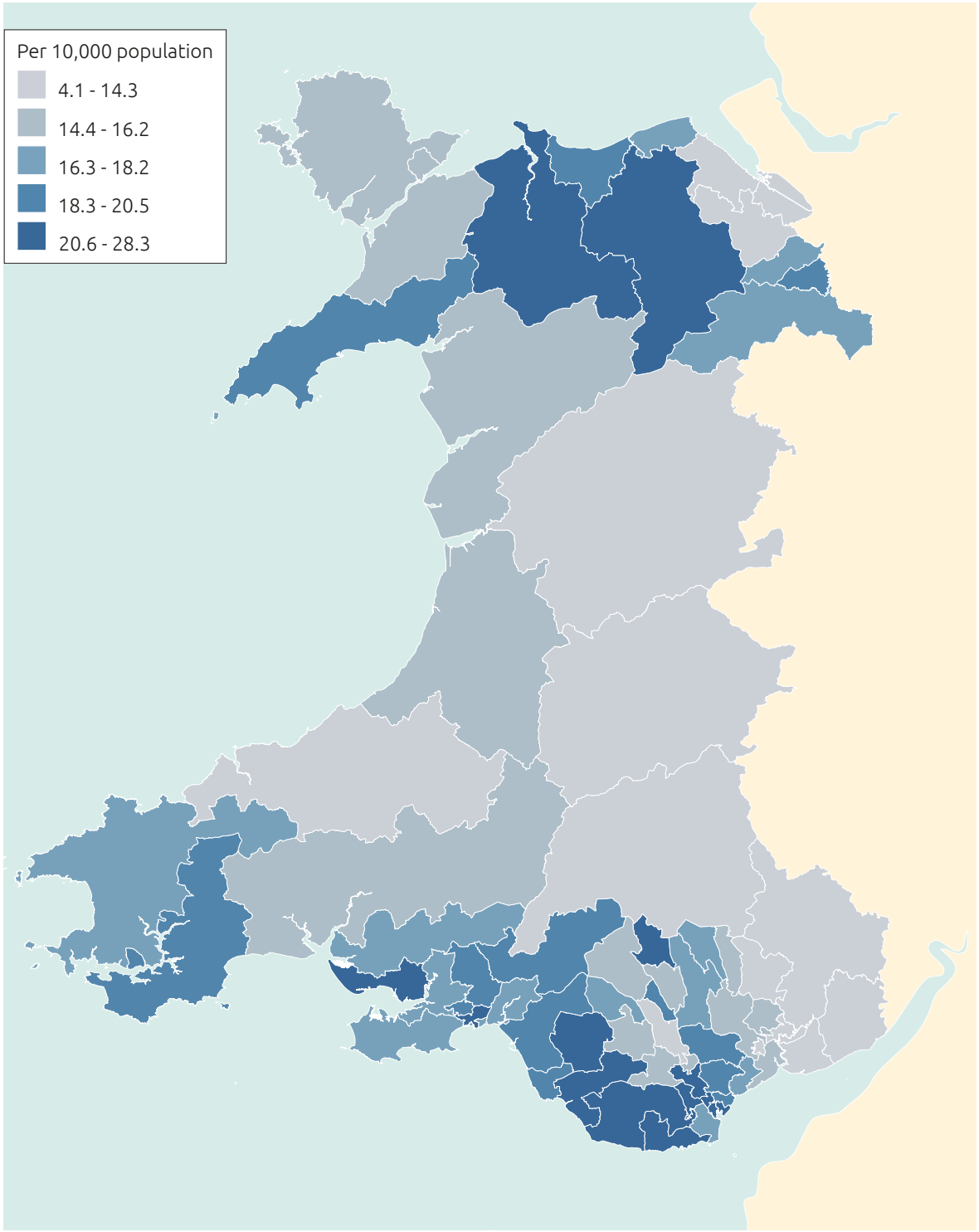
NICE Guidelines: Acute Heart Failure: diagnosis and management (CG180)[108].

ESC Guidelines: Management of AF developed in collaboration with EACTS[109].

Wales Cardiac Network AF Workplan[110].

AF 3: Rate of emergency stroke admissions

Age standardised map by Primary Care Cluster per 10,000 population – 1 yr. 2017/18



Context

A stroke happens when the blood supply to part of the brain is cut off, resulting in brain cell death. There are two main types of stroke:

i) Ischaemic strokes are caused by blockages which cut off the blood supply to parts of the brain. Blockages can be caused by a blood clot or atheromatous plaques and can occur in a brain artery or a small blood vessel deep within the brain. Without blood, brain cells begin to die. This damage can have different effects, depending on where it happens in the brain.

ii) Haemorrhagic strokes are caused when a blood vessel bursts within or on the surface of the brain. Haemorrhagic strokes are generally more severe and are associated with a considerably higher risk of dying within the first three months and beyond, when compared to ischaemic strokes. These are also referred to as subarachnoid haemorrhage (bleeding on the surface of the brain) or intracerebral haemorrhage (bleeding within the brain).

AF is commonly associated with ischaemic strokes due to the increased risk of blood clots forming in the left atrium of the heart, becoming dislodged and travelling through the circulation to block an artery in the brain causing a stroke.

Magnitude of variation

For Primary Care Clusters in Wales, the rate of emergency stroke admissions ranged from 1.34.1 % to 28.3% (6.9-fold variation).

There is considerable geographical variation in the prevalence of AF in Wales, both between and within communities. Reasons for the degree of variation may include differences in:

- The prevalence of people with AF in different local areas;
- Differences in the percentage of AF patients treated with anti-coagulation drug therapy;
- Levels of deprivation in different areas; and
- The quality of reporting in different areas.

