
ABHI
CARDIOVASCULAR
HEALTH CHECK REPORT

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44 IN THE UNITED KINGDOM, CVD IS RESPONSIBLE FOR 1 IN 4 PREMATURE DEATHS

EXECUTIVE SUMMARY

This report serves as a 'Health Check' for cardiovascular disease (CVD). It predominantly concentrates on treatment and how the uptake of HealthTech can provide solutions and benefits across the whole pathway of care for CVD. Divided into six challenges, the report spotlights different key issues with proposed specific recommendations.

With the Health Check report findings in mind, ABHI Cardiovascular makes four overarching recommendations:

1. Appoint a National Cardiovascular Disease Director with powers to join-up and direct the delivery of treatment with accountability and resource
2. The creation of a National Cardiovascular Disease Strategy
3. Ensure the level of resource which is focussed on CVD matches the scale of the challenge
4. Invest in an NHS workforce which has the skills, training and knowledge to diagnose, treat and manage CVD

Through these recommendations, a renewed focus on CVD will help improve outcomes and benefit the NHS.

1. WORKFORCE

The NHS workforce is coming under increasing pressure. Having listened to the views of clinical representatives, it is clear there is a consensus that CVD workforce represents a significant challenge for the NHS. There is agreement from professionals working across all areas of CVD that investment in specific training and technologies is needed.

2. AWARENESS

More planning is needed in the support offered to patients diagnosed with CVD, with many struggling to obtain the information they need and unable to navigate the system. Patients should be signposted to validated information sources and appropriate and trusted patient groups.

A more joined-up approach to knowledge sharing will ensure clinicians are aware of new life-changing technologies available to them, as well as the ever-growing understanding of the early signs of CVD allowing patients to be diagnosed sooner and receive the best available treatment.

3. DIAGNOSIS AND DETECTION

As the NHS Long Term Plan identified, increasing early detection and diagnosis holds significant opportunities to improve patient outcomes and achieve efficiencies.

However, this opportunity is not yet fully realised with low investment in diagnostic equipment, low awareness of the early signs of CVD and suboptimal patient pathways. This all contributes to lengthening the time before a patient begins their treatment and increases the level of resources required to care for them.

4. NHS CAPACITY AND RECOVERY

NHS Capacity has for many years been a significant challenge which COVID-19 has exacerbated. Patients now face record waiting times, with hospitals struggling to clear the backlog of cases caused by the pandemic. Many patients face the prospect of their condition deteriorating before they receive treatment.

The Government and NHS have announced significant extra resources to help clear the record waiting lists, however, given the scale and complexity of CVD, it needs to be a priority focus of the NHS, with its own strategic plan for delivering better outcomes for patients.



5. PATIENT PATHWAYS

There is unwarranted variation in CVD patient pathways across the NHS. Despite recommended patient pathways existing for CVD, pockets exist where pathways are not properly adhered to.

In some cases, bespoke pathways have been created with the aim of improving best practice, but successes have then not been systematically recorded or shared across the system. Work is now being undertaken to develop networks to ensure NHS organisations work collaboratively and in a more joined-up fashion.

There is a need for greater accountability of pathways, with systems in place to measure both the awareness of and adherence to CVD pathways. Creating well designed pathways, that are widely followed, can improve outcomes and deliver efficiencies.

6. TECHNOLOGY ASSESSMENT AND IMPLEMENTATION

Current technology assessment arrangements can be complex and difficult to navigate, with organisations responsible for Health Technology Assessment (HTA) often having overlapping remits and being given little instruction on where to prioritise their resources.

Even when technologies have been approved for use, many patients are not receiving their potential benefits, as adoption is often happening at a slow pace.

More needs to be done to ensure organisations can appropriately assess devices and technology can be taken up at pace and scale to save time, money and lives.

ABHI Cardiovascular brings together a number of manufacturers of products for the different specialities within CVD and has taken a high-level view of CVD, examining the challenges faced by the NHS and wider impact of the disease to the UK population. This report aims to identify policy levers and drivers that are needed to improve CVD care in the UK.

To support the recommendations within this report, industry makes the following commitments:

Industry will offer support by responding to the health and care needs identified through a national CVD Strategy, for example developing appropriate technologies and generating supporting evidence.

Through secondments and training, industry can help develop CVD innovation leadership in the NHS, whilst promoting the country as a world leading location for research, development and investment in CVD. Our industry will continue to provide many thousands of skilled jobs and technologies that help deliver high quality outcomes to patients and support the health system to deliver cost effective care.

INTRODUCTION

Cardiovascular Disease (CVD) is second only to cancer, as the UK's biggest killer - claiming around 160,000 lives in the UK every year¹.

In the United Kingdom, CVD is responsible for 1 in 4 premature deaths² with an estimated 7.6m people currently living with heart and circulatory diseases in the UK³.

Public Health England (PHE) identified that CVD-related healthcare costs in England amounted to an estimated £7.4 billion per year in 2019, and annual costs to the wider economy were an estimated £15.8 billion⁴. Despite this, there is no national strategy for improving outcomes in CVD.

CVD is a general term for conditions affecting the heart or blood vessels. It is usually associated with a build-up of fatty deposits inside the arteries and an increased risk of blood clots; however it can also refer to a number of other conditions, including defects to the heart's electrical system. The disease encompasses a wide range of conditions that impact people in many different ways. However, they nearly always reduce an individual's quality of life.

These varying conditions are recognised as existing under the umbrella of CVD, however, they are often seen and treated as separate, unrelated conditions. This has led to a fragmented approach to the management of CVD and a focus that has appeared to shift between different priorities.

This report examines CVD as a family of interlinked and interwoven conditions, seeking to identify where improvements can be made to the system to improve outcomes for patients.

The report covers six key challenges for the NHS:

- > workforce
- > awareness of patients and clinicians
- > detection and diagnosis
- > NHS capacity and recovery
- > patient pathways
- > technology assessment and implementation

CARDIOVASCULAR DISEASE (CVD) IS SECOND ONLY TO CANCER, AS THE UK'S BIGGEST KILLER

From an in-depth review of the policy landscape, a number of themes emerged which highlight failings in the system that are hampering the NHS's ability to deliver a high-quality service for patients with CVD.

A **lack of strategic workforce planning** has left the workforce stretched and under-resourced, unable to cope with the health challenges of a growing and ageing society.

A **lack of national oversight** on CVD has meant resources are not being deployed to the right areas of the system and **longstanding underinvestment** has meant that care has not kept pace with international standards.

NHS structure and process has slowed progress, with new technologies and treatments that can save time and improve outcomes often **not reaching the front line**. The formation of Integrated Care Systems (ICSs) should help overcome this, encouraging collaboration and ensuring a more holistic approach to the delivery of health and care.

To overcome these challenges, this report sets out a series of recommendations that are underpinned by four central recommendations.

Data shows that CVD mortality improvements have slowed in the UK more than in many other European countries, and that CVD is a significant contributor to the slowdown in life expectancy improvement overall⁵. However, by working co-operatively, co-ordinating efforts and sharing best practice, there is an opportunity to improve outcomes in CVD across the country.

CVD is endemic in British society. It is prevalent in every town and city across the four nations of the UK, impacting families and communities from all walks of life. The size of the challenge that governments face therefore requires collaborative working to deliver better outcomes for their populations. A renewed focus on developing a joined-up, whole pathway approach to CVD is welcome, but will require both resource and accountability to bring this vision to fruition.

In recent years, great strides forward have been taken in the outcomes of cancer patients, with survival rates improving markedly over the past decade ⁶. Much of this progress can be attributed to the focus it has been given by policymakers, who developed a national strategy for the disease and created the role of National Cancer Director to deliver its aims and objectives. Whilst some of this progress is likely to have been lost because of the effects of COVID-19, the pre-pandemic improvement to cancer patient outcomes is testament to what can be achieved when the NHS has a clear goal.

Now is the time for CVD to be given the same focus and attention as cancer, aiming to prevent thousands of deaths each year and enabling people up and down the country to live healthier, happier lives.



CVD IS ENDEMIC IN BRITISH SOCIETY. IT IS PREVALENT IN EVERY TOWN AND CITY ACROSS THE FOUR NATIONS OF THE UK, IMPACTING FAMILIES AND COMMUNITIES FROM ALL WALKS OF LIFE.

RECOMMENDATIONS

This report has four overarching recommendations:

1. Appoint a National Cardiovascular Disease Director with powers to join-up and direct the delivery of treatment with accountability and resource
2. The creation of a National Cardiovascular Disease Strategy
3. Ensure the level of resource which is focussed on CVD matches the scale of the challenge
4. Invest in an NHS workforce which has the skills, training and knowledge to diagnose, treat and manage CVD

Aligned to the six key challenges facing CVD, this report additionally provides more detailed recommendations as to where this resource and strategy should focus. They include:

Workforce

- > Creation of a Workforce Strategy for CVD services. This should include looking at future requirements and the changing technological landscape.
- > Increase the number of training places available for CVD clinicians.
- > Embed technology to enable integrated and interoperable patient records that can be accessed across the health and care system.

Awareness

- > Better signposting and utilisation of patient groups and local support groups to deliver effective information to patients.
- > Quality training in 'priority areas', such as CVD, should be offered to all healthcare professionals by Royal Colleges and Clinical Societies.
- > A national hub for patient information on procedures should be made available. This could be run through the Getting It Right First Time (GIRFT) programme or The National Institute for Health and Care Excellence (NICE) Pathways.
- > A national scheme should be developed to expedite the use of multidisciplinary teams and clinician 'buddy systems' across the service.

Diagnosis and detection

- > Continued commitment to the Community Diagnostics Hubs programme, and future planning to harness the full potential of the hubs.
- > Mandate integrated IT systems to enable easy sharing of test results.
- > Make 'every contact count' by developing a specific programme for CVD detection through healthcare interactions during patient care for other conditions.
- > Triaging of patients for tests in a standardised way, developed by NHS England and led by ICSs.

NHS capacity and recovery

- > Ensure flexibility and accessibility of funding for CVD diagnosis and treatment, with a clear end-to-end approach that captures outcomes across the whole system.
- > Position digital innovation within rehabilitation services to improve uptake.
- > Ensure the reimbursement system supports the adoption of remote monitoring technology.

Patient pathways

- > Ensure pathway accountability at a national and local level, linked to GIRFT teams and local CVD ICS leads to ensure implementation.
- > Appropriate support, transparency and accountability on planned system changes for re-establishing joined-up pathways for CVD.
- > Drive and measure awareness and adherence with recommended pathways.
- > Support holistic pathways that are clinically led and utilise supporting evidence.

