British Heart Foundation Cymru

Bias and Biology

The Heart Attack Gender Gap

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Foreword

Systemic inequalities have only been exacerbated by the pandemic and it is deeply concerning that 100,000 women with heart disease in Wales today face unconscious bias and disadvantage at every stage of their heart disease journey.

It's shocking that coronary heart disease alone kills twice as many women as breast cancer[1] and yet, heart disease is often perceived as something which only affects men. This assumption is simply costing women their lives.

Since the 1960s, there have been dramatic improvements in survival rates from cardiac events, such as heart attacks, but the benefits of improved treatment and care have not been felt equally across society. Today it is unacceptable that there are too many situations where women have worse outcomes than men.

Through our British Heart Foundation (BHF) funded research and working with patients, clinicians, and the public, we can see clearly that women are disadvantaged at every stage of the patient pathway.

Tragically, women are less likely to be diagnosed quickly, less likely to receive optimal heart disease treatment and less likely to receive cardiac rehabilitation after a heart attack or surgery. We fear that the assumption that women are not at risk of heart disease is costing women their lives. This has got to stop.

We are calling on Welsh Government to commit to a women's health quality statement which adopts a lifetime view, moving beyond the idea of women's health as synonymous with just reproductive health. The women of Wales deserve a dedicated quality statement that drives change to tackle inequity in both care and outcomes between men and women – a problem which is perilous in cardiac care.

Welsh Government can lead the way, shine a light on these health inequalities and prevent women in Wales dying needlessly from heart disease.

Dr Charmaine Griffiths
Chief Executive Officer, British Heart Foundation

Introduction: the scale of the problem

Women face unconscious biases and disadvantages at every stage of their heart disease journey. Research funded by BHF suggests that the deaths of at least 8,000 women could have been prevented through equitable cardiac treatment over a ten-year period (2003–2013) in England and Wales[2] and there is no evidence that things have improved since then, particularly with Covid-19 having exacerbated existing health inequalities.

Women are:

- **not seen as being at risk of heart attacks.**
- **more likely to be misdiagnosed or diagnosed slowly.**
- **less likely to receive optimal treatment.**
- **more likely to experience difficulties accessing cardiac rehabilitation.**

We estimate that at least 100,000 women are living with heart diseases in Wales.[3] The most common of these is coronary heart disease with around 45,000 women in Wales living with this condition. In 2020, coronary heart disease was the third biggest cause of death for women in Wales, after dementia and Covid-19.[4] Cardiovascular disease does also increase the risk of mortality from Covid-19. In 2019, coronary heart disease was the second biggest cause of death for women behind dementia. Wales has the second highest coronary heart disease female death rate of the UK's four nations[5] with around 1,300 women dying every year – that is twice as many deaths as breast cancer.

Despite these shocking statistics, women are often forgotten as an 'at-risk' group for heart disease. The people of Wales are not well aware that heart attacks happen to women as well as men.[6] This may lead to symptoms being dismissed or not taken seriously.

Once women do present with symptoms, there are further systemic biases in diagnosis and treatment for heart attacks. This means that women are more likely to be misdiagnosed or to be diagnosed more slowly. Once diagnosed, women are less likely to be given optimal treatment[7] and have reported having difficulties accessing effective post-treatment care, such as cardiac rehabilitation. These gaps in treatment and care cause women to have poorer outcomes than men and are ultimately costing women their lives.[8]

This report identifies areas of disadvantage that women face at every stage of the patient pathway and recommends actions for Welsh Government to provide equitable care for patients with heart disease. Women from Black, Asian and Ethnic Minority backgrounds[9] and women living in deprivation[10] often face additional barriers to good health and may be more likely to have poorer outcomes from heart disease. But this information is not collected in Wales, so we are unable to fully understand the impact of heart disease on women with these backgrounds.

Key recommendation:

A quality statement for women's health

Welsh Government should commit to a women's health quality statement which addresses inequalities experienced by women with heart disease. The quality statement should seek to improve outcomes for women with heart disease through:

1. Improved public awareness
2. Timely diagnosis
3. Equitable treatment
4. Equitable access to cardiac rehabilitation

1. Women are not seen as being at risk of heart attacks

There are long-standing societal biases and misunderstandings which assume that women are not at risk of heart attacks. A 2021 BHF Cymru survey of 1000 people in Wales showed that women are not seen as being at risk of heart disease by the Welsh public. 65% of people in Wales are unable to identify heart disease as one of the leading causes of death for women.[11]

Heart attacks do happen to women

Each year, around 1,700 women are admitted to hospitals in Wales due to a heart attack.[12] Yet, a 2021 BHF Cymru survey found that over a third of women in Wales do not feel confident in recognising the symptoms of a heart attack and only 7% feel very confident.[13] As women are not seen by the people of Wales as being at risk of heart attacks, when women do experience the symptoms of a heart attack their symptoms might not be taken seriously by themselves or those around them.