Options for action

The Cardiac Network and Stroke Network in Wales are committed to working together and have identified AF and stroke prevention as key areas for maintaining healthcare quality and improvements:

- Target treatment for hypertension including behavioural risk factors – such as dietary salt intake, physical inactivity, being overweight, smoking and excess alcohol consumption;
- The early identification of patients with AF and at risk of thromboembolic events and the prompt initiation of an oral anticoagulant as this has been shown to reduce the risk of stroke by 2/3rds;
- The NHS Wales Informatics Services has developed a new software module and encourages GP practices to use Audit + for the identification of patients with atrial fibrillation and their current anticoagulant medication;
- Cardiac and Stroke networks work together with Primary Care Clusters to identify and review known AF patients currently not anticoagulated who would benefit from anticoagulation;
- Identify those AF patients on warfarin who have a total time in therapeutic range <60% and switch them to DOAC agents;
- Improve detection of AF in primary care by opportunistic screening for AF in all patients ≥ 65 years by taking the pulse; and
- Develop systematic screening utilising technology e.g. automated BP monitors that record irregular rhythm; hand held ECG devices; use of smartphone apps.

Resources

NICE Guidelines: Hypertension in adults: diagnostic and management (CG127)[111].

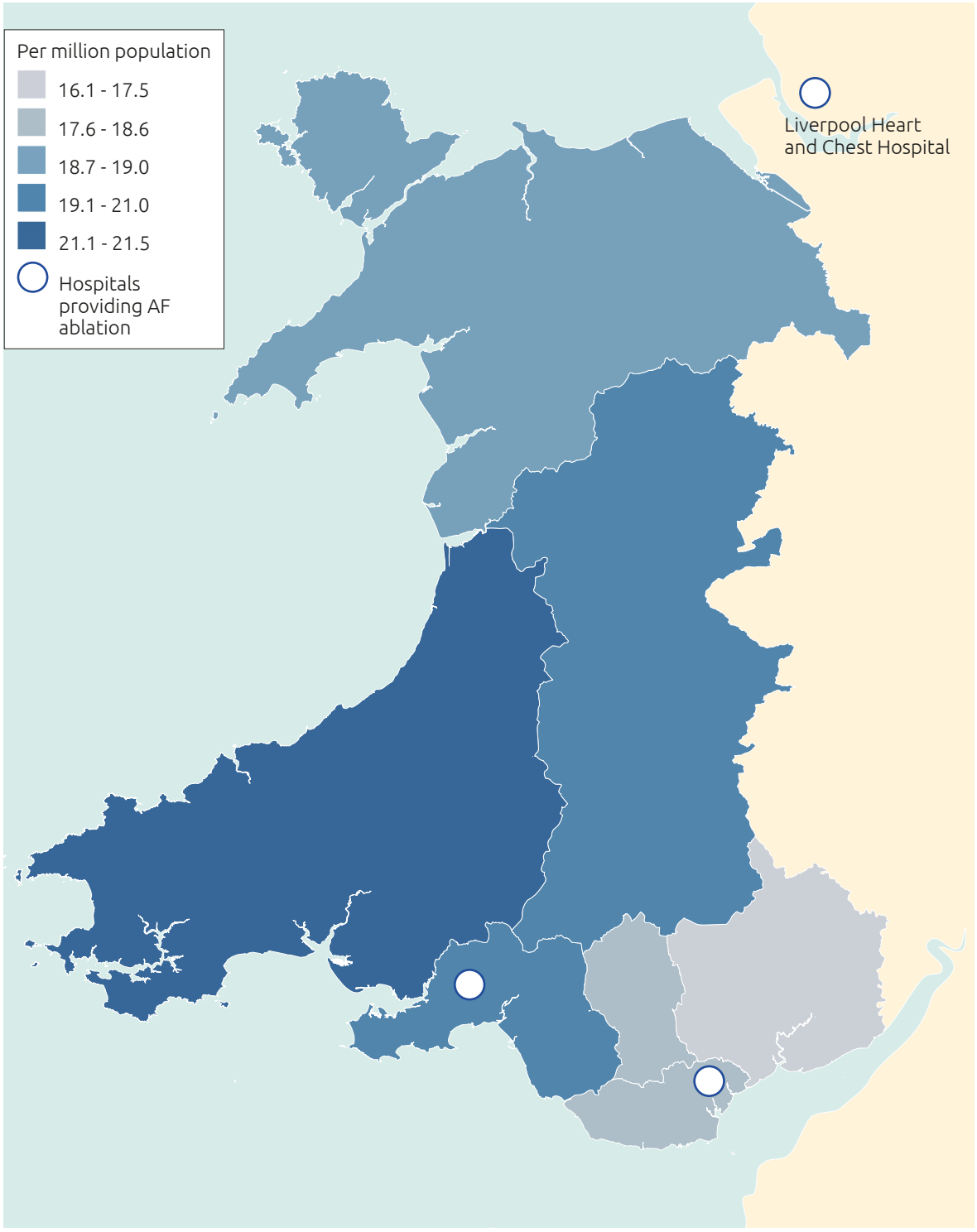
NICE Guidelines: Acute heart failure: diagnosis and management (CG180)[112].

ESC Guidelines: Management of AF developed in collaboration with EACTS[113].

Wales Cardiac Network AF Workplan[114].

AF 4: Rate of atrial fibrillation (AF) ablation procedures

Age standardised map by local health board per million population - 3 yr. combined 2015/16 - 2017/18



Context

Atrial fibrillation (AF) ablation is now the most common ablation procedure in the UK, comprising two thirds of all catheter ablation procedures. Catheter ablation is a technique for treating (and usually curing) heart rhythm disturbances (arrhythmias), using fine, flexible electrodes threaded into the heart via veins. These are used to make small burns (either with radio-frequency energy to produce heat or via cryotherapy to freeze tissue) that eliminate the abnormal tissue responsible for the arrhythmias.

AF ablation is amongst the newest and most complex procedures; due to its complexity, it is more time consuming and demanding of resources.

Most ablation procedures, and especially AF ablation, are performed for the improvement of symptoms. Hence AF ablation is often indicated when medication is ineffective or poorly tolerated.