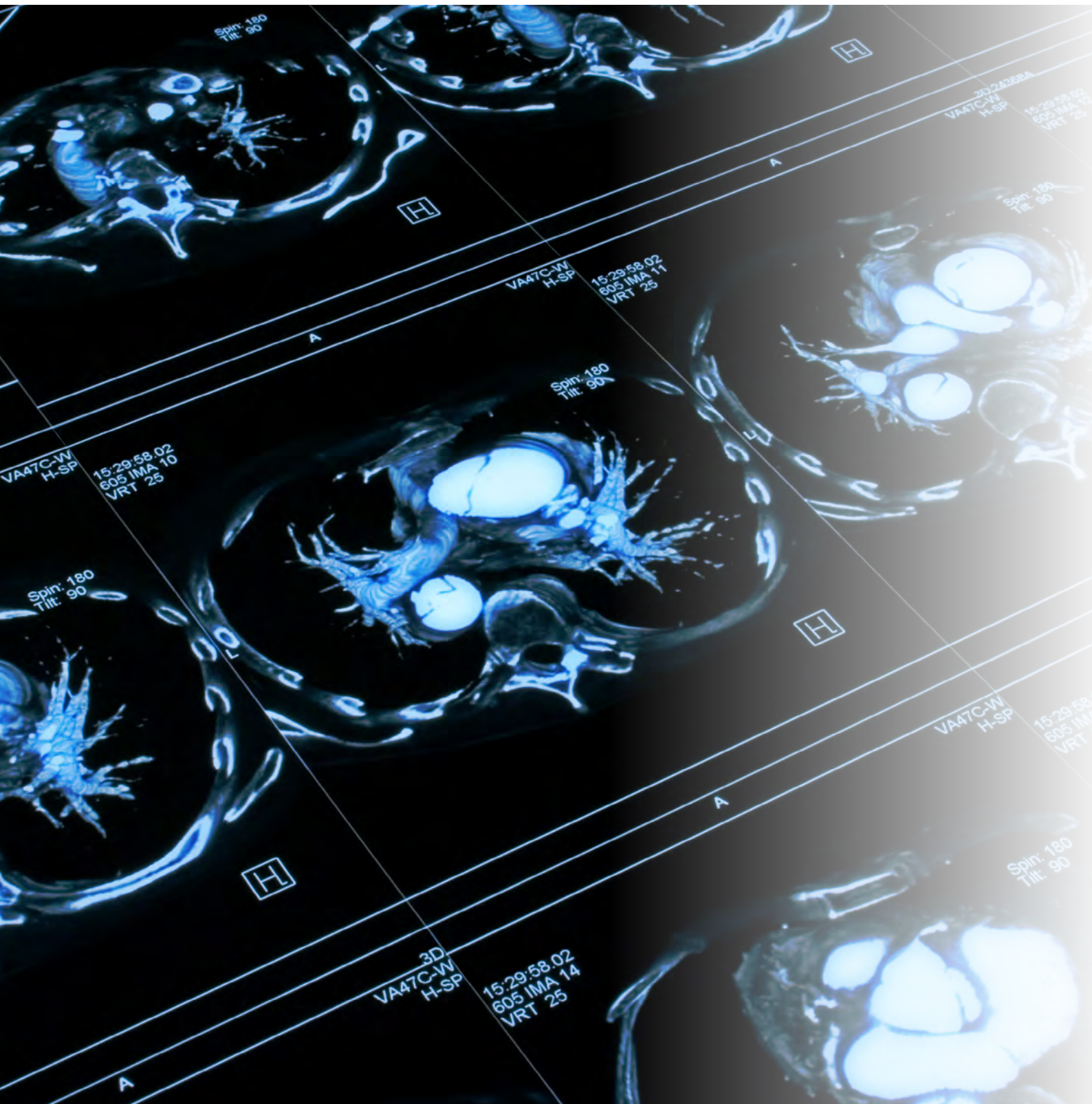
Technology assessment and implementation

- > Ensure a 'system pull' of CVD HealthTech by channeling funding and streamlining HTA evaluations for new technologies.
- > NICE should remain the focus for national HTA assessments and more local mechanisms only used where circumstances dictate a clear need to do so. Co-ordination should be encouraged to minimise duplication of resources.
- > A commitment to transparency and information on the reimbursement and commissioning decision making process.

LANDSCAPE REVIEW AND GAP ANALYSIS

The group carried out a landscape review and gap analysis on CVD policy reports and initiatives over the last twenty years to develop the challenges for this Health Check report, with further detail included in the appendix.

The review took a comprehensive look at the current CVD landscape from Government publications, patient groups and charities, as well as from industry organisations.



HEART RELATED CONDITIONS

CONGENITAL HEART DEFECT

A defect in the structure of the heart – such as birth defects, like holes in the heart.

MYOCARDIAL INFARCTION OR 'HEART ATTACK'

Happens when the bloody supply to part of the heart is cut off.

ARRHYTHMIA

Caused by an irregular heart rhythm, which can lead to heart failure.

HEART FAILURE

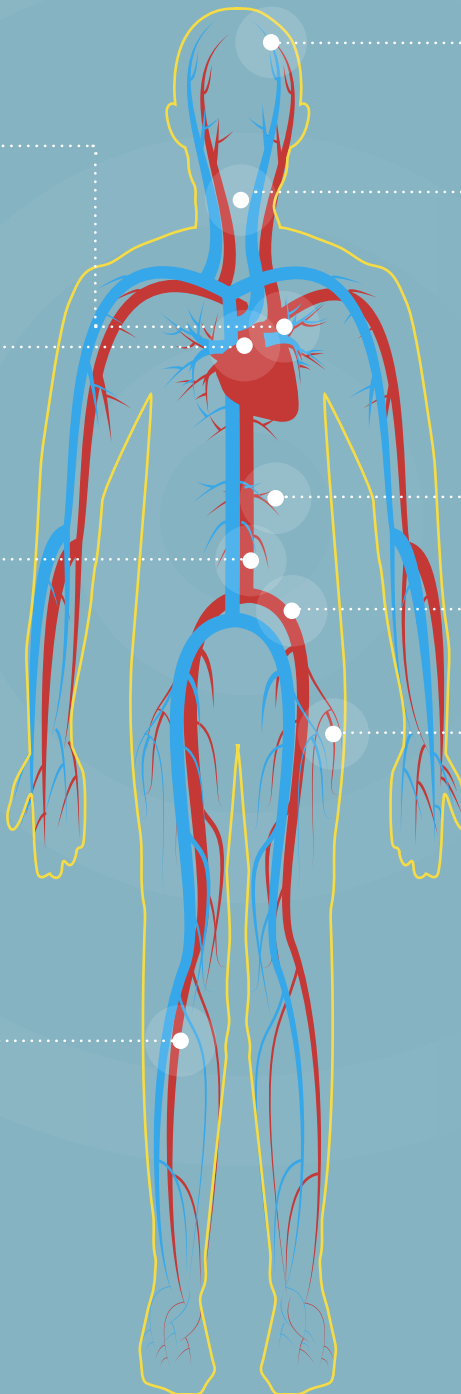
When the heart cannot pump properly and supply the body with enough oxygenated blood.

CORONARY HEART DISEASE

Caused by plaque buildup in the wall of the arteries that supply blood to the heart.

HEART VALVE DISEASE

Occurs when one or more of the heart valves is diseased or damaged, affecting the way blood flows through the heart.



STROKE

Strokes occur when a blood clot blocks the flow of blood and oxygen to the brain.

RHEUMATIC HEART DISEASE

A disease caused by rheumatic fever. An inflammatory disease that can affect many connective tissues, especially in the heart, joints, skin, or brain. Often brought on by a strep infection.

DIABETES

Caused by the body not producing enough or any insulin, leading to a build up of glucose in the bodies bloodstream.

PERIPHERAL ARTERIAL DISEASE

An abnormal narrowing of arteries other than those that supply the heart or brain, often occurring in the arms and legs.

ANGINA

Caused by the narrowing of arteries that supply your heart muscle with blood and oxygen, meaning the blood supply to your heart muscle is restricted.

AORTIC ANEURYSM

A swelling of the aorta - the main blood vessel that leads away from the heart, down through the abdomen to the rest of the body. Aortic aneurysm can occur in both the chest or abdomen.

DEEP VEIN THROMBOSIS

Caused by blood clots forming in the leg veins, which move to the heart and lungs, causing a pulmonary embolism.

CHALLENGE 1: WORKFORCE

The workforce challenges faced by the NHS are well rehearsed and now widely regarded as being at a critical point⁷. Indeed, The King's Fund has commented extensively on this subject, arguing that the NHS workforce in England is in crisis and that urgent action is required to address staff shortages⁸.

There are multiple and complex challenges within CVD care, that will require a concerted effort if they are to be overcome. Addressing the current workforce gaps is no small task, and yet will only solve part of the problem. It will also require planners to look twenty years into the future to understand what knowledge and skills may be appropriate. We welcome, therefore, the forthcoming review of long-term workforce needs by Health Education England (HEE).

The role of cardiac surgeons has evolved greatly over the last twenty years. Minimally invasive, image guided techniques have changed the way procedures are delivered. Many procedures require surgeons to be as skilled in guiding devices through the body as they are in open surgical techniques. Imaging diagnostics require support staff to be proficient in IT and manage complex software applications.

To support the development of potential solutions, we conducted interviews with leading clinicians with expertise and experience in CVD.

KEY ISSUES

The most pressing issue is that which is facing the majority of the system, there is a shortage of clinicians across many areas that are required to deliver comprehensive CVD care. As far back as 2017, NHS Providers found that staffing issues were ranked alongside budget constraints as the key concern of NHS leaders⁹. In 2019, the Health Foundation found that the current staff shortage was around 100,000 and would rise to 250,000 if urgent action was not taken¹⁰.

The clinicians we spoke to echoed this concern for CVD. A key area was the number of clinical radiologists. Dr Stephen Harden, a Consultant Cardiothoracic Radiologist at University Hospital Southampton and the Royal College of Radiologists (RCR), Medical Director for Education and Training for Clinical Radiology, highlighted the data from the most recent Royal College of Radiology workforce survey which found that there is an estimated 'shortage of 1,939 consultant radiologists, equivalent to a third (33%) of the workforce and a forecast of a significant shortage of 3,600 radiologists, equivalent to a 44% shortfall by 2025'¹¹.