The symptoms of a heart attack can vary from person to person, but the most common signs of a heart attack are:

- **central chest pain or discomfort in your chest that suddenly occurs and does not go away**
- **pressure, tightness, or a squeezing sensation in your chest**
- **pain, which radiates down your left arm, both arms, or to your neck, jaw, back or stomach**
- **feeling sick, sweaty, light-headed, or short of breath**

Anyone experiencing any of these symptoms must seek immediate medical attention. A heart attack is a life-threatening medical emergency. The sooner a person experiencing a heart attack is given medical attention, the better their chances of a full recovery. However, women tend to present later than men.

Societal biases, which don't see women as at risk of a heart disease, likely contribute to this delay. If the people of Wales do not recognise women as at risk of a heart attack, women's symptoms may be misinterpreted or not taken seriously. Patients we spoke to who had experienced a heart attack informed us that they and their families had initially dismissed their symptoms as a panic attack. This, however, is only a part of the picture. Societal bias and the perpetuation of traditional gender roles may cause women to prioritise others over themselves, experience barriers to accessing care, or be fearful and embarrassed.[14]

Kay's story

Kay lives in North Wales, on the border with England. Kay has never smoked and has always kept a healthy weight. One evening, just before her 60th birthday, Kay had gone to bed to read and started to feel a heaviness in her chest. A heart attack did cross her mind, but she never thought that this would be the case without any other symptoms. Kay assumed that she was having a panic attack, something she had never experienced before. So, Kay didn't seek immediate treatment.

When the symptoms of chest heaviness did not subside, Kay felt that she should get checked out at the hospital. Whilst getting ready for the hospital, Kay became physically sick and once in the car, she experienced tingling in her left arm. At the hospital, Kay was diagnosed with a heart attack – a serious medical emergency requiring a 999 call.

High blood pressure is more strongly associated with heart attacks in women

High blood pressure is the biggest modifiable risk factor contributing to premature deaths from heart and circulatory diseases in Wales.[15] The BHF estimates that there are thousands of women living in Wales with undiagnosed high blood pressure. Untreated high blood pressure puts people at risk of heart attack or stroke. High blood pressure has been found to be more strongly associated with heart attacks in women than in men, likely due to underdiagnosis and undertreatment.[16] In the USA, for example, it has been estimated that if high blood pressure were eradicated, it would reduce female cardiovascular death there by 38%, compared to 30% in men.[17]

High blood pressure during pregnancy is associated with an increased risk of several heart conditions, including coronary heart disease, heart attack, heart failure, and cardiomyopathy.[18] Around 1 in 10 women develop high blood pressure during pregnancy in the UK.[19]

Diabetes is more strongly associated with heart attacks in women

Diabetes is caused by problems with the body's ability to produce or respond to a hormone called insulin, which helps to move glucose (a type of sugar) from your bloodstream into the cells of your body for energy. Untreated, this leads to high levels of glucose in your blood. High blood sugar can damage blood vessels and the nerves that control your heart. Over time this damage can lead to heart disease. Having diabetes doubles the chances that a person might develop cardiovascular diseases, including coronary heart disease and heart attack. The main cause of death for people with diabetes is cardiovascular disease.