There is widespread variation in ablation rates within Wales and this is also apparent through the UK. The ablation rates in Wales are low when compared to the UK as a whole, but it should be noted that ablation rates in the UK are just below the average for Europe.

Magnitude of variation

For Health Boards in Wales, the rate of AF ablation procedures ranged from 16.1 – 21.5 (0.13-fold variation).

There is considerable geographical variation in the rate of AF ablation procedures in Wales. Reasons for the degree of variation may include differences in:

- Identification of people with AF, and referral rates for AF ablation; and
- Access to local heart rhythm specialists and tertiary specialist care.

Options for action

Overall the AF ablation rates in Wales are low, the service was first established in University Hospital Wales and latterly in Morriston Cardiac Centre, Swansea. North Wales patients are treated in Liverpool Heart and Chest Hospital.

For numbers to increase the service within Wales needs to expand capacity to perform AF ablation, and referral rates need to increase:

- Increase the numbers of heart rhythm specialists in district general hospitals; and
- Increase access to AF ablation in specialist centres.

Resources

NICOR: National Audit of Cardiac Ablation: 2013-14[115].

AF Financial Impact: Stroke Summary

Stroke Admissions - Welsh Resident Analysis (2016/17)

Resident Local Health Board	Hospital Spells	Provider Spells	Total Bed days	Total Costs	Hosp. LoS	Prov. LoS	Hosp. Cost	Prov. Cost
Abertawe Bro Morgannwg	1,013	1,010	11,894	£5,470,237	11.7	11.8	£5,400	£5,416
Aneurin Bevan	950	623	8,069	£3,843,832	8.5	13.0	£4,046	£6,170
Betsi Cadwaladr	1,395	1,245	22,632	£9,045,577	16.2	18.2	£6,484	£7,266
Cardiff and Vale	855	665	18,542	£6,451,908	21.7	27.9	£7,546	£9,702
Cwm Taf	573	563	5,686	£2,944,937	9.9	10.1	£5,140	£5,231
Hywel Dda	786	742	15,650	£7,229,376	19.9	21.1	£9,198	£9,743
Powys	295	292	3,222	£1,704,142	10.9	11.0	£5,777	£5,836
Grand Total	**5,867**	**5,140**	**85,695**	**£36,690,009**	**-**	**-**	**£43,591**	**£49,364**
Total Average	**838**	**734**	**12,242**	**£5,241,429**	**14.1**	**16.2**	**£6,227**	**£7,052**

Table 8

Table 8 shows the number of 'Hospital Spells' (Hosp) and 'Provider Spells' (Prov) and a comparison between average length of stay and cost per spell.

The difference between the two calculations will have a greater impact for LHBs that transfer patients more between sites (perhaps where acute and rehab services aren't co-located).

Welsh Resident Analysis - the data includes spells for Welsh residents treated in England according to the information that has been received from NHS digital. English residents treated in Wales are not included here.

Outcome data is not available at present, but this would also significantly add to the analysis.

When assessing the opportunity, please bear in mind that "costs per spell' are "fully absorbed" rate, and as they include an element of fixed costs (e.g. estates, rates), semi fixed costs (most staff costs), and variable costs (e.g. drugs, prosthetics), fully absorbed costs are not fully releasable.

12
Value-Based and Prudent Healthcare

Healthcare that fits the needs and circumstances of patients and avoids wasteful care

A value-based healthcare approach encourages us to allocate resources for the greatest positive impact on outcomes for our patients. This cannot be done by a hospital or primary care alone, but requires collaboration across the whole system to ensure that the highest value interventions are maximised from prevention through to end of life care.

In order to do this it is necessary to avoid thinking about care delivery in terms of primary or secondary care services, but instead move towards looking at the population need and then deciding the best way to meet it. This also requires us to use data including variation, outcome and costing data to inform decision making.

The Value-Based Healthcare Programme in Wales is setting out to support clinical teams to capture, analyse and utilise outcome data to support not only direct care but also to identify patient need and possible solutions to meet that need. This work is already well advanced in heart failure and will progress over time to other areas of cardiology. Therefore we will be building a data-driven approach to decision-making through collecting information on the outcomes that really matter to patients. This approach is underpinned by the principles of Prudent Healthcare.

The NHS in Wales is facing the twin challenges of rising costs and increasing demand, while continuing to improve the quality of care.

Informed by the work of the Bevan Commission and others around the world, the NHS in Wales is taking on the principles of prudent healthcare as it responds to these challenges. Prudent healthcare puts NHS Wales at the front of a growing international effort to get greater value from healthcare systems for patients.

Any service or individual providing a service should:

- Achieve health and wellbeing with the public, patients and professionals as equal partners through co-production;
- Care for those with the greatest health need first, making the most effective use of all skills and resources;
- Do only what is needed, no more, no less; and do no harm; and
- Reduce inappropriate variation using evidence based practices consistently and transparently.

Prudent healthcare aims to create a patient-centred system. An NHS based on prudent healthcare principles ensures patients receive the most appropriate agreed treatments. This will reflect the contribution individuals can make to their own health and wellbeing.

This NHS Wales Cardiovascular Atlas of Variation provides the current picture of cardiovascular services in Wales, and by acting on its findings we should be in a position to deliver value-based, prudent cardiovascular care in Wales.

13
Summary of Key Points

Key Points:

- The cardiovascular atlas of variation is aimed at starting the discussions around what may be causing unwarranted variation, which will help inform a value-based cardiovascular care programme for Wales;
- The gap between supply and demand of health services, as well as unwarranted variation, is having an impact on the efficiency and value of health services;
- Identifying unwarranted variation in cardiovascular care can help ensure that resources are allocated to where there is greatest value;
- 22 indicators were identified across four areas:
  - Risk Factors;
  - Acute Coronary Syndrome;
  - Heart Failure; and
  - Atrial Fibrillation.
- These indicators have been displayed in map form, which shows the degree of variation across different geographies; and
- Along with each map is a brief interpretation of what might explain the variation in each scenario, with suggestions of evidence-based resources to address these issues.