The Vascular Society published a workforce report in 2018 which found that there is significant variation in the number of vascular surgeons in each of the home nations:

- > England (n=445) 1 per 124,987 population
- > Scotland (n=42) 1 per 129,162 population
- > Wales (n=26) 1 per 120,200 population
- > Northern Ireland (n=9) 1 per 207,867 population
- > United Kingdom (n=522) 1 per 126,514 population.

The report found that those numbers put the UK behind the USA, which has 1 vascular surgeon per 108,000 people and France, which has 1 vascular surgeon per 107,000 of the population.

This has led to a situation where half of radiology departments do not have enough staff to deliver safe care out of hours. Alongside this, we were told by Denis Harkin of the Royal College of Surgeons (RCS) that he has seen a number of colleagues take early retirement and that he is concerned of the impact of an aging workforce and how that will impact the delivery of care over the next 5 years. Dr Harden also told us there have been predictions of up to 20% of the current workforce retiring in the next 5 years.

Dr Clare Appleby, Interventional Cardiologist at Liverpool Heart and Chest Hospital, and Honorary Secretary of the British Cardiovascular Intervention Society (BCIS), highlighted the impact of lifestyle and expectations and how these were causing a 'brain drain' from the medical profession. She referenced the need to make medicine more flexible and appealing for people to remain in the sphere. This is even more of an issue in acute settings, where the perception is of an unfriendly work/life balance made up of on call shift patterns and disruptive hours. Recruiting and retaining a workforce that is fit to deal with the future pressures caused by CVD needs to be a priority.

In addition, Dr. Appleby highlighted some immediate concerns, with burnout and a stretched workforce putting huge pressures on activity. She described how both challenges had been exacerbated by COVID-19 and the workforce was in greater need of support than ever before.

Additionally, the need for enhanced infection prevention measures in hospitals because of the pandemic has reduced the number of beds for elective care, making it more difficult to tackle growing waiting lists.

Addressing the current crisis requires the training of more clinicians. However, several of the people we spoke to expressed concerns that at current levels, workforce numbers are likely to fall further behind demand for services over the next few years. Dr Stephen Harden highlighted a recent increase in training numbers but expressed concerns as to whether or not this would be sufficient to meet ever increasing demand, especially given the five-year training period required. Denis Harkin said that he has seen a reduction in the number of people applying for training posts in vascular surgery.

The Vascular Society's report on workforce challenges reinforces these comments. They identified a need to almost double the number of training places from 178 to 333 in England. The Royal College of Radiologists RCR have called for a £750m investment in the training of radiologists to meet the projected demands on services¹².



THE ROLE OF TECHNOLOGY

All of the clinicians we spoke to agreed that HealthTech offers a significant opportunity to maximise the use of existing NHS resources. It was acknowledged that addressing the workforce challenges will take time, however there is an opportunity to utilise new technologies to fully utilise current available resources.

Minimally invasive technologies were cited as underutilised tools for increasing efficiency which could help to reduce the time spent in theatre for operations and increase the speed at which patients recuperate.

Investing in interoperable IT systems was viewed as an easy way to maximise resources, allowing information to be shared seamlessly between different services and enabling clinicians to perform remote diagnoses.

Telemedicine and remote monitoring can also drive efficiencies, and are crucial tools in preventing conditions worsening and reducing the number of patients in unplanned and emergency care. However, more needs to be done to ensure new technologies are incorporated into current hospital and medical records. Industry can lead in this area and help ease the burden on the NHS workforce.

In addition to investments in technology, the associated education was also cited as a key area which required investment. It was noted that the need for training has grown in parallel with advances in technology but that, to date, much of that need was still unmet.

The HealthTech industry is well positioned to provide much of this training in collaboration with the NHS. A positive example of such collaboration was noted in the support industry offers in having experts on hand in theatre to support the implantation of devices, which Dr Clare Appleby, noted. Increasingly, industry partners are looking for how they can work with ICSs and what added benefits they can provide.

Whilst there are mechanisms in place to encourage uptake of particular innovative technologies, such as the Accelerated Access Collaborative (AAC), more needs to be done to ensure current systems are fit for purpose in prioritising technology that drives efficiencies and improves outcomes in areas such as CVD. This theme is explored in more detail in Challenge 6.

Recommendations

1. Creation of a Workforce Strategy for CVD services. This should include looking at future requirements and the changing technological landscape.
2. Increase the number of training places available for CVD clinicians.
3. Embed technology to enable integrated and interoperable patient records that can be accessed across the health and care system.

CHALLENGE 2: AWARENESS OF PATIENTS AND CLINICIANS

An engaged and health aware population supports effective healthcare delivery. Early identification and knowledge of treatment options are some of the best ways to minimise the impact on individuals and the healthcare system. CVD is an interconnected area with significant complexities and therefore adequate resource needs to be committed into increasing awareness of symptoms, treatment and management options for both patients and clinicians.

For healthcare professionals, supporting patients to navigate the NHS and get the best treatment is key. For general practitioners (GPs) and primary care professionals, awareness of treatment pathways and diagnostic tools will ensure patients receive the best possible treatment and do not have to undergo numerous, unnecessary tests .

For patients there needs to be systems and support networks that deliver understandable, jargon-free information on current treatment options and the status of future ones. Support from organisations such as patient groups and charities should also be signposted.

KEY ISSUES

Patient awareness

For patients, the key challenge is access to reliable and easy to understand information. Even prior to diagnosis, a patient researching a particular condition can be quickly be surrounded by acronyms and impenetrable terminology. Once diagnosed they may be presented with different management and treatment options, and not fully understand what these options are, or even be fully aware of the consequences of their condition.

Anecdotally, many patient groups hear of patients using social media as a tool for information, which can promote evidence and information not clinically accurate or up to date. Mrs Trudie Lobban MBE, Founder and Trustee of Arrhythmia Alliance, Founder and CEO of AF Association, and STARS, stated:



CVD is a complex disease and increasing awareness amongst society of how to detect its warning signs as well as how to properly manage the disease could save thousands of lives each year. Unfortunately, too many people take counsel on the disease from 'Dr Google', where the information is sometimes inaccurate, unreliable, and misleading. Ensuring patients have access to reliable information from medical experts and professional organisations such as Arrhythmia Alliance will be a key component in reducing the number of deaths from the disease each year. Professional patient organisations in partnership with healthcare professionals can play an important role in achieving this.

Patient groups are trusted resources which people could, and should, be signposted towards when presenting with symptoms at primary and secondary care. Patient groups typically will have accurate and easy to understand information on their websites, as well as the ability to provide support to individuals, who may have just received a life-changing diagnosis¹³.

There are several patient groups who, we believe, provide excellent resources and whose details are included in the appendix.

An example of information dissemination campaigns is the Aortic Dissection Awareness Group campaign, THINK AORTA. This aims to raise awareness and improve diagnosis of aortic dissection worldwide. They have found that a diagnosis of aortic dissection is considered in less than half of patients who arrive at Emergency Departments with symptoms of the condition and that one-third of patients with aortic dissection are inappropriately treated following a different, incorrect diagnosis¹³.

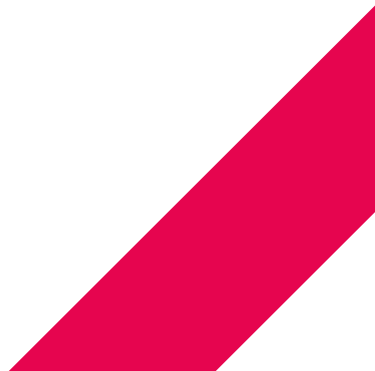
Patients may not appreciate that there is disparity in access to treatment and access to specialist centres in CVD. They are unlikely to be aware of the variations in the levels of care that can occur across the country, such as in the geographical differences in access to 24-hour stroke centres.

Patients should be able to make an informed choice about the right treatment for them. This means that appropriate information should be supplied, for all treatment options, with enough time for patients to consider and decide which course of action might be preferable. Different patients may have different needs, and discussions need to consider the patient at the heart of the decision making process.

Whilst it is acknowledged that healthcare inequalities remain in all conditions, the recent creation of the Office for Health Improvement and Disparities (OHID), which has been created to tackle disparities in health across England, is a positive step forward.

However, disparities in health between different groups in CVD are stark, with people from poorer backgrounds more likely to be diagnosed with CVD. These disparities were reinforced by the King's Fund, who outlined in a recent publication that 'cardiovascular disease (CVD) and diabetes are higher among Black and South Asian groups'¹⁴.

Whilst data is patchy regarding the links between diversity and patient outcomes, it is important that any work to raise the profile of CVD is inclusive. Public awareness campaign messaging and information for CVD needs to be tailored to reach a range of individuals and be easily accessible and understandable for all.



Clinician awareness

Primary care is responsible for referrals for many CVD conditions, however, awareness amongst GPs of the various CVD conditions can vary. This means that referrals can often be delayed, or patients can be put onto the wrong pathway. This often delays effective management and treatment of the condition and can have a detrimental impact on the outcomes for a particular individual.

The prevalence of CVD means that all healthcare professionals are likely to interact with CVD patients at some point in their career. There is therefore, at the start of medical training, an opportunity to increase the level of CVD specific training to ensure all clinicians have a solid background in the area.

There is a role for clinical societies to play in maintaining and improving training around CVD symptoms and treatments, and an opportunity for Royal Colleges to make additional and specific training on NHS priority areas, such as CVD, available to clinicians outside of their own specialities.

Collaboration between multi-disciplinary teams can be a useful tool for providing quality CVD care. This work reduces the burden on CVD specialists, and means that patients can be offered a range of support. It also makes it easier to share knowledge and expertise across teams. For example, within the peripheral vascular disease pathway, working in a joined-up way with GPs, Allied Health Professionals (AHPs) and specialists, reduces the burden on secondary care to help manage patients and the risk of amputation.

Similarly, there are examples of cardiologists having a 'buddy system' where they conduct walk in training clinics and education days with GPs and nurses to discuss CVD patients, including diagnosis, referral pathways and treatment options. This means primary care professionals are more comfortable referring a patient directly to the right person, and are more able to diagnose patients quickly, resulting in better patient outcomes and a better patient experience.

These education days can also be facilitated by societies allowing groups of professionals to be equipped with the most up to date information about CVD treatments, and better able to help patients who present with CVD. Clinician awareness also needs to be supported by clear, concise and quality pathways that direct the patient to the right point of assessment or treatment without delay. An example of where clinician awareness in a CVD discipline has driven improved outcomes is MARS.