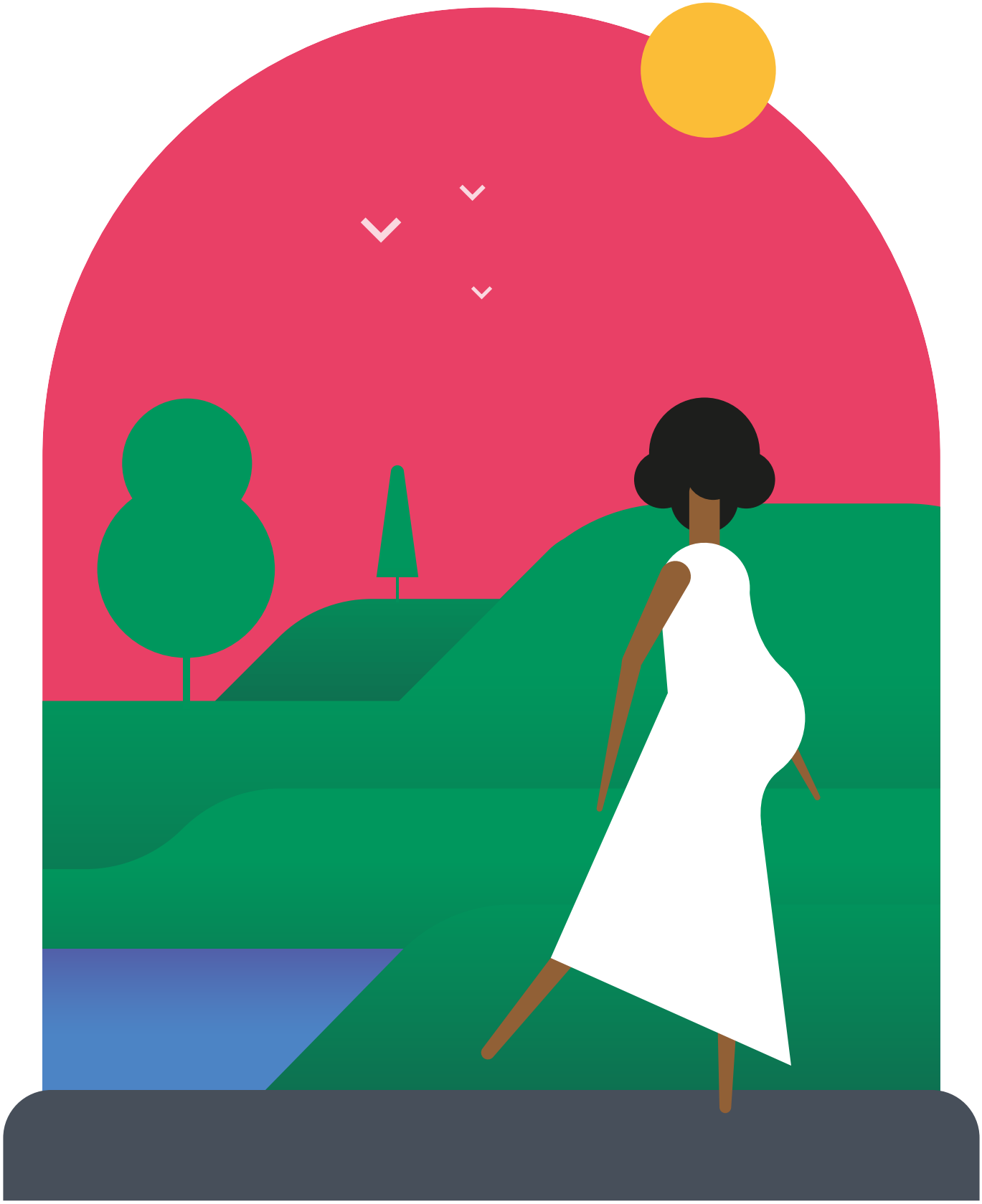
There is evidence that women who have diabetes are more at risk than men with diabetes. Data published in 2014 from 858,507 people in 64 prospective population-based cohort studies highlighted that the risk of coronary heart disease was 44% greater in women with diabetes than in men with diabetes.[20] The UK Biobank found similar risk profiles, with women having a 29% higher risk of heart attack associated with diabetes than men.[21]

Complications during pregnancy can be risk factors for heart disease later in life

Pregnancy requires a 50% increase in cardiac output and so has a profound impact on the cardiovascular system. Pregnancy can reveal previously undiagnosed cardiovascular problems, can lead to new heart and circulatory diseases or result in complications that identify risk factors for lifetime cardiovascular risk. Cardiovascular diseases are a leading cause of maternal mortality in more economically developed countries.[22,23] High blood pressure during pregnancy, gestational diabetes, pre-term delivery, and miscarriage are associated with increased lifetime risk of cardiovascular diseases.[24,25]

Women who develop diabetes during pregnancy are at risk of developing diabetes later in life. Gestational diabetes is hyperglycaemia (high blood sugar) which develops during pregnancy in women with no previous history of diabetes. Gestational diabetes occurs in 1 in every 23 pregnancies in the UK.[26] Women who have gestational diabetes are at a much higher risk of type 2 diabetes, with 39% of women in Wales who have gestational diabetes developing type 2 diabetes later in life[27] and therefore more likely to develop coronary heart disease later in life.