14
Glossary of Terms

Ablation - elimination or removal. A therapeutic method that physically destroys the heart tissue that causes or contributes to some types of fast heartbeats (tachycardia).

ACS - Acute coronary syndrome (ACS) is a syndrome (set of signs and symptoms) due to decreased blood flow in the coronary arteries such that part of the heart muscle is unable to function properly or dies.

Angina - recurring chest pain or discomfort that happens when some part of the heart does not receive enough blood.

Angiography - an x-ray that uses dye injected into arteries so that blood circulation can be studied.

Angioplasty - a non-surgical, invasive catheterisation procedure where a narrowed portion of a blood vessel, e.g., coarctation of the aorta, coronary artery stenosis, is enlarged by inflating a balloon that straddles the narrowed segment.

Anticoagulant - a medication that keeps blood from clotting.

Arrhythmia - an abnormal heartbeat.

Arteriosclerosis - commonly called hardening of the arteries also known as atherosclerosis. A variety of conditions caused by fatty or calcium deposits in the artery walls causing them to thicken.

Artery - a blood vessel that carries oxygenated blood away from the heart to the body.

Atrial Fibrillation - Atrial fibrillation is a heart condition that causes an irregular and often abnormally fast heart rate.

Atheroma - a build-up of fatty deposits in wall of an artery which may result in narrowing of the vessel

Atherosclerosis - a type of arteriosclerosis caused by a build-up of plaque in the inner lining of an artery.

Atrium - one of two upper chambers in the heart.

Balloon Angioplasty - An invasive catheterisation procedure where a narrowed portion of a blood vessel e.g., coarctation of the aorta, coronary artery stenosis, is enlarged by inflating a balloon that straddles the narrowed segment.

Beta Blocker - A drug that slows heart rate, lowers blood pressure, controls angina, helps regulate arrhythmias, and protects patients with prior heart attacks from future heart attacks. It increases the time that the heart can fill with blood, and therefore decreases the amount of work the heart needs to do.

Blood Pressure - the force or pressure exerted by the heart when pumping blood; also, the pressure of blood in the arteries.

Bradycardia - abnormally slow heartbeat.

Cardiac - pertaining to the heart.

Cardiac Arrest - the stopping of heartbeat.

Cardiac Catheterisation - a diagnostic, invasive procedure in which a tiny, hollow tube (catheter) is advanced from a blood vessel in the wrist or groin through the aorta into the heart chambers using X-Ray guidance in order to image the heart and blood vessels. In addition, X-ray pictures (angiograms) of the heart and blood vessels are made by injecting a dye through the catheter into the bloodstream.

Cardiology - the clinical study and practice of treating the heart.

Cardiomyopathy - an abnormal heart condition in which the heart is dilated (poor pumping power and enlarged), restrictive (impaired ability of the heart to fill), or hypertrophic (a thickened heart).

Cardiovascular - pertaining to the heart and blood vessel (circulatory) system.

Cardiovascular Disease (CVD) - Cardiovascular disease (CVD) is a collective term for diseases of the heart and blood vessels. The term commonly includes diseases such as coronary heart disease.

Cholesterol - a waxy substance that is produced in the human body, animal fats, and in dairy products and is transported in the blood.

Circulatory System - pertaining to the heart and blood vessels, and the circulation of blood.

Computed Tomography (CT) scan - a CT scan ("cat scan") is an x-ray technique that uses a computer to create cross-sectional (or slice-like) pictures of the heart. A CT scan shows detailed images of any part of the body, including the bones, muscles, fat, and organs. CT scans are more detailed than general x-rays.

Coronary Heart Disease - Coronary heart disease (CHD), previously called ischaemic heart disease, is when coronary arteries become narrowed by a gradual build-up of fatty material within their walls.

Congestive Heart Failure (CHF) - a condition in which the heart cannot pump out all of the blood that enters it, which leads to an accumulation of blood in the vessels and fluid in the body tissues. Congestive heart failure can be due to poor heart muscle function, abnormal communications or holes within the heart, or other abnormal burdens of the heart such as obstructed valves, leaky (regurgitant) valves, poorly controlled rhythm disturbances or shunts.

A combination of clinical signs and symptoms; in infants manifested as poor feeding, rapid breathing, sweatiness, rapid heart rate and failure to gain weight; in adults, manifested as fluid retention, shortness of breath, being easily fatigued and exercise intolerance.

COPD - Chronic obstructive pulmonary disease (COPD) is the name for a group of lung conditions that cause breathing difficulties.

Coronary Artery Bypass Graft (CABG) - a surgical procedure in which a healthy blood vessel is transplanted from another part of the body into the heart to replace or bypass a diseased vessel.

Coronary Heart Disease (CHD) - a condition in which the coronary arteries narrow from an accumulation of plaque (atherosclerosis) and cause a decrease in blood flow.

CRT - Cardiac Resynchronization Therapy is a pacemaker therapy for treatment of heart failure due to poor pump contraction (CRT-P). Can also have pacing plus a defibrillator function (CRT-D).

Defibrillator - a battery-driven, mechanical device used to treat life-threatening heart rhythm abnormalities and establish normal heartbeat. The battery and electrical circuits ("generator") are implanted in the body, usually under the clavicle. Wires leading from the generator are placed on the heart muscle to deliver the electrical current needed to treat the abnormal rhythm.

Echocardiography - an imaging procedure that creates a moving picture outline of the heart's valves and chambers using high-frequency sound waves that come from a hand-held probe placed on the chest or passed down the throat. Echo is often combined with Doppler ultrasound and colour Doppler to evaluate blood flow across the heart's valves. Doppler senses the speed of sound and can pick up abnormal leakage or restriction of the valves.