THE PREVALENCE OF CVD MEANS THAT ALL HEALTHCARE PROFESSIONALS ARE LIKELY TO INTERACT WITH CVD PATIENTS AT SOME POINT IN THEIR CAREER.

MARS CASE STUDY

Clinicians, commissioners and the Strategic Clinical Network across Greater Manchester have come together and developed the **Manchester Amputation Reduction Strategy (MARS)**. This is an integrated whole systems programme that could be adopted nationally.

MARS is part of the Greater Manchester vascular reconfiguration programme and aims to reduce the number and cost of lower limb amputations across the 25 square mile area which houses 3 million people. It works on the basis that this will be achieved through the development and implementation of an integrated commissioning strategy designed to prevent, manage and heal chronic foot and leg ulcers faster. The work also addresses disease specific inequalities.

It is founded on three principles. Firstly, excellence already exists but is not practised everywhere. Secondly, key to improving outcome is an educated and empowered patient and fully staffed and appropriately skilled workforce. Finally, an amputation is the culmination of a number of steps and therefore each phase leading to an amputation requires an intervention. MARS, therefore, has a Public Health, Community and Hospital focus.

MARS acknowledges that prevention is key and aims to co-ordinate prevention initiatives using the 3FOUR50 principle; that three lifestyle behaviours (poor diet, lack of exercise and smoking) lead to four health conditions (Cardiovascular disease, Respiratory disease, Type 2 diabetes and Cancer) which together contribute to over 50% of all deaths. This principle is being used to harmonise and reduce the significant duplication of prevention/rehabilitation services across Public Health, Community and Hospital services. The plan recognises that change happens in communities, supported by local organisations. The programme includes the role of schools and colleges in encouraging children to develop healthy lifestyles. It is envisaged that an integrated approach will benefit both patients, staff and the tax payer.

The Public Health plan links with the Community and Hospital clinical pathways to create a unified patient journey. The clinical pathway implementation plan will address the inequality in the provision, access and outcome of services patients connect with. The key to improving wound care journeys is to bring standards up those for patients with diabetes whilst improving the diabetes care bundles too.

The vision is to create community wound care teams that bring together the skills of community nursing and podiatry services that are managed by a non-medical consultant. There will be three tiers of care; tier 1 (adult community nursing) will manage wounds as per MARS pathways, tier 2 (specialist clinics) will be run by specialist podiatrists and nurses with the most complex wounds managed at the multi-disciplinary level (tier 3). Tier 1 and 2 will be in the community, and tier 3 in hospital outpatient setting. Patients will move through the tiers seamlessly as the wounds progress/deteriorate. All protocols and pathways will be evidence based and NICE compliant.

The MARS Phase 1 pilot work is very promising with evidence of improved integrated care and reduced costs already coming through.

Recommendations

1. Better signposting and utilisation of patient groups and local support groups to deliver effective information to patients.
2. Quality training in 'priority areas', such as CVD, should be offered to all healthcare professionals by Royal Colleges and Clinical Societies.
3. A national hub for patient information on procedures should be made available. This could be run through the GIRFT programme or NICE Pathways.
4. A national scheme should be developed to expedite the use of multidisciplinary teams and clinician 'buddy systems' across the service.

CHALLENGE 3: DETECTION AND DIAGNOSIS

Early detection and diagnosis are essential in ensuring NHS resources are used efficiently right from the start of the pathway. For example, mechanical thrombectomy is proven to significantly improve patient outcomes and save stroke patients' lives the earlier the procedure is performed.

As acknowledged by the Richards Review¹⁵, 'Diagnostic services in the NHS were reaching a tipping point' prior to the pandemic. Currently the NHS has a lack of capacity to deliver the diagnostic services required to support fast and efficient healthcare. The Government has made steps to improve this and recently announced a £350 million investment in 40 new community diagnostic centres, which are set to be fully operational by March 2022, alongside updates expected in the Spending Review committing to 100 community diagnostic centres¹⁶.

The Life Sciences Vision¹⁷ acknowledged the need to use 'new technology to get diagnosis and treatment right first time and build genuine trust between the NHS and the life sciences sector'. There needs to be adequate resource, support and commitment both nationally and locally to deliver this recommendation.

Increasing diagnostic capacity will require workflow changes, investment and quality pathways to be integrated into existing centres and hubs. This will require IT infrastructure changes that support the transfer of data and allow rapid access to test results. Where remote monitoring technology offers a benefit, it needs to connect with existing health records and be accessible to all relevant healthcare professionals (HCPs). ABHI Cardiovascular welcomes the anticipated investment in the Spending Review committed to improving technology and data in hospitals which will improve information sharing.

KEY ISSUES

Even prior to COVID-19, detection and diagnostic capacity was limited due to the prioritisation of treatment, and a lack of investment in diagnostic infrastructure, outlined further in the Challenge 4. With the additional COVID-19 backlog, there is an increasing pressure on the system¹⁸.

Valve for Life is an initiative launched by the European Association of Percutaneous Cardiovascular Interventions (EAPCI) aiming to improve access to minimally invasive 'key-hole' therapies for heart valve disease across the NHS. Valve for Life presented to EAPCI that in 2019 that there were 225 patients who died on the transcatheter aortic valve implantation (TAVI) waiting list at 16 centres, which would equate to 500 patients per annum across all 36 TAVI centres. Current waiting times will also exacerbate existing delays in diagnosis and appropriate treatment, potentially worsening the situation.

Early detection and diagnosis offer an opportunity to reduce future burdens, secure appropriate treatments for patients and help clear the elective backlog.

As identified previously, workforce limitations mean that testing capacity can often be a barrier for detection. There is a need to train primary care professionals, such as GPs or nurses to carry out some CVD tests, rather than waiting for a referral to an expert at a specialist centre. An example of this has been seen with echocardiograms, where traditionally, referrals were made to an expert cardiac sonographer to carry out the test at an acute centre, whereas now many GPs and nurses with a specialist interest are being trained to do this where there are no added patient complications or complexities. This could be supported by new digital technology in the future, such as hand-held echocardiography with algorithmic analysis²⁰. Another example is NHS England considering the possibility of cardiologists being trained to perform mechanical thrombectomy to support the demand for the service. This focus on thinking differently and upskilling those in the community such as pharmacists and GPs is a potential solution to this capacity barrier.

Another way to drive efficiencies in the pathway for detection and diagnosis is to focus on appropriate early triage for specialist diagnostics, which would reduce unnecessary tests and drive improvements in patient outcomes. Prioritisation of patients from low-risk to high-risk at the early triage stage, in a standardised way, would help drive efficiency in the system.

Specific challenges around detection remain mainly in primary care, where opportunities can be missed to identify patients early, often through patients not presenting or GPs not having the time to carry out more detailed consultations. Many CVD patients present with complex conditions and have multiple comorbidities and specific issues that need follow up, and are not appropriately recognised. One significant opportunity for the NHS to detect CVD early in patients is to “make every contact count”, with health workers screening ‘at risk’ patients when they interact with the service. For example, when individuals are coming in for diabetes tests, they could be checked for heart and other conditions as well.

This would mean a role for nurses, as well as GPs, to carry out additional checks, such as for atrial fibrillation. Another example is UK charity, Heart Valve Voice’s successful campaign to promote stethoscope testing in all over 60’s, which is an easy and reliable way to detect heart disease²¹.

As recently seen in the COVID-19 vaccine roll out, there are opportunities to maximise interactions with patients whilst they are within a healthcare setting.

Another way to drive efficiencies in the pathway for detection and diagnosis is to focus on appropriate early triage for specialist diagnostics which would reduce unnecessary tests and drive improvements in patient outcomes. Prioritisation of patients from low-risk to high-risk at the early triage stage, in a standardised way, would help drive efficiency in the system.

AF DETECTION CASE STUDY

The recent successful campaign, led by Arrhythmia Alliance to detect atrial fibrillation (AF)—the most common type of arrhythmia—highlighted how high-risk patients can be picked up when patients are in a healthcare setting for another reason, in this case at COVID-19 vaccination centres. The campaign found that 6% of people aged 65 or older attending a COVID-19 vaccination centre had “possible AF”.

The result supports previous findings that the incidence of AF is higher among people aged 65 or older than it is in the general population and that a simple pulse check can identify previously undetected AF.

Arrhythmia Alliance has created an online resource hub for healthcare professionals working at vaccine clinics to detect AF. This included posters, referral letters, and factsheets that could be downloaded, printed off free of charge and in some cases can lend one-lead ECG monitors. Additionally, the charity provided links to “Know Your Pulse” videos, which explained how to perform a simple pulse check and how this can help to detect AF. These videos could be played at vaccine centres²².

There are many digital technologies that can support detection, like those that do a simple 30 second pulse check. The Atrial Fibrillation Association says that everyone over 65 years of age should use a device to detect Atrial Fibrillation²³, and this is supported by the European Society of Cardiology (ESC) who recommend opportunistic screening, via pulse checking or ECG rhythm strip, for AF in patients aged 65 or older²⁴.

The NHS's capacity to detect CVD is likely to increase in the coming years as more digital technologies emerge in the space. The ability of algorithms and machine learning to automatically analyse diagnostic results and images could help lower pressures on the workforce by reducing the time and level of training needed to perform these tests. Technologies such as digital stethoscopes and sensors which predict hypertension have, in recent years, entered the marketplace, and policymakers will need to ensure that incentives are in place to ensure these types of technologies are reaching the front-line.

However, not all detection need rely on new digital technologies and actions such as routinely taking patients' blood pressure or checking their heartbeat via a stethoscope in every interaction with a health professional could detect CVD early and improve the outcomes of patients throughout the UK.

ABHI Cardiovascular welcomes the update to the Community Pharmacy Contractual Framework²⁵, enabling blood pressure checks to people aged over 40 at pharmacies. This provides an excellent opportunity for early detection and the group is calling for other CVD tests to be performed alongside blood pressure tests.

Remote monitoring, identified here as technology that provides support in detection and diagnostics, such as remote echocardiogram and bedside ultrasound, is often not taken up consistently across the NHS. This technology can help reduce the pressure on waiting times for diagnostic tests.

Finally, as identified in the introduction, the data sharing capabilities between NHS organisations causes issues in the pathway and delays in time to diagnosis. There is often an inability for diagnostic centres to share data and information with primary care systems. This means tests may be repeated, incurring additional, avoidable costs, whilst frustrating patients with unnecessary procedures.