A 2013 meta-analysis undertaken at the University of Cambridge showed that a history of miscarriage or recurrent miscarriage is



associated with a greater risk of developing coronary heart disease later in life. The analysis identified that on average, women who have a history of miscarriage are at 45% higher risk of coronary heart disease while recurrent miscarriage is associated with a two-fold risk compared to women who have no history of miscarriage.[28]

Preterm delivery, or preterm birth, is the birth of a baby before 37 weeks of pregnancy. According to NICE guidelines, preterm birth occurs in around 7.3% of live births in England and Wales.[29] Preterm delivery is the highest cause of neonatal fatality but can also have health implications for the mother. A 2018 UK meta-analysis of studies across the world identified that preterm delivery is associated with up to a 2-fold increase in maternal cardiovascular events later in life. This includes coronary heart disease and heart attacks.[30]

Women are often unaware that these experiences that occur during childbearing years can lead to a greater chance of developing heart disease later in life. Women are not routinely asked about diabetes or hypertension in pregnancy, history of miscarriage, pre-term birth, endometriosis or early menopause by healthcare professionals assessing cardiovascular risk.

Women are at an increased risk of heart disease during and after menopause

During menopause, there are alterations in sex hormones and several detrimental changes in cardiometabolic risk factors[31,32] that put women at a higher risk of heart and circulatory diseases during and after menopause (increased chance of hypertension, obesity, diabetes, reduction in vascular health and fat deposition around organs in the abdomen).

Menopause usually happens between the ages of 45 and 55. Menopause is considered early if it occurs between the ages of 40–45 and premature if it occurs before the age of 40. Studies have shown that early menopause is linked to a higher risk of heart disease and premature death.[33] A 2016 meta-analysis suggested that women who experience early menopause (under the age of 45) have a 50% higher risk of coronary heart disease and nearly a 25% higher risk of cardiovascular death than women whose menopause occurs later.[34] The study found that the risk of cardiovascular disease increases the younger the menopause occurs.

Our recommendation:

Welsh Government should commit to a public awareness raising campaign which underlines that cardiovascular disease is a leading cause of death in women.

2. Women are more likely to be diagnosed slowly or misdiagnosed

Women not being seen as at risk of heart attack can impact whether a woman presenting with heart attack symptoms receives a timely and correct diagnosis.

A cohort of patients in England and Wales studied between 2004 and 2013 identified that an incorrect initial diagnosis after a heart attack increases the risk of death after 30 days by 70%.[35] Research suggests that women are 50% more likely than men to receive the wrong initial diagnosis for a heart attack.[36] Some patients told us that clinicians have previously misdiagnosed them with anxiety or a panic attack. This is likely due to the misperception that women are not at risk of heart attacks.

BHF-funded researchers at the University of Leeds found that women are referred for diagnostic testing much more slowly than men.

A coronary angiography is a test which involves inserting a catheter into a blood vessel to support x-ray imaging of how blood flows around and through the heart. The test is used to identify whether there is a blockage or narrowing of the arteries and its exact location. However, the BHF-funded study in Leeds found that women who had a type of heart attack usually caused by a partially blocked artery (non ST-Elevation Myocardial Infarction or NSTEMI) are 34% less likely than men to receive a coronary angiography imaging test within 72 hours of their hospital admission.[37] This is likely to be due to women not being seen as at risk of a heart attack and their symptoms being taken less seriously.

Our recommendation:

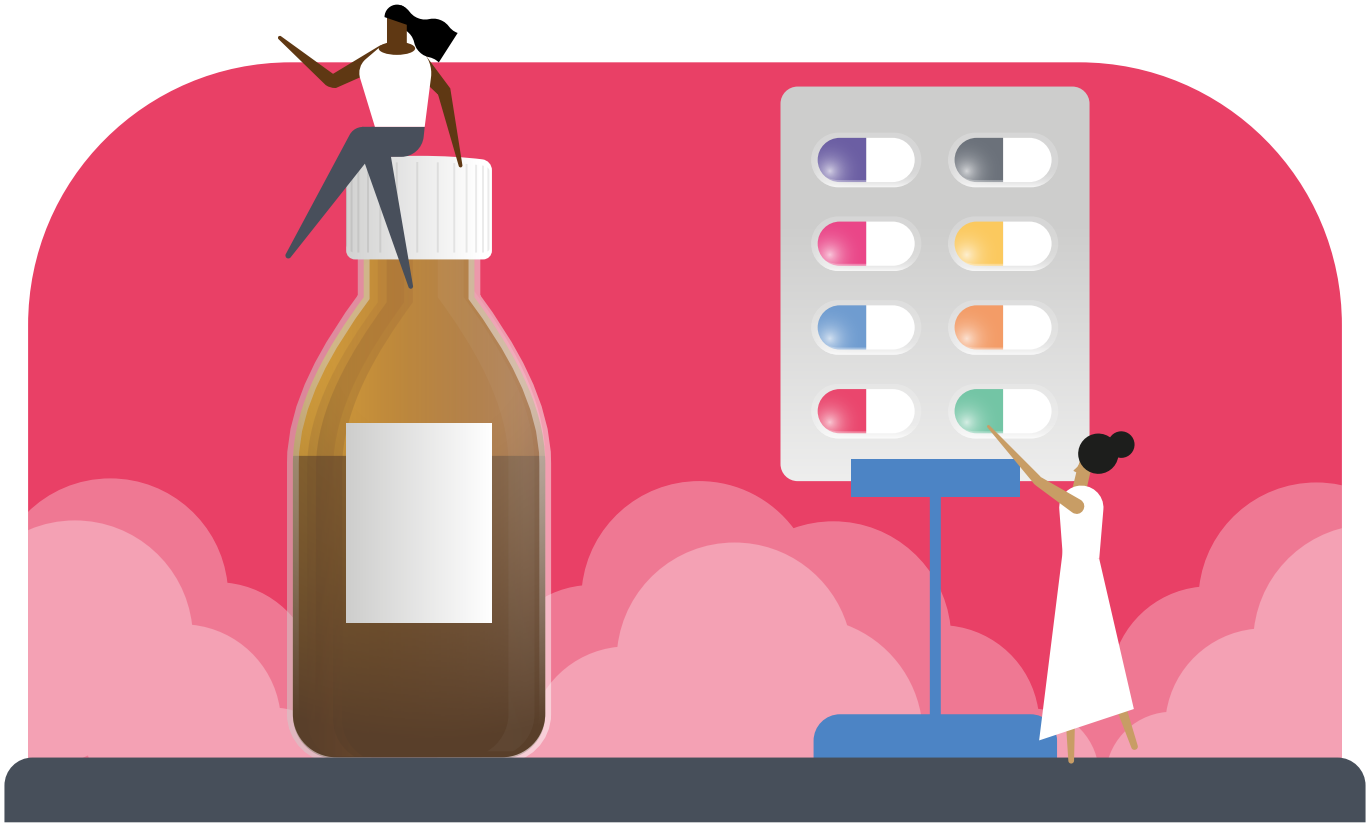
The NHS in Wales should provide continuing professional development to support clinicians in primary and secondary care to understand the risks and symptoms of heart disease to improve diagnosis and treatment for women with cardiovascular disease.

3. Women are less likely to receive optimal treatment

A heart attack is a medical emergency and when patients present at hospital, they are admitted so that staff can provide treatment and care to minimise damage to the heart.

Treatment for a heart attack depends on the severity and type of heart attack experienced by a patient. However, in general, treatments for a heart attack can include coronary angioplasty (the insertion of one or more stents to re-open a blocked coronary artery), coronary bypass surgery (moving an artery from somewhere else in the body to bypass the blockage), and thrombolysis (medicine to dissolve the blockage). Patients may also receive statins to lower cholesterol or other medications to tackle high blood pressure. Receiving these treatments quickly can reduce the amount of permanent damage to the heart and prevent another heart attack.

Not receiving optimal treatment can lead to another heart attack and, in some cases, death. A clinical trial undertaken by researchers at the University of Edinburgh on acute coronary syndrome (an umbrella term which includes non-ST-elevation myocardial infarction (NSTEMI), ST-elevation MI (STEMI), and unstable angina) found that even when diagnosis in women is improved, sex inequalities in treatment persist.[38] The study revealed that women who were diagnosed quickly were still around half as likely as men to receive recommended treatment.