Ejection Fraction - the measurement of the blood pumped out of the ventricles.

Electrocardiogram (ECG) - a test that records the electrical activity of the heart, shows abnormal rhythms (arrhythmias or dysrhythmias), and detects heart muscle damage. The test uses measurements of the heart's electrical activity by placing electrodes on the arms, legs and chest.

Fibrillation - rapid unco-ordinated contractions of the heart muscles.

Flutter - ineffective contractions of the heart muscles.

Heart Attack - also called myocardial infarction; damage to the heart muscle due to insufficient blood supply.

Heart Block - interrupted electrical impulse to heart muscles.

High Blood Pressure - blood pressure that is above the normal range.

Heart Failure - A condition where the heart muscle weakens and can't pump blood efficiently throughout the body. This is called systolic heart failure or heart failure with reduced ejection fraction HFrEF. Another type of congestive heart failure is due to lack of relaxation of the heart muscle causing fluid to be forced into the lungs, abdomen, and legs. This type is called diastolic heart failure or heart failure with preserved ejection fraction HFpEF.

HfrEF - reduced ejection fraction also known as systolic HF, the heart muscle is not able to contract adequately and, therefore, expels less oxygen-rich blood into the body.

Hospital Spell - is a continuous periods of inpatient care within the same hospital. With regards to the Patient Episode Database for Wales (PEDW).

Hypertension - high blood pressure.

Ischemia - decreased flow of oxygenated blood to an organ due to obstruction in an artery.

Ischemic Heart Disease - coronary artery disease or coronary heart disease caused by narrowing of the coronary arteries and decreased blood flow to the heart.

LBBB - Left Bundle Branch Block is a condition in which there is a conduction abnormality in the heart which has pathognomonic changes on an ECG.

LSOA - Lower Super Output Areas (LSOAs).

NICOR - National Institute for Cardiovascular Outcomes Research (NICOR) collects data and produces analysis to enable hospitals and healthcare improvement bodies to monitor and improve the quality of care and outcomes of cardiovascular patients.

Non - ST elevation acute coronary syndrome (NSTEAC) - Non-ST-elevation acute coronary syndromes (NSTE-ACS) are the most frequent acute coronary syndromes.

Magnetic Resonance Imaging (MRI) - a diagnostic procedure that uses a combination of large magnets, radiofrequencies, and a computer to produce detailed images of organs and structures within the body. MRI technology uses the body's magnetic field and high-tech computers to "reconstruct" images of the heart, blood vessels, lungs and trachea.

Myocardial Infarction (also called heart attack) - occurs when one of more regions of the heart muscle experience a severe or prolonged decrease in oxygen supply caused by a blocked blood flow to the heart muscle.

Myocardial Ischemia - insufficient blood flow to part of the heart.

Pacemaker, mechanical - a battery-driven, mechanical device used to treat heart rhythms that are too slow, too fast or irregular. The battery and electrical circuits ("generator") are implanted in the body, usually under the clavicle. Wires leading from the generator are placed on the heart muscle to deliver the small amount of electrical current needed to treat the abnormal rhythm and regulate heartbeat.

Palpitations - the sensation of the heart beating rapidly or irregularly.

Pathognomonic - specifically characteristic or indicative of a particular disease or condition.

PCI - Percutaneous coronary intervention (PCI) is a non-surgical procedure used to treat narrowing (stenosis) of the coronary arteries of the heart found in coronary artery disease.

PEDW - Patient Episode Database for Wales.

Person Spells - continuous periods of inpatient care for a single patient which could take place under any number of different providers.

Pulmonary - pertains to lungs and respiratory system.

Pulmonary Valve - the heart valve located between the right ventricle and the pulmonary artery that controls blood flow to the lungs.

Pulmonary Vein - the vessel that carries newly oxygenated blood to the heart from the lungs.

Quality and Outcomes Framework (QOF) - The Quality and Outcomes Framework is a system for the performance management and payment of general practitioners in the National Health Service in England, Wales, Scotland and Northern Ireland.

ST elevation myocardial infarction (STEMI) - ST-segment elevation myocardial infarction (STEMI) is the term cardiologists use to describe a classic heart attack.

Stent - cylindrical metal device that is placed on a balloon catheter, and used to enlarge narrowed areas of blood vessels. When expanded, stents have the appearance of a "chicken wire" cylinder, and resist collapsing. When non-expanded, the stents are long and thin. Stents can be used in blood vessels (coronary arteries, pulmonary arteries or veins, major systemic veins, or the aorta).

Stenosis - the narrowing or constriction of a blood vessel or valve in the heart.

Stress - mental or physical tension that results from physical, emotional, or chemical causes.

Stroke - the sudden disruption of blood flow to the brain.

Supraventricular Tachycardia (SVT) - very rapid beating of the heart's upper chambers.

Tachycardia - rapid heartbeat.

Thrombolysis - the breaking up of a blood clot.

Transient Ischemic Attack (TIA) - a stroke-like event that lasts for a short period of time and is caused by a blocked blood vessel.

Valves (the heart valves are tricuspid, pulmonic, mitral, and aortic) - the "doors" between the chambers of the heart.

Vascular - pertaining to blood vessels.

Vein - a blood vessel that carries blood from the body back into the heart.

Ventricle - one of the two lower chambers of the heart.

Ventricular Fibrillation - a condition in which the ventricles contract in rapid and unsynchronized rhythms and cannot pump blood into the body.

Ventricular Tachycardia - a condition in which the ventricles cause a very fast heartbeat.

Welsh Index of Multiple Deprivation (WIMD) - Welsh Index of Multiple Deprivation. The Welsh Index of Multiple Deprivation (WIMD) is designed to identify the small areas of Wales that are the most deprived.

X-ray - a machine that uses radiation to produce pictures of the inside of the body.