NHS IT pathways should be joined up so different healthcare organisations can access results and share information to avoid these problems. ABHI Cardiovascular welcomes the anticipated announcement in the Spending Review that looks to improve data capabilities²⁶.

Recommendations:

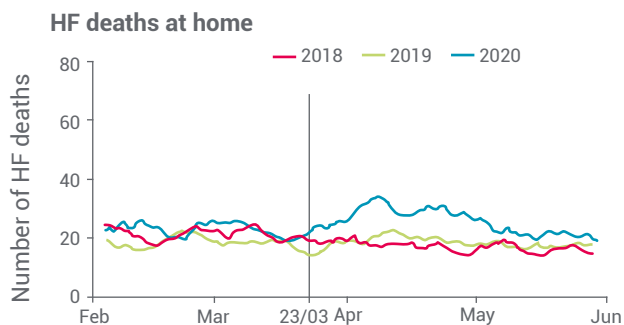
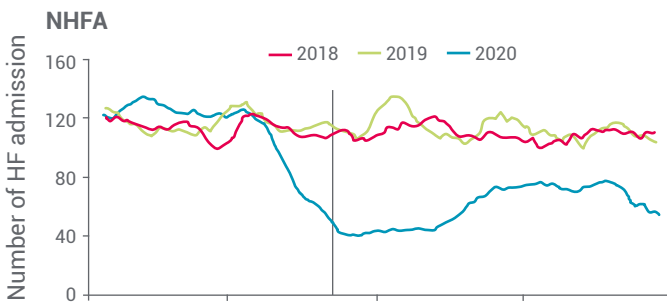
1. Continued commitment to the Community Diagnostics Hubs programme, and future planning to harness the full potential of the hubs.
2. Mandate integrated IT systems to enable easy sharing of test results.
3. Make 'every contact count' by developing a specific programme for CVD detection through healthcare interactions during patient care for other conditions.
4. Triaging of patients for tests in a standardised way, developed by NHS England and led by ICSs.

CHALLENGE 4: NHS CAPACITY AND RECOVERY

Capacity remains a key barrier in changing and improving CVD care in the NHS. Without increasing the capacity to deliver appropriate treatments, the NHS may not clear the backlog for many years to come, and patients may suffer the consequences of a longer wait²⁷.

There are record waiting lists across the NHS, with reports that there are 7 million people currently waiting for treatment and could be as many as 13 million in the next few months²⁸. It is believed that there are many more patients who are yet to present for treatment as they have been nervous about attending a GP appointment during the COVID-19 crisis²⁹. The true effect of these 'missing millions' on the NHS is still unknown, with many now presenting with more severe and advanced conditions, and the cost of treating these individuals is likely to be much higher.

These 'missing millions' could face long-term health impacts if they do not receive treatment as early as possible. An example of this can be seen in endovascular aneurism repair. If patients are not appropriately prioritised and triaged, the aneurism size will grow, significantly reducing the quality of outcome. Data highlights how, compared with the rolling daily average in 2018/19, there was a substantial decline in admissions for heart failure but an increase in deaths from heart failure in the community³⁰. When people fail to seek help, the condition often worsens, resulting in increased mortality rates, comorbidities and worse outcomes placing additional pressure on the NHS in the longer term.



The high number of people affected by CVD means this area needs to be a priority for the NHS and should be targeted for action.

As outlined previously, even with an unlimited budget, it is impossible, in the immediate term, to train enough staff to meet growing demands on the NHS in CVD. Therefore, policymakers need to look at the system holistically and review the system that supports the service in delivering the best possible care with the resources available, including looking at the role technology can play.

KEY ISSUES

Capacity is a long-acknowledged issue within the NHS. The UK has the lowest availability of Magnetic Resonance Imaging (MRI) scanners in Europe, with just nine MRI and seven computerized tomography (CT) scanners per million, putting it in the bottom five countries in the OECD, alongside Hungary, Costa Rica, Mexico and Columbia³². Capacity within cardiac catheter laboratories, where tests and procedures including ablation, angiography, angioplasty and implantation of pacemakers/ICDs are carried out, is known to restrict the number of procedures that can take place.

Valve for Life report that the UK performs only 78 TAVI procedures per million of population, compared to 292 in Germany, 188 in France and 144 in Austria³³. Data comparing the UK with Western Europe show that the UK performs less than half the number of ablations per million population compared to these countries³⁴.

A key area of focus for the Government and NHS is to keep people out of hospital, by getting them back to full health and into the community for recovery as soon as possible after treatment. This should remain a priority. For CVD there is a role here particularly around prevention, remote monitoring and rehabilitation.

REHABILITATION

A focus on rehabilitation for patients post-operatively can support the aim of keeping people out of hospital.

Data shows that when a person has a cardiac event or undergoes heart surgery, cardiac rehabilitation (CR) can be a vital route back to living as full a life as possible. CR is proven to reduce hospital readmissions³⁵ and reduces the chance of a patient having another cardiac event³⁶, whilst being deemed as highly cost effective.³⁷ However, only half of eligible people take up the offer of cardiac rehabilitation in the UK. Increasing uptake of CR in the UK from the current 52% to 65% could lead to 8,500 saved lives and 21,000 fewer hospital admissions over the next ten years, with a justifiable expenditure of £885 per patient (£77.7m) per year³⁸.

One way to effectively drive uptake is through the use of digital innovation. The British Heart Foundation (BHF) has highlighted how uptake of digital innovation would reduce waiting times and help patients work towards their own goals³⁹.

REMOTE MONITORING

Remote monitoring (RM) is a solution that has drawn increased focus since the start of the COVID-19 pandemic due to the technology's ability to support out of hospital management of patients. It has the potential to deliver several efficiencies within the system, such as earlier discharge and a reduction in out-patient burden. The high adoption of remote monitoring in implantable cardiac devices serves as an example of how the NHS and industry reacted at scale to deliver a solution that supported the effective management of patients.

Despite this success, more improvements can still be made. For example, adoption of remote monitoring in pacemakers, used to treat slow heart rates (bradyarrhythmias) is less comprehensive. New predictive digital solutions used as an adjunct to remote monitoring, such as multi-sensor alert based diagnostic technology, also have the potential to further improve the management of complex patients.

However, complexities around the funding model, upfront cost of the technology and staffing levels to support the shift in clinical management, are all examples of barriers that may limit adoption. Within the Long Term Plan, the NHS highlighted the need for better access to heart failure nurses to support improvement targets. However, in 2017, 84 per cent of heart failure services employed one heart failure specialist nurse per 100,000 population, compared to the 3-4 nurses per 100,000 population estimated that is needed to deliver the recommendations within the Long Term Plan⁴⁰.

To ensure systems can further improve their remote monitoring capabilities, which may help deliver key NHS priorities such as reduction in out-patient visits, more needs to be done to ensure providers have the requisite funding, workforce and skills to achieve this.

“ NEW PREDICTIVE DIGITAL SOLUTIONS USED AS AN ADJUNCT TO REMOTE MONITORING, SUCH AS MULTI-SENSOR ALERT BASED DIAGNOSTIC TECHNOLOGY, ALSO HAVE THE POTENTIAL TO FURTHER IMPROVE THE MANAGEMENT OF COMPLEX PATIENTS. ”

REMOTE MONITORING: IMPLANTABLE CARDIAC MONITOR CASE STUDY

Implantable cardiac monitors, also known as implantable loop recorders, monitor heart rhythm for longer periods of time than heart rhythm monitors that are worn externally (such as Holter monitors).

Implantable cardiac monitors can identify Atrial Fibrillation (AF) and could be particularly helpful for identifying AF in people who have had a stroke. If people are diagnosed with AF, they can then be offered anticoagulant therapy to reduce the risk of having another stroke or 'mini-stroke' (transient ischemic attack). Additionally, implantable cardiac monitors can help identify heart arrhythmias for fainting patients.

The cardiac monitor continuously monitors heart rhythm and identifies potential AF episodes from the person's electrocardiogram (ECG) trace using an algorithm. An ECG trace is assessed in 2-minute windows, which are considered positive if AF is present for longer than a programmable threshold. If the algorithm detects a potential AF episode, the ECG trace is stored. The device can also be programmed to only store episodes that persist for a set period.

Rhythm abnormalities recorded by the monitor are wirelessly transmitted to a patient's home monitor or mobile phone app, which is then sent to a server. All of which is transmitted, and stored data is encrypted. A care alert is sent to clinicians when the device detects a rhythm abnormality. They can access the data online. Alternatively, daily notifications can be sent⁴¹.

In September 2020, NICE released a Diagnostic Guidance (DG41) on implantable cardiac monitors to detect atrial fibrillation after a cryptogenic stroke⁴².

MONITORING AND TRIAGE SERVICE

Certain implantable cardiac monitors come with a monitoring and triage service as part of their package. A triage and monitoring service can review ECG recordings made by an implanted monitor remotely. ECGs are reviewed by cardiologists and cardiac physiologists at a monitoring and triaging service centre. Any clinically relevant cases requiring action or escalation are notified to the clinician by phone or email.

REMOTE MONITORING DIGITAL SOLUTIONS

Clinical burden

Heart failure (HF) represents a significant clinical and economic burden for healthcare systems, accounting for 1-2% of healthcare spend in the UK.⁴³ Patients with heart failure that may no longer be optimally managed by pharmacological options alone, can be effectively treated using cardiac resynchronisation therapy-defibrillators (CRT-D) and implantable cardiac defibrillators (ICD). Despite the clinical effectiveness of CRT-D and ICD devices, up to 20% of patients⁴⁴ will be admitted to hospital in the two years following the initial procedure, due to worsening heart failure. Most of these admissions are non-elective and consume a significant amount of hospital resource⁴⁵.

Digital solution

A novel alert based digital technology has recently been developed, which can be used alongside remote monitoring, in the management of heart failure patients implanted with a CRT-D or ICD device. The technology employs a predictive algorithm, to provide advanced notice of worsening heart failure. This information allows medical teams to intervene earlier, positively impact patient care and optimise hospital resources.

A recent European study by Heggermont *et al*⁴⁶, has shown that when activated this technology demonstrated:

- > 74% reduction in hospitalisation rate
- > 70% reduction in average total costs
- > 56% reduction in length of stay when hospitalised

Impact

The benefits of alert-based systems used alongside remote monitoring are aligned to several NHS strategies set out in the Long Term Plan such as predictive prevention, avoidance of hospital admissions and out-patient transformation⁴⁷. To effectively recognise these benefits, systems need to be supported and resourced to address adoption barriers.