BHF-funded researchers at the University of Leeds found that women are less likely to receive optimal treatment after a heart attack.[39] The cohort study investigated the treatment women receive when they are admitted to hospital after having a heart attack. Comprising of 233 hospitals in England and Wales, the study revealed that there are differences in the use of evidence-based medicine that disadvantage women with heart disease, causing worse health outcomes and poorer care, including:

- **Women who have a heart attack where a coronary artery is completely blocked acutely (known as a STEMI) were around 3% less likely to receive timely reperfusion (restoration of blood flow, using procedures such as drugs or stents) than men.**

- **Women who have a heart attack caused by a partially blocked coronary artery (an NSTEMI) were 34% less likely to receive coronary angiography within 72 hours of their hospital admission. Coronary angiography is used to reveal the presence and extent of disease in the coronary arteries and is a vital step in treatment because it helps doctors decide on next treatment steps, for example, transcatheter treatment with stenting to open the blocked artery which could happen immediately, referral for coronary artery bypass graft surgery or treatment with drugs. Research shows that people who receive timely angiography for an NSTEMI have better outcomes as a result.**

- **Women were less likely to be prescribed drugs that help to reduce the chance of having a second heart attack; they were 4.2% less likely to receive dual antiplatelet therapy – this involves taking two antiplatelet drugs, often aspirin and an antiplatelet agent.**

The study estimated that if equity in treatment were achieved, at least 8,243 female deaths over a ten-year period could have been prevented in England and Wales.[40] This disparity in treatment is likely to be because heart attack symptoms in women are seen as less severe and not taken seriously.

Suboptimal treatment also impacts women when visiting their GP. Examining the management of cardiovascular disease, a systematic review and meta-analysis of over two million patients worldwide found that women were less likely to be prescribed optimal medication in primary care. This study systemically investigated sex differences in cardiovascular medication prescribed to patients at high risk or with established cardiovascular diseases by their GP between 2000 and 2019. The study found that women were significantly less likely to be prescribed statins, aspirin, and medication for high blood pressure.[41] The study cites the misperception that cardiovascular disease predominantly affects men as a key reason as to why women are receiving suboptimal treatment in primary care.

Percentage prevalence of cardiovascular medication prescription in women and men at high risk of or with established cardiovascular disease in primary care worldwide[42]

Medication	Women	Men
Aspirin	41%	56%
Statins	60%	63%
Medication for high blood pressure	68%	69%

Case study:
Mixed gender clinical teams provide the best care

An American study has shown that there is emerging evidence that the gender of clinicians may impact patient outcomes.

In terms of women being treated for heart diseases:

1. **female patients who are treated by male clinicians have the worst outcomes.**
2. **female patients who are treated by female clinicians have better outcomes.**
3. **female patients who are treated by mixed gender clinical teams have the best outcomes.**[43]

Although the reasons for this are multifactorial, the study suggests they relate to perceived biological sex and societal gender role differences in disease presentation, pathophysiology, and treatment responses.[44] These factors are mitigated somewhat when clinical teams are of mixed genders.

There is a considerable lack of representation of female clinicians in cardiology in the UK. Recent statistics show that although women make up over half of all medical students, women only make up 28% of cardiology trainees and 13% of cardiologists in the UK,[45] and the proportion of women cardiology consultants has not improved in the last 15 years,[46] Clinicians in Wales that we have spoken to have confirmed that this accurately reflects the situation in Wales. Addressing perceived and actual barriers to women pursuing a career in cardiology has the potential to improve care and outcomes for female patients in Wales.

Our recommendation:

Welsh Government should work with the Wales Cardiac Network, the Heart Conditions Implementation Group and Health Education and Improvement Wales to:

a. understand and address the challenges leading to women receiving sub-optimal treatment and address this through All-Wales Cardiac Pathways and continuing professional development for clinicians.

b. address barriers to women pursuing a career in cardiology to allow recruitment from the widest possible talent pool and enable optimal cardiovascular clinical research and care.

4. Women are more likely to experience difficulty accessing cardiac rehabilitation

Cardiac rehabilitation services are an important part of patient recovery and are usually offered to patients who have had a heart attack or heart-related surgery. Rehabilitation services are centred around exercise, education, medication adherence and management of stress and anxiety. Rehabilitation has been proven to reduce the chances of further complications after a heart attack, improve quality of life, and improve patient recovery.