Appendix 1
Health Board Map

BCUHB – Betsi Cadwaladr University Health Board

HDUHB – Hywel Dda University Health Board

ABMUHB – Abertawe Bro Morgannwg University Health Board

CVUHB – Cardiff & Vale University Health Board

CTUHB – Cwm Taf University Health Board

ABUHB – Aneurin Bevan University Health Board

PTHB – Powys Teaching Health Board

Please note from April 1st 2019
ABMUHB Abertawe Bro Morgannwg University Health Boards will be known as SBUHB Swansea Bay University Health Board
CTUHB Cwm Taf University Health Board will be known as CTMUHB Cwm Taf Morgannwg University Health Board

Appendix 2
Local Authority Map

Betsi Cadwaladr University Health Board
1 – Anglesey
2 – Gwynedd
3 – Conwy
4 – Denbighshire
5 – Flintshire
6 – Wrexham

Hywel Dda University Health Board
7 – Ceredigion
8 – Pembrokeshire
9 – Carmarthenshire

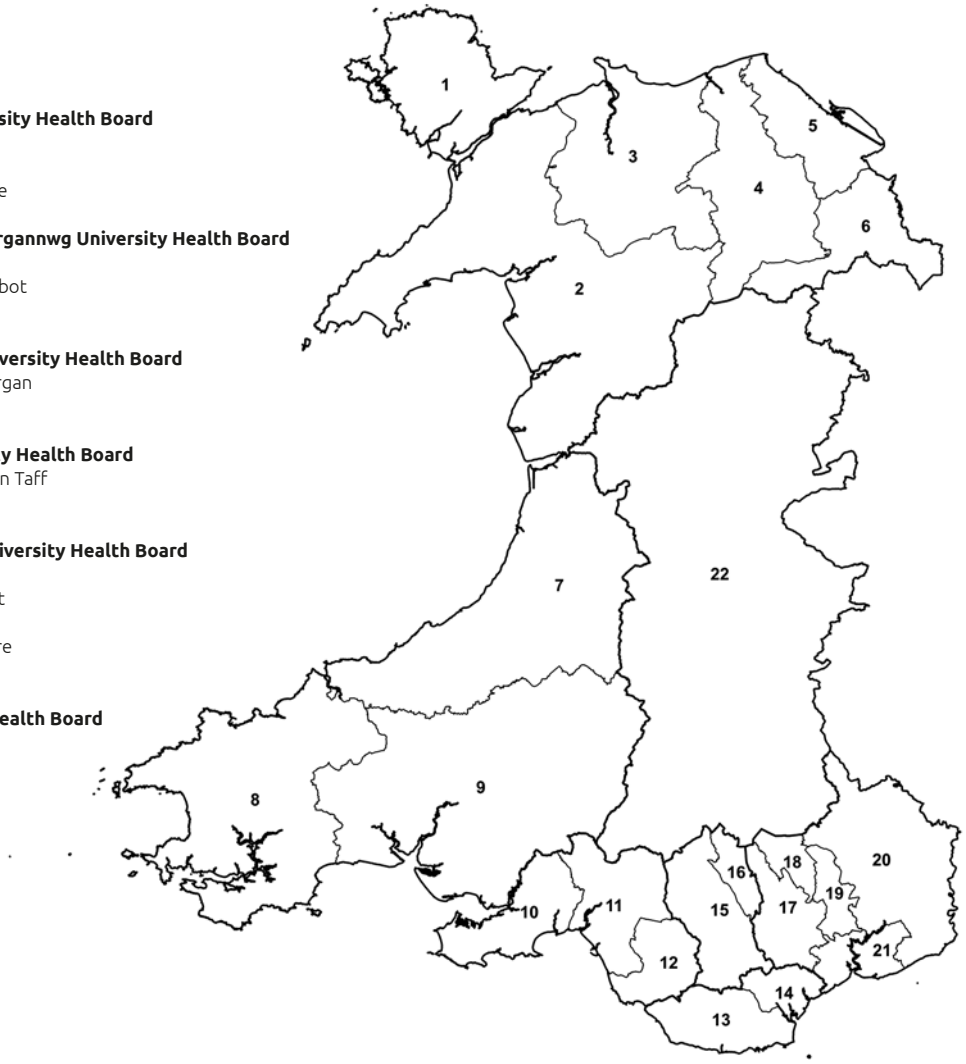
Abertawe Bro Morgannwg University Health Board
10 – Swansea
11 – Neath Port Talbot
12 – Bridgend

Cardiff & Vale University Health Board
13 – Vale of Glamorgan
14 – Cardiff

Cwm Taf University Health Board
15 – Rhonnda Cynon Taff
16 – Merthyr Tydfil

Aneurin Bevan University Health Board
17 – Caerphilly
18 – Blaenau Gwent
19 – Torfaen
20 – Monmouthshire
21 – Newport

Powys Teaching Health Board
22 – Powys



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Appendix 3
Primary Care Cluster Map

Betsi Cadwaladr University Health Board
1 – Anglesey
2 – Arfon
3 – Central & South Denbighshire
4 – Conwy East
5 – Conwy west
6 – North East Flintshire
7 – Dwyfor
8 – North West Flintshire
9 – Meirionnydd
10 – South Flintshire
11 – North Denbighshire
12 – South Wrexham
13 – North & West Wrexham
14 – Central Wrexham

Hywel Dda University Health Board
15 – Amman/Gwendraeth
16 – Llanelli
17 – North Ceredigion
18 – North Pembrokeshire
19 – South Ceredigion
20 – South Pembrokeshire
21 – Taf/Tywi