Funding

Funding challenges exacerbate the capacity crisis in the CVD space. The rising prevalence of CVD means that funding levels are not sufficient to meet the current patient demand.

Payment systems are not aligned to pull through minimally invasive, efficiency driving technologies. Currently technology that is disruptive in the pathway, but may streamline the process and reduce pressure on the workforce and on procedure waiting lists, is often not taken up due to funding barriers. Running costs need to be taken into consideration, both in terms of undertaking monitoring in HCP time for data analysis and infrastructure costs to industry. HealthTech often provides efficiency savings in reducing bed days, minimising staff time, and reducing emergency admissions. However the initial upfront cost can prove to be a barrier to accessing longer term efficiencies.

In addition, the value of the service provided by CVD industry partners is often not taken into consideration by payers within the system. The wider savings to the pathway, and the training, education and support that industry provides outside of the device itself, often outweighs the price of the device and should be considered.

This wider value often contributes to freeing up efficiencies in the pathway. This is discussed further in Challenge 6.

Recommendations

1. Ensure flexibility and accessibility of funding for CVD diagnosis and treatment, with a clear end-to-end approach that captures outcomes across the whole system.
2. Ensure the reimbursement system supports the adoption of remote monitoring technology
3. Ensure the reimbursement system supports the adoption of remote monitoring technology.



CHALLENGE 5: PATIENT PATHWAYS

Pathways should, and in many cases do, support patients to receive the most effective treatments available. At their most effective, they standardise care to ensure that all patients receive the optimum treatment and allow policy makers to understand where blockages and costs lie within the system.

The current landscape for patient pathways in CVD is varied and fragmented. Pathways developed by NICE and shared through its Pathways System are often not applied, whilst many NHS organisations have created their own bespoke pathways for CVD. GIRFT has made recommendations in this area⁴⁸, however often pathways remain under-developed and under-utilised. This has led to unwarranted variation across the system that adds unnecessary complexity and fuels inefficiencies.

KEY ISSUES

A comprehensive understanding of resource use and how patients flow through the system is key to developing an efficient patient pathway. It is important to understand and address the most time-consuming aspects of care, and how technology can help alleviate these pressures.

Ineffective pathways result in disjointed care that may negatively impact patient experience and outcomes. Tests often need repeating, and patients end up detailing their history multiple times, making it challenging for them whilst also consuming unnecessary HCP time in an already under-resourced system.

A more collaborative and joined-up patient pathway would help overcome this, for example a patient with hypertensive vascular disease would be able to move seamlessly from Community Diagnostic Centres, through to secondary care and then into tertiary care without the need for investigations to be repeated.

This is linked to the wider issues regarding siloed community and hospital care with barriers often existing between organisations when it comes to sharing patient data. Greater adoption of digitisation could play a role in effective pathway development by increasing joined up care, including the sharing of test results.

CVD presentations are not always clear, which can make an initial referral more complex. Breathlessness could be a symptom of multiple conditions, both respiratory and cardiac, and therefore the pathway for it should include multiple diagnostic tests to determine the correct treatment pathway. If a breathlessness pathway was introduced, following GP referral, this could help get the right patient to the right pathway much quicker. The Lambeth and Southwark Adult Breathlessness Assessment Algorithm⁴⁹ provides a helpful case study in this regard.

Findings from the NHS Improving Quality (NHS IQ) national pilot programme, which was established to improve speed and accuracy of diagnosis in patients experiencing the symptom of breathlessness⁵⁰, support the benefits of a more holistic pathway. In a pilot in one site of Leicester, (Leicestershire and Rutland), 48% of patients were discharged back to their GP after the first visit, and 29.6% avoided further outpatient appointments through this approach⁵¹. This is just one example of how a breathlessness pathway could be introduced, and ABHI Cardiovascular supports efforts to replicate this across the system.

There is a need to spread best practice pathways as pathways not running effectively can significantly increase costs to the NHS and delay patient treatment, resulting in worse outcomes. Heart Valve Voice carried out research which found that sub-optimal pathway could result in additional costs of up to £46,000 for a TAVI patient, with the optimal pathway costs saving 34%⁵².

Often local decision making around process, pathways and procurement of devices results in regional variation. The establishment of ICSs provides an opportunity for more joined up care. ICSs are being introduced to bring about new partnerships between organisations to coordinate services and to provide an integrated, collaborative approach to healthcare. In CVD, there is an opportunity for ICSs to make improvements and join up pathways which have traditionally been split into different siloes allowing for upfront investment in technology that can help the system save money. This new structure should address some of the limitations mentioned previously on effectively scaling effective pathways.

Where there are established and recognised pathways recommended by NICE in the CVD space there is often a lack of awareness and implementation. Similarly, good pathways that are implemented in particular areas rarely spread consistently across the NHS. The Leicester Vascular Limb Salvage (VaLS)⁵³ in an example where best practice can be seen but is yet to be replicated at pace and scale across the NHS.

LEICESTER VASCULAR LIMB SALVAGE (VALS) CASE STUDY

One-year outcomes of patients with chronic-limb threatening ischaemia (CLTI) treated in an outpatient-based vascular limb salvage clinic show an improved rate of major amputation. Authors Andrew Nickinson (University of Leicester, Leicester, UK) and colleagues write in the *European Journal of Vascular and Endovascular Surgery* (EJVES) article that their study supports the recommendations of the Global Vascular Guidelines and “provides a reproducible service model that delivers timely vascular assessment in an ambulatory setting”.

Focusing on the work done in Leicester for patients with CLTI, Nickinson discussed how “a nurse-led, open access, outpatient limb salvage clinic” has attempted to provide a one-stop assessment for patients. According to the author, patients referred into the clinic receive a detailed vascular assessment, including duplex arterial ultrasound, on the same day, before a decision regarding next steps is made “there and then” by a vascular consultant.

Moreover, it was said that these patients have access to dedicated outpatient angiography slots, “with the aim of this project being to treat patients in 10 days or less of initial referral.” In order to establish whether or not this limb salvage service can help to meet time-to-treatment targets, Nickinson explained that an investigation evaluating one-year amputation outcomes was conducted.

“Looking at our primary outcome, which was major amputation at 12 months, those patients in the VaLS clinic had half the rate of major amputations compared to the other comparative cohorts, and this result was found to be statistically significant. The trend continued for amputation-free survival also and, in absolute terms, there was a 15% improvement, which was again statistically significant.”⁵⁴

Where there are effective proven pathways, priority needs to be placed on implementation across the NHS, and clinicians need to be made aware about these processes. Guidance and information need to be more robust where there is data on the benefits of a pathway so that it is followed rigorously and implemented across the country, with metrics to track uptake. NICE Pathways are an example of such recognised pathways.

Primary Percutaneous Coronary Intervention (PCI) was an ambition outlined in the National Service Framework in 2000⁵⁵ and drove service improvements and uptake. This sets out the gold standard of what can be achieved when Government and NHS work together to drive changes to improve patient outcomes.



INTERVENTIONAL CARDIOLOGY: PRIMARY PCI - BEST PRACTICE PATHWAY TO REDUCE THE DOOR TO BALLOON TIME METRICS CASE STUDY

The primary PCI pathway is an example of an area where time to treatment saves lives. The National Institute for Cardiovascular Outcomes Research (NICOR) 2020 report outlined the difference in day case rates in PCI procedures and the recommendations focus on modifying the pathway to drive improvements⁵⁶. The outlined practice in the 2013/14 NHS standard contract for cardiology: Primary Percutaneous Coronary Intervention (PPCI, also known as stents) states the aim of the service is to ensure, where possible, whole population coverage to allow patients experiencing ST Segment Elevation Myocardial Infarction (STEMI) to be treated by timely PPCI in a Heart Attack Centre (HAC).

Access to Primary PCI services will be provided 24 hours per day, and 7 days per week. National and international guidelines recommend that in the emergency treatment of patients with STEMI, angioplasty treatment should be performed within 90 minutes of arrival of the patient at the angioplasty site, termed door to balloon (DTB) time, and within 150 minutes of a patient's call for help, termed call to balloon (CTB) time.

The pathway includes those patients who self-present to hospital, those who are taken by ambulance to hospital for assessment, and those who are already in hospital at the time of their heart attack, whether the first hospital is the PPCI centre or a non-PPCI hospital. This is backed up by NICE guidelines for ACS patients which highlight a Management of STEMI pathway⁵⁷.

Since this was prioritised from 2000 there was a significant increase in application of emergency PPCI for treatment of patients with STEMI. This is an example of where a drive centrally from the government and NHS lead to improvements in practice.

However, there are concerns in the recent NICOR NCAP report that Call-To-Balloon (CTB) times for patients with STEMI have been increasing⁵⁸. "Door-To-Balloon (DTB) times have remained relatively constant (although the MINAP and NAPCI audits reveal there is scope to reduce DTB times further), and so the problem appears to be with increasing Call-To-Door (CTD) times." One suggested solution to this would be to focus on the pathway, as identified in the NICOR 2020 report⁵⁹.

In certain cases, and for some CVD conditions, there is not a recommended pathway that is NICE approved or recognised across the NHS. In these cases, where there is an absence of formal guidance, the system should empower clinicians to use their expertise to disrupt current practices and embrace innovative new technologies. Successes can then be shared and adopted across the NHS.

The group commends the NHS's focus on this area, with progress on developing a whole pathway approach for CVD beginning to emerge. This will aid efforts to create a more collaborative mentality and move away from siloed trusts competing with one another, however, there will need to be accountability to ensure this vision comes to fruition.

The group is calling for the resource and strategy to deliver the vision of joined-up CVD pathways as well as systems in place for dialogue and transparency with patients and industry on the strategy to help deliver the objective of the Long Term Plan and GIRFT programme.

Recommendations

1. Ensure pathway accountability at a national and local level, linked to GIRFT teams and local CVD ICS leads to ensure implementation.
2. Appropriate support, transparency and accountability on planned system changes for re-establishing joined-up pathways for CVD.
3. Drive and measure awareness and adherence with recommended pathways.
4. Support holistic pathways that are clinically led and utilise supporting evidence.

CHALLENGE 6: TECHNOLOGY ASSESSMENT AND IMPLEMENTATION

Health Technology Assessment (HTA) is intended to deliver guidance and information on technologies and treatments that should be offered to patients. Doing this well requires that the organisations carrying out HTA processes and evaluations understand the core demands on the service and address them by providing information on the best use of resources. However, despite the size and scale of CVD, there is currently a low level of HTA resource specifically dedicated to the condition.