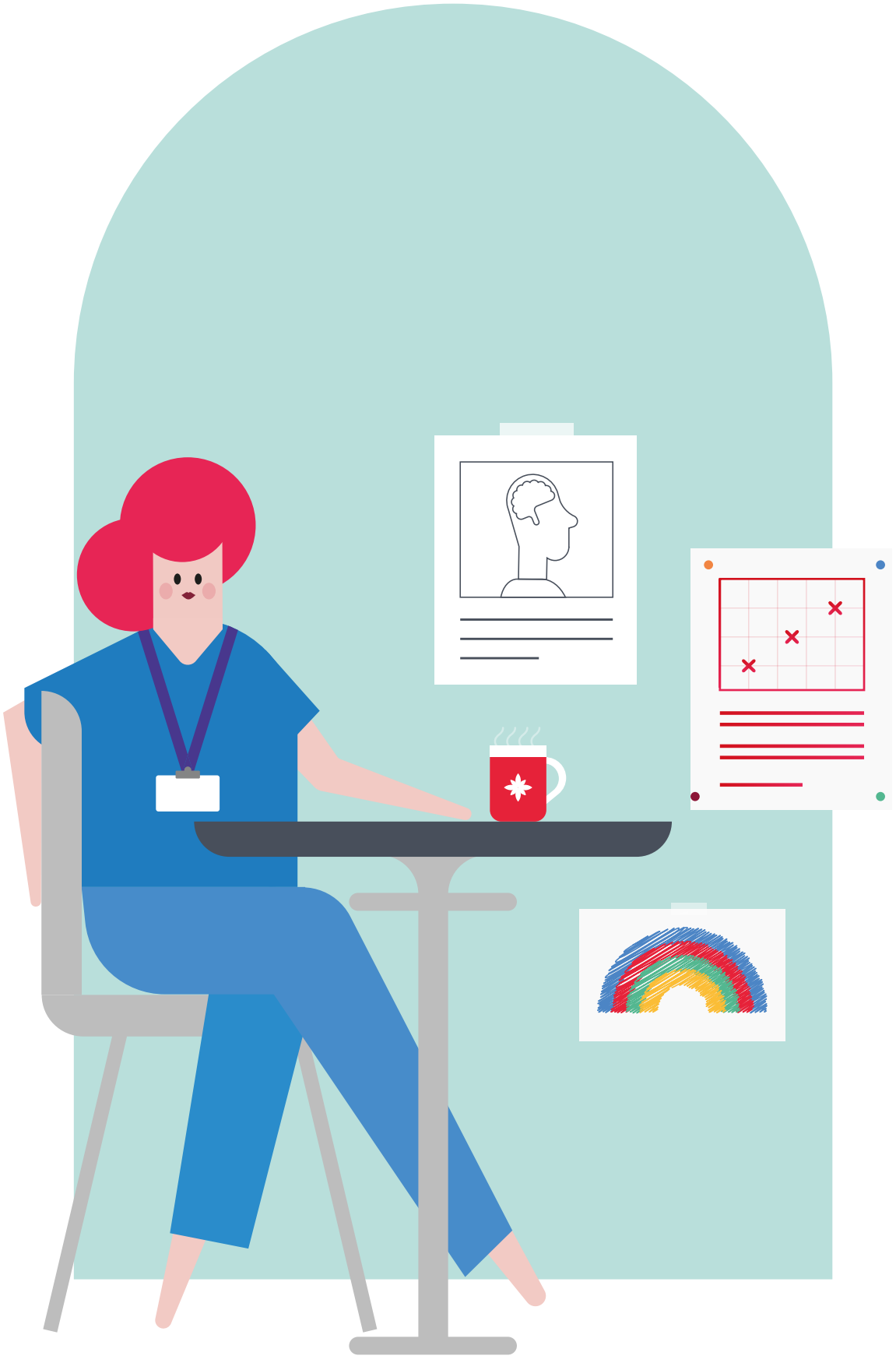
However, female participation in cardiac rehabilitation is low. Across the UK, the proportion of women recruited to cardiac rehabilitation programmes from those eligible is lower than expected.[47] In Wales, the average number of female cardiac rehabilitation patients has remained stagnant in recent years, despite the National Cardiac Rehabilitation Audit reporting repeated calls for cardiac rehabilitation programmes to recruit more women.[48]

Clinicians reported that their female patients were more likely to struggle to attend on-site cardiac rehabilitation services due to a range of socioeconomic factors, such as being more likely to be the primary carer for children and elderly relatives. Clinicians we spoke to also cited access to transport could act as a barrier faced by some women as only 35% of registered keepers of cars in the UK are female.[49] This may limit the accessibility of traditional, in-person cardiac rehabilitation sessions to women. Clinicians also said that women may feel like they are a minority in group sessions as there is most often a male majority, which may deter some women from attending. To prevent women feeling outnumbered during cardiac rehab sessions, it has been suggested that alternative 'women-only' sessions may offer a solution.

The Covid-19 pandemic has disrupted cardiac rehabilitation services in Wales, often prohibiting the provision of in-person cardiac rehabilitation services. Cardiac rehabilitation providers adapted by embracing digital platforms. Digital cardiac rehabilitation includes virtual assessments and consultations, as well as signposting to online resources. Clinicians reported an increased uptake across men and women in cardiac rehabilitation throughout the pandemic, suggesting that a digital offering increases patient participation.