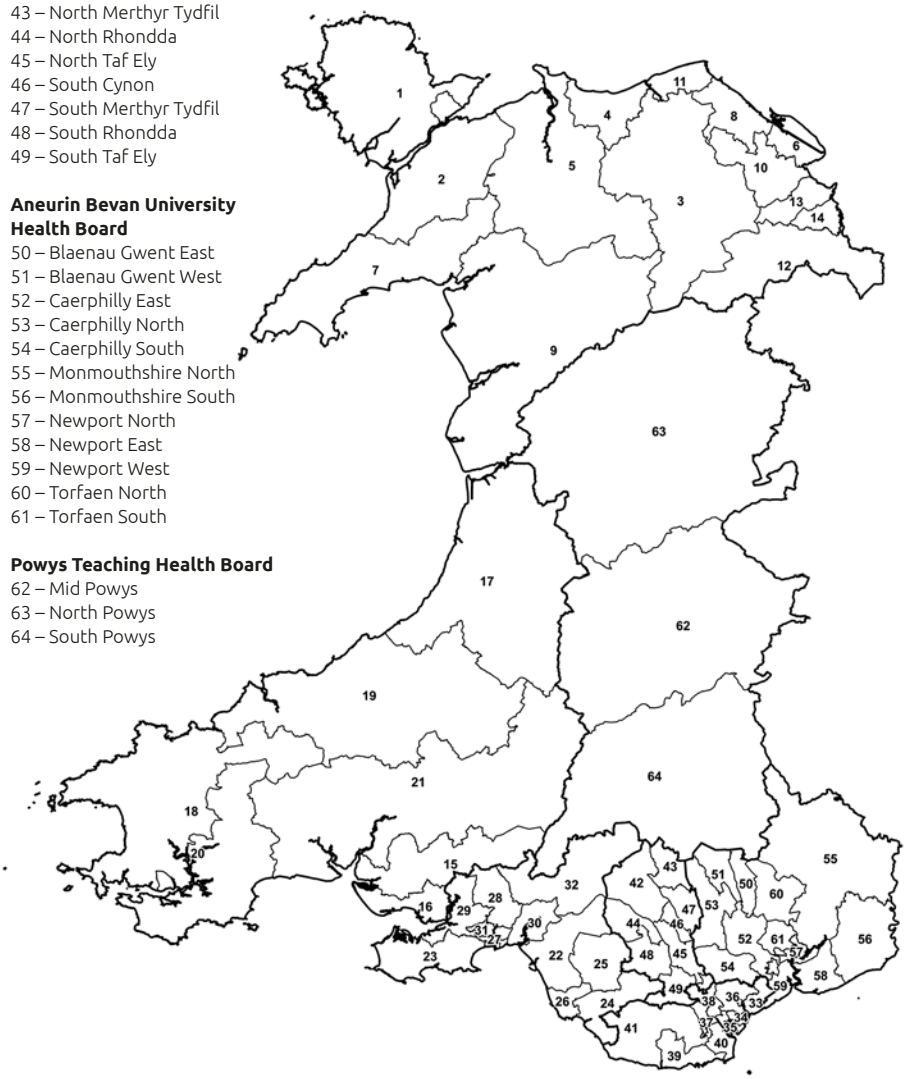
Abertawe Bro Morgannwg University Health Board
22 – Afan
23 – BayHealth
24 – Bridgend East Network
25 – Bridgend North Network
26 – Bridgend West Network
27 – CityHealth
28 – Cwmtawe
29 – Llwchwr
30 – Neath
31 – Penderi
32 – Upper Valleys

Cardiff & Vale University Health Board
33 – Cardiff East
34 – Cardiff South East
35 – City & Cardiff South
36 – Cardiff North
37 – Cardiff South West
38 – Cardiff West
39 – Central Vale
40 – Eastern Vale
41 – Western Vale

Cwm Taf University Health Board
42 – North Cynon
43 – North Merthyr Tydfil
44 – North Rhondda
45 – North Taf Ely
46 – South Cynon
47 – South Merthyr Tydfil
48 – South Rhondda
49 – South Taf Ely

Aneurin Bevan University Health Board
50 – Blaenau Gwent East
51 – Blaenau Gwent West
52 – Caerphilly East
53 – Caerphilly North
54 – Caerphilly South
55 – Monmouthshire North
56 – Monmouthshire South
57 – Newport North
58 – Newport East
59 – Newport West
60 – Torfaen North
61 – Torfaen South

Powys Teaching Health Board
62 – Mid Powys
63 – North Powys
64 – South Powys



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Appendix 4
Major Hospitals Map

Betsi Cadwaladr University Health Board
d – Wrexham Maelor Hospital
f – Ysbyty Glan Clwyd
j – Ysbyty Gwynedd