The challenges within the current HTA landscape are, in part, caused by the lack of national leadership for CVD. Since the Cardiovascular Disease Outcomes Strategy⁶⁰ and National Service Framework for Coronary Heart Disease⁶¹ there has been limited focus. This has resulted in a lower profile for CVD with opportunities to improve care through a more joined-up approach missed. The current scope of National Clinical Directors in this area lacks the resource and accountability to drive changes in policy. A new National Cardiovascular Disease Director could proactively engage multiple stakeholders to craft a holistic approach to the challenge.

ABHI Cardiovascular is calling for a 'system pull' in areas of need identified as a priority by the NHS, such as cancer and CVD, which can then inform industry and HTA organisations where to channel their resources.

KEY ISSUES

Data

Clinical evidence is essential to the development, regulation and evaluation of HealthTech. One persistent challenge is a dogmatic approach to the consideration of evidence. Many involved in HTA hold that there is little value in anything that is not a randomized, controlled clinical trial, forgetting when such trials are actually needed and when they are not. Ethical considerations for studies that involve invasive procedures should allow better use of cross over trials where subjects can act as their own controls. The rapid iteration of HealthTech also means that the gathering of real world, real time evidence is a highly appropriate way to assess the safety and efficacy of a product as well as supporting the ongoing regulatory process, something recognised in NICE's Strategy 2021-2026⁶².

Organisations

The current landscape of organisations undertaking HTA assessments, processes and evaluations in the NHS is complex with multiple overlaps. Assessments can be done by NICE, GIRFT, Clinical Reference Groups (CRGs), Health Technology Wales (HTW), Scottish Health Technologies Group (SHTG) and locally within individual organisations.

This can lead to duplication, contradictory advice and missed opportunities for sharing best practice. For innovators, understanding the system and where to take technology is a challenge.

NICE should remain the focus for national HTA assessments and more local mechanisms should only be used where circumstances dictate a clear need to do so. Co-ordination should be encouraged to minimise duplication of resources and ensure there is clarity around HTA.

Collaboration

During some HTA, there is currently limited engagement with patients, clinicians and industry, with key stakeholders not engaged, or an over reliance on one voice. Collaboration and transparency around decision making will help drive uptake and awareness of technologies.

It is important to secure input from those who will be directly affected by the decision being made. Patient compliance and buy-in is a key success factor. We recommend stronger patient perspectives within reimbursement decisions, and patient preference and satisfaction should be considered as a valid measure.

Industry has a role to play, and where there is an innovative technology, risk sharing can be used as part of value-based procurement. This would focus on an outcome with an agreed financial cost. This requires transparency and communication between industry and the NHS and will result in a mutually beneficial process that secure best value and enhances patient outcomes.

Uptake

To drive successful uptake, HTA needs to be linked to commissioning and funding. With Commissioning through Evaluation (CtE), learnings can be taken on how to encourage uptake of innovative products, and linking data capture, decision making and funding. Issues within the process has resulted in slower uptake of technology.

COMMISSIONING THROUGH EVALUATION CASE STUDY

Healthcare innovations which have already been approved for use on the NHS through a commissioning policy, but not yet implemented, should be implemented as swiftly as possible this year to accelerate the return to routine NHS operation and reduce the need for hospital visits by vulnerable patients.

Left Atrial Appendage Occlusion

The left atrial appendage is a structure at the upper section of the heart that is the source of blood clots that can enter the circulation and cause a stroke. This is particularly the case in patients that have a condition called atrial fibrillation. Stroke risk reduction is normally achieved by the prescription of anticoagulant drugs. Some people cannot tolerate these drugs or are at too high a risk of bleeding to take them. In these cases, an alternative approach is to insert a device that stops blood clots from entering the circulation and causing a stroke.

The LAAO procedure is minimally invasive and patients are generally discharged from the hospital within a day, allowing them to return to their regular lives with a greatly reduced risk of stroke.

NHS England's commissioning policy for left atrial appendage occlusion was issued in July 2018 and estimated the initial volume would be 400 procedures a year, rising to 1000 in 5 years' time. In the UK only approximately 180 procedures are taking place a year. This has led to an inequity of access to LAAO outside the current commissioned centres, most notably there is a lack of a service in the East of England and South West regions.

Mitral Valve Repair

NHS England's commissioning policy for percutaneous mitral valve leaflet repair was issued in July 2019. The percutaneous mitral valve repair is an edge-to-edge repair technique for the mitral valve which connects the left atrium (LA) and the left ventricle (LV). According to the commissioning policy, only around "400 patients might presently be considered for percutaneous mitral valve edge-to-edge leaflet repair in England on an annual basis. This may be expected to increase annually with improved referral networks and clinical awareness".

However, there are currently just three hospitals which perform the commissioned procedure in London, Manchester and Bristol whereas the commissioning policy aims for nine centres. As a result, much fewer commissioned procedures than the target of 400 are still being performed.

PFO Closure

There is a third commissioning policy on (Patent foramen ovale) PFO closure, also published in July 2019, which has not been implemented yet.

PFO closure is used to reduce the risk of further strokes in patients who have already suffered a stroke of undetermined origin. The foramen ovale normally closes at birth, separating the right atrium from the left atrium. In a heart with a PFO, venous blood leaks from the right atrium into the left atrium, from where it can directly reach the brain.

The ABHI proposed Accelerated Access Transitional Scheme, described below, will go some way to addressing concerns around CtE, and implementing an effective approach to the uptake of innovative technologies.

ACCELERATED TRANSITIONAL ADOPTION SCHEME (ATAS) FOR HEALTHTECH CASE STUDY

A potential scheme that could help ensure timely patient access to innovative technologies is the proposed joint industry and NHS scheme 'ATAS', which is in the early stages of development and aims to create a more systematic approach to the uptake of new and innovative technologies.

There is currently no structured scheme for patient access to promising technologies that have regulatory approval before they have received a NICE recommendation. To date, existing initiatives to accelerate uptake of innovation in the NHS have only included a select number of technologies.

ATAS looks to address this by enabling all technologies that meet the scheme's criteria to be considered for inclusion by NICE through Topic Selection. For technologies to be included they must meet the following criteria:

1. The technology has benefits that are likely to be highly disruptive or lead to a stepwise change to an established care pathway in the UK or could be disruptive to standard of care.
2. The technology addresses an unmet clinical need for the NHS, or that significantly improves the current treatment options.
3. The technology has been submitted to HealthTech Connect/Innovation Service.

The scheme is designed to increase the 'system pull' of innovative technologies, accelerating the development of supportive evidence and ensuring patients get timely access to life-saving and life-enhancing technologies.

Where applicable conditional reimbursement will be agreed for technologies that go through the scheme and achieve positive guidance from NICE. These technologies will then be supported by the appropriate commissioning policy to help drive adoption of the technology through the system.

For clarity, the ATAS proposal is for the creation of a structured pathway for early access to HealthTech which may be otherwise be referred to as a conditional reimbursement or coverage with evidence generation (known as managed access for pharmaceuticals).

In NICE, the UK has a world leading HTA organisation. However, their outputs often fail to be implemented across the NHS.

Where there is positive NICE guidance or a commissioning policy has been introduced, there needs to be appropriate pull through so that the technology can be adopted at pace and scale by the NHS. This requires links to appropriate commissioning and awareness of guidance to ensure impact across the country.

TAVI CASE STUDY

Heart valve disease is a little-known disease but is prevalent in the senior population. Across the UK approximately 1.5 million people over the age of 65 are currently affected and that number is only expected to grow with the number of people in this age bracket. Aortic stenosis is a common form of heart valve disease in which the aortic valve - the main valve through which the heart pumps blood to the body, becomes narrowed and restricted, obstructing the flow of blood.

Overall, around 750,000 people in the UK are thought to have aortic stenosis – although some will not have been diagnosed. If left untreated, aortic stenosis can be fatal with a two-year survival rate of around 50 per cent and a five-year survival rate of just 3 per cent, worse than many common cancers. Fortunately, aortic stenosis can be safely and effectively treated by a procedure to replace the narrowed valve, either by open-heart surgery (surgical aortic valve replacement- SAVR), or by a keyhole technique known as transcatheter aortic valve implantation (TAVI). It is vital that patients are diagnosed and treated rapidly.

TAVI is a, minimally invasive treatment for aortic stenosis, which allows the aortic valve to be replaced without the need for open-heart surgery. TAVI is performed under local anaesthetic, and patients can usually be discharged just one or two days after the procedure. The COVID-19 pandemic saw a shift from SAVR to TAVI for some patients because of the circumstances with instances of day-case TAVI. Since it was performed in the UK in 2007, TAVI has grown exponentially to become a routine treatment for millions of patients across the world. However, the rate of TAVI in the UK is much lower than in other Western European countries, the lowest number of centres with a TAVI list generally of only 1 or 2 days a week and the lowest number of TAVI Operators.

In the UK, TAVI is only routinely commissioned for patients that are inoperable and at high risk from surgery. The numbers and funding are controlled by NHS England and the Health Boards in the devolved nations. More than 5,000 TAVI procedures took place in 2019 across England. These numbers do not nearly cover the prevalence for this cohort of patients. The control of numbers has led to wide variation and inequality of treatment across the UK.

There is a great need to move TAVI into routine aortic stenosis treatment along with SAVR to cover the prevalence and clear the elective backlog and also the capacity and workforce issues need to be addressed to provide an efficient service.

MECHANICAL THROMBECTOMY CASE STUDY

The Clinical Commissioning Policy for mechanical thrombectomy for acute ischaemic stroke was published in 2018 by NHS England.

Ischaemic stroke is the most common type of stroke. It happens when an artery (blood vessel) is blocked by a blood clot, cutting off blood flow to part of the brain. Without a blood supply, brain cells can be damaged or destroyed because they may not receive enough oxygen. Symptoms may include numbness or weakness on one side of the body and problems with balance, speech and swallowing. Symptoms may range from mild and resolve, through to severe strokes that can lead to coma and death.

Mechanical clot retrieval aims to restore normal blood flow to the brain, using a device to remove the blood clot blocking the artery. This procedure aims to restore blood flow and minimise brain tissue damage. When used with other medical treatments such as clot-busting drugs, and care on a specialist stroke unit/rehabilitation, mechanical thrombectomy can significantly reduce the severity of disability caused by a stroke.

The positive commissioning of mechanical thrombectomy and associated policy was where successful commissioning policy change has been seen, driving uptake of this life-saving procedure.