Flexibility in cardiac rehabilitation provision may be key for inclusivity. Although we understand NHS capacity is limited, there are simple ways to provide person-centred cardiac rehabilitation to allow women in Wales to benefit from an approach that incorporates flexibility.

Practitioners have expressed an interest in continuing to provide 'menu-based' cardiac rehabilitation with both digital and face-to-face options. This would provide options to patients depending on their clinical and personal circumstances.[50] According to clinicians, this approach should encourage higher participation amongst all groups, including women, and should support women to fit cardiac rehabilitation around their other commitments.



Case study:
BHF's Cardiac Rehab at Home Hub[51]

The BHF Cardiac Rehab at Home Hub is an online programme which was set up to help patients exercise safely, and to give tips about healthy eating and advice about cardiac medications when face-to-face services were unavailable during the Covid-19 pandemic. The Hub is packed with physical exercise videos and information on accessing emotional support to provide a holistic online platform for cardiac rehabilitation.

Our recommendation:

Welsh Government should work with the Wales Cardiac Network to build on the innovation in rehabilitation from the pandemic and develop All-Wales Cardiac Pathways. Pathways should ensure that patients continue to be offered flexible, menu-based approaches to cardiac rehabilitation depending on personal and clinical circumstances. This will support female participation where there are personal circumstances borne out of societal biases which act as barriers to women attending cardiac rehabilitation.

Maureen's story

Maureen is a fit, active, and healthy woman in her seventies. She has two children and two grandchildren and is living happily by the seaside in South Wales.

However, when Maureen was 45, she was diagnosed with familial hypercholesterolemia, an inherited condition which results in increased cholesterol and higher chances of blocked arteries. Having checked her cholesterol at a health spa, Maureen was told to visit her GP urgently. After a visit to her GP, Maureen saw a specialist in Llandough hospital who told her she had four blocked arteries and needed a quadruple bypass. Maureen was immediately admitted for emergency open heart surgery.

Maureen spent ten days on the ward before receiving her surgery. During this time, Maureen said she felt supported and informed about her health.

After her surgery and recovery in hospital, Maureen was given cardiac rehabilitation sessions. Maureen said this helped her to understand her condition, improve her fitness, and feel emotionally supported.

Since Maureen's surgery, treatment, and aftercare, she has increased her fitness and does line dancing multiple times a week. The treatment and care she received supported Maureen to make a full recovery and she continues to live her life without limitations.

This is the kind of positive treatment and aftercare experience that we believe all women with heart disease in Wales deserve and is achievable through a dedicated plan to address health inequalities faced by women.

Summary of recommendations: closing the gap

Women in Wales are disadvantaged compared to men at every stage of the patient pathway. This is leading to poorer outcomes for many women across Wales. Welsh Government needs to recognise these health inequalities and commit to a women's health quality statement that aims to reduce these inequalities for women in Wales. This should focus on the particular risk that heart disease poses to women.

A women's health quality statement should ensure that women receive equitable care at all stages of the patient pathway and take steps to inform women of their risks of heart disease and the symptoms of acute cardiac events such as a heart attack. The quality statement should seek to improve outcomes for women with heart disease through:

1. **Public awareness:** Welsh Government should commit to a public awareness raising campaign which underlines the risk of heart disease and symptoms of acute events in women.

2. **Timely diagnosis:** The NHS in Wales should provide continuing professional development to support clinicians in primary and secondary care to understand the risks and symptoms of heart disease to improve time to diagnosis in women and to avoid misdiagnoses, which can be fatal.

3. **Equitable treatment:** Welsh Government should work with the Wales Cardiac Network, the Heart Conditions Implementation Group and Health Education and Improvement Wales to:

    a. understand and address the challenges leading to women receiving sub-optimal treatment and address this through All-Wales Cardiac Pathways and continuing professional development for clinicians.

    b. address barriers to women pursuing a career in cardiology with the aim of providing patients with gender balanced clinical teams.

4. **Equitable access to cardiac rehabilitation:** Welsh Government should work with the Wales Cardiac Network to build on the innovation in rehabilitation from the pandemic and develop All-Wales Cardiac Pathways. Pathways should ensure that patients continue to be offered flexible, menu-based approaches to cardiac rehabilitation depending on personal and clinical circumstances. This will support female participation where there are personal circumstances borne out of societal biases which act as barriers to women attending cardiac rehabilitation.

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