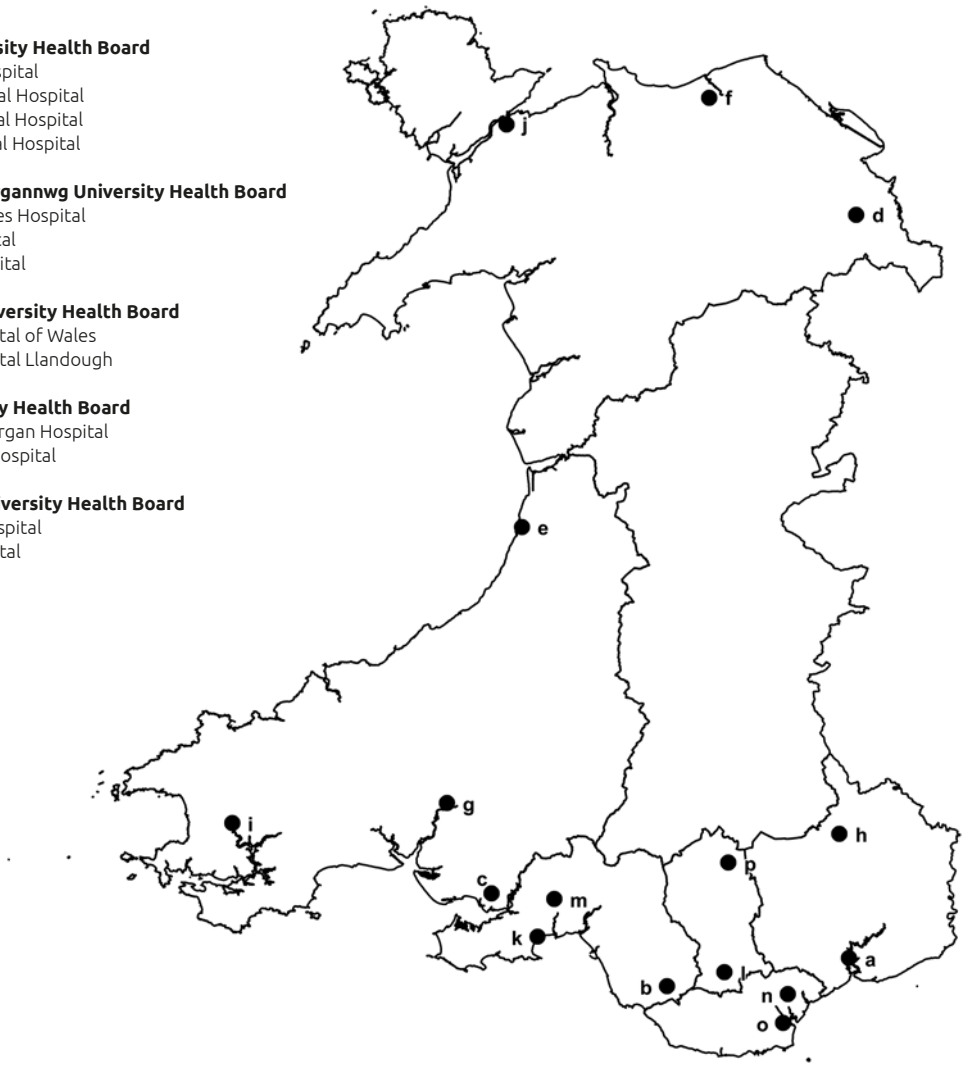
Hywel Dda University Health Board
c – Prince Philip Hospital
e – Bronglais General Hospital
g – Glangwili General Hospital
i – Withbush General Hospital

Abertawe Bro Morgannwg University Health Board
b – Princess Of Wales Hospital
k – Singleton Hospital
m – Morriston Hospital

Cardiff & Vale University Health Board
n – University Hospital of Wales
o – University Hospital Llandough

Cwm Taf University Health Board
i – The Royal Glamorgan Hospital
p – Prince Charles Hospital

Aneurin Bevan University Health Board
a – Royal Gwent Hospital
h – Nevill Hall Hospital



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Appendix 5
Population

	Total Population*
NHS Wales	3,174,670
Aneurin Bevan University Health Board	597,520
Abertawe Bro Morgannwg University Health Board	542,170
Betsi Cadwaladr University Health Board	703,950
Cardiff & Vale University Health Board	497,930
Cwm Taf University Health Board	303,700
Hywel Dda University Health Board	390,750
Powys Teaching Health Board	138,670

* Rounded to nearest 10 for ease of reading (Public Health Wales Observatory)

Appendix 6
ACS 3 University Hospital of Wales

Example of a robust solution to deliver timely transfers and angiography

Timeliness to angiography +/- angioplasty for lower-risk heart attacks at the University Hospital of Wales

The University Hospital of Wales delivers tertiary care to 1.3 million people in South East Wales. Historically, we have struggled to deliver NSTEMI angiography in a timely fashion, with delays for transfer from referral hospitals often reaching 7-14 days. These problems were compounded by the launch of the 24/7 network primary angioplasty service in 2012, placing further pressure on bed availability. In recent years, we attempted to address these delays, defining referral criteria, developing e-referral, using dedicated acute coronary syndrome (ACS) nurses to run the service, and identifying issues delaying patient transfer, i.e. availability of beds and transfer ambulances. At times of severe front door pressure, a lack of available beds for ACS transfers resulted in major fluctuations in transfer times and only modest improvements in overall median delay to angiography. A more fundamental change of approach was required.

Having identified the weakness in the system, we put in place robust solutions to deliver timely transfers and angiography. We converted the four-bed ACS cardiology ward space into a regional Treat and Repatriate Unit. Beds were replaced with trolleys (this in essence protecting them from being filled by other patients), with the area open on a day-case basis only. We changed our whole ethos of regional NSTEMI care from one of planned transfer, inpatient admission for treatment and discharge home from our hospital, to one of a day-case visit from the referral hospital, immediate angiography +/- angioplasty followed by same-day repatriation back to the referral hospital afterwards. Central to the success of a treat and repatriate system is ambulance support. Our traditional ambulance services could understandably not guarantee timely transfers due to unpredictable emergency pressures, and the knock-on effect of late transfers would be late angiography (or no angiography at all), cancelled repatriation and further delays. The solution to this was to contract St John Ambulance to bring patients to the Treat and Repatriate Unit from referral hospital early in the day and return them back following angiography +/- angioplasty. We also created dedicated catheter laboratory slots, changing the ethos of the catheter laboratories and consultants in response to clinical priority and transfer timelines.

The early results have been very encouraging, with compliance with angiography within 72 hours improving from less than 30% of patients to greater than 85% of patients in the first 3-month pilot, along with significant reductions in length of stay. Feedback from patients, relative, staff and referral hospitals has been universally positive. There remain challenges to solve, however, in particular maintaining performance in the longer term and also funding of the dedicated ambulance service. Although huge costs savings can be found in reduced bed day stays in referral hospitals, from reduced staff costs (from the closure of the ward area in the evenings and weekends) and from less standard ambulance journeys, we face the perennial NHS problem of moving money from one pot to another. Additionally, like many other hospitals, while 7-day working will reduce delays to angiography even further, delivering this within the current staff and financial framework remains a huge challenge for the future. Notwithstanding these issues, we look forward to continuing our novel service and reporting significant improvement in treatment times for NSTEMI patients in future MINAP reports.

Dr Tim Kinnaird – Lead Interventional Cardiologist

Dr Sean Gallagher – Consultant Cardiologist

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