Current systems that encourage innovation and uptake at pace and scale often focus on picking a small number of 'winners', such as through the Rapid Uptake Products (RUP) programme and MedTech Funding Mandate. However, their narrow scope has meant that impact has been limited, with any benefits having a marginal impact on the quality of care provided for CVD.

There is an opportunity for a more joined-up approach which considers the whole system impact of CVD and encourages the collaboration and co-ordination of resources needed to deliver impactful improvements.

Recommendations:

1. Ensure a 'system pull' of CVD HealthTech by channeling funding and streamlining HTA evaluations for new technologies.
2. NICE should remain the focus for national HTA assessments and more local mechanisms only used where circumstances dictate a clear need to do so. Co-ordination should be encouraged to minimise duplication of resources.
3. A commitment to transparency and information on the reimbursement and commissioning decision making process.

REPORT RECOMMENDATIONS

Through each challenge of this report a series of specific and targeted recommendations have been made. The resource and accountability that flow from the overarching recommendations should support their delivery. These are:

1. APPOINT A NATIONAL CARDIOVASCULAR DISEASE DIRECTOR WITH POWERS TO DIRECT THE DELIVERY OF TREATMENT

3. ENSURE THE LEVEL OF RESOURCE WHICH IS FOCUSED ON CVD MATCHES THE SCALE OF THE CHALLENGE

2. THE CREATION OF A NATIONAL CARDIOVASCULAR DISEASE STRATEGY

4. INVEST IN AN NHS WORKFORCE WHICH HAS THE SKILLS, TRAINING AND KNOWLEDGE TO DIAGNOSE, TREAT AND MANAGE CVD

The National Cardiovascular Strategy will provide guidance and focus for how and where these recommendations can be implemented. This focused, national strategy is needed to drive change. The suggested timeline and actions below highlight how this Strategy could be developed and implemented.

The delivery of these recommendations requires joined up working between ICS's, NHS England, NICE and Government. The National Cardiovascular Disease Strategy would require resource, support and leadership from NHS England and Government to provide the weight to drive change.

As a first step a new National Cardiovascular Disease Director should be appointed. This new role would be responsible for the development and delivery of the National Cardiovascular Disease Strategy and would have new powers to drive change and compel collaboration from the relevant organisations.

To ensure all relevant parties are included in the development of a National Cardiovascular Disease Strategy, a taskforce should be created. This would provide the same co-ordinating role as the working group did for 'Achieving world-class cancer outcomes: a strategy for England 2015-2020'⁶³. This Taskforce could be made up of the new National Cardiovascular Disease Director, NHS England, OHID, HEE, GIRFT leads, patient groups, clinical groups, commissioners and represents an opportunity to engage with industry and wider stakeholders through written submissions and a series of workshops and meetings.

ROADMAP

> YEAR 1

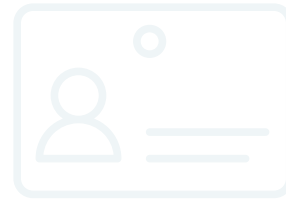
Appoint National Cardiovascular Disease Director

- Power to oversee training
- Work with NICE to ensure prioritisation of CVD

Launch consultation on National CVD Strategy

Launch consultation on workforce strategy

Initial development of Patient Resource Hub



-----> YEARS 2-3

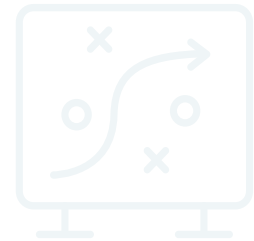
Launch CVD Strategy

- This should include guidance on resource allocation
- Guidance on pathway implementation
- Proposals for reimbursement strategies for diagnostics
- IT review to ensure information can be shared
- Feedback mechanism for frontline NHS teams to identify priorities
- Reporting and information systems established

Launch Workforce Strategy

- Including training and education for non-specialist staff

Launch consultation on pathways that need to be developed



-----> YEARS 3-5

Impact Assessment

- Assess data on pathway implantation
- Assessment of resource allocation and alignment to public health needs
- Assess information on patient access to treatment

Tracking and reporting of staffing levels and gaps

Reporting on patient engagement with resource hub



APPENDIX - ABHI CARDIOVASCULAR HEALTH CHECK REPORT

Gap analysis overview

ABHI Cardiovascular reviewed a total of twenty one papers, reports and policy documents to assess where the gaps in CVD policy were, and how these could be addressed in this report. These are identified below:

Strategic drivers: Whilst there is an overall balance between treatment and prevention, the treatment element is largely drawn from the GIRFT reports which are specifically designed to address operational elements of healthcare delivery within specific clinical specialities areas. The GIRFT recommendations are segmented into various subsets of CVD and only address the broader issues when it comes to prevention. The core driver of future NHS policy, the Long Term Plan, places a heavy focus on prevention and awareness. The only other national, cross cutting set of recommendations come from PHE's Action on Cardiovascular Disease Strategy. The strategic value of technology and treatment is largely ignored in current policy recommendations.

Fragmentation in approach: Recent reports have tended to focus in on the specific CVD diseases, diabetes and heart failure in particular, largely ignoring the interconnectivity of many of these diseases. The last report that highlighted this was the Cardiovascular Disease Outcomes Strategy in 2013. This focussed on the need for an approach that treats CVD diseases as a 'single family' of diseases. However, there remains a clear fragmentation in approach.

Awareness: Many of the recommendations on prevention relate to ensuring patients are aware of risk factors, related conditions, routes for diagnosis and how to lead healthier lifestyles. Alongside this, only a handful of recommendations are related to ensuring that the NHS workforce is sufficiently skilled. There is very little focus on ensuring patients are aware of their treatment and management options when it comes to CVD disease.

Lack of strategy: In focussing on specific disease, there no longer appears to be a concerted strategy to manage CVD. While it is encouraging to see that the NHS Long Term Plan highlights the burden of CVD, stroke and diabetes, they remain as separate clinical areas, each with separate activity plans. Work to prevent and then diagnose diseases in the CVD family are largely similar, by focussing on one there is potential to miss others. Diabetes shares the same risk factors as CVD, and having diabetes increases the risk of CVD⁶⁴, yet there is not currently a joined-up approach to these issues.

Under valuing the role of technology: Whilst much of the current focus is placed on delivering appropriate treatments, there is little focus on the strategic value of ensuring patients have uniform access to technology. There appears to be little focus on the benefits that HealthTech can bring. Patient access issues are looked at with regards to ensuring access to preventative services and diagnostics, yet there is little focus on delivery of treatment and technology

Appendix A - Gap analysis

Reports assessed within the gap analysis included:

- > Getting It Right First Time (GIRFT) Papers:
 - Diabetes: July 2017
 - Cardiothoracic surgery: March 2018
 - Vascular Surgery: March 2018
 - GIRFT Guidance for Integrated Healthcare Systems on CVD prevention during and after the COVID-19 pandemic: March 2021
- > NHS Long Term Plan
- > Cardiovascular Disease Outcomes Strategy
- > National service Framework for CHD
- > Action on Cardiovascular Disease: getting serious about prevention
- > Diabetes UK – 2020-2025 Strategy
- > Living well with dementia (England)
- > A New Era for Stroke
- > British Heart Foundation Strategy
- > Fighting cardiovascular disease – a blueprint for EU action
- > Public Health England: The 10-year CVD ambitions for England – one year on

Appendix B - Innovation Landscape Review

The analysis looked at six reports aimed specifically at improving the innovation landscape:

- > Medical Technology Group – Access Accelerator, Feb 2021
- > Health Tech Alliance – Transforming the MedTech Landscape: Covid and Beyond, November 2020
- > ABHI – Diagnostics, Prevention and Treatment, October 2019
- > Accelerated Access Review, October 2018
- > ABHI - Making it happen: delivering future innovation in healthtech
- > DHSC & BEIS - Life Sciences Vision

Appendix C – Patient Group resources and contact details

- > Aortic Dissection Awareness Group - <https://aorticdissectionawareness.org/contact/>
- > Aortic Dissection Charitable Trust - hello@tadct.org
- > Arrhythmia Alliance - info@heartrhythmalliance.org
- > British Heart Foundation - heretohelp@bhf.org.uk
- > Heart UK - ask@heartuk.org.uk
- > Heart Valve Voice - info@heartvalvevoice.com
- > Pumping Marvellous - <https://www.pumpingmarvellous.org/about-us/contact/>
- > Stroke Association - supportercare@stroke.org.uk

GLOSSARY

Organisations

Accelerated Access Collaborative (AAC): The AAC is a unique partnership between the following patient groups, government bodies, industry and NHS bodies, working together to streamline the adoption of new innovations in healthcare.

British Cardiovascular Intervention Society (BCIS): BCIS promotes education, training and research in cardiovascular intervention as well as developing and upholding both clinical and professional standards.

European Association of Percutaneous Cardiovascular Interventions (EAPCI): EAPCI was created in 2006 with objectives and activities stemming from the synergy between the assets of EuroPCR and the former European Society of Cardiology Working Group on Interventional Cardiology.

European Society of Cardiology (ESC): ESC is an independent, nonprofit organisation aiming to reduce the burden of cardiovascular disease.

Getting It Right First Time (GIRFT): GIRFT is a national programme designed to improve the treatment and care of patients through in-depth review of services, benchmarking, and presenting a data-driven evidence base to support change.

Health Education England (HEE): HEE supports the delivery of excellent healthcare and health improvement to the patients and public of England by ensuring that the workforce of today and tomorrow has the right numbers, skills, values and behaviours, at the right time and in the right place.

Integrated Care Systems (ICSs): ICSs are new partnerships between the organisations that meet health and care needs across an area, to coordinate services and to plan in a way that improves population health and reduces inequalities between different groups.

National Institute for Cardiovascular Outcomes Research (NICOR): 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. NICOR manages six national clinical audits and a number of New Technology registries. NICOR is a unique partnership of clinicians, IT experts, analysts, academics and managers, which provides project, technical and analytical support for all of our audits and registries.

National Institute for Health and Care Excellence (NICE): NICE's role is to improve outcomes for people using the NHS and other public health and social care services.

Office for Health Improvement and Disparities (OHID): The OHID is part of the Department of Health and Social Care and will drive the prevention agenda across government to reduce health disparities, many of which have been exacerbated by the COVID-19 pandemic, and improve the public's health.

Public Health England (PHE): PHE was an executive agency of the Department of Health and Social Care in England which began operating on 1 April 2013 to protect and improve health and wellbeing and reduce health inequalities.

Royal College of Surgeons (RCS): The Royal College of Surgeons of England provides world-class education, assessment and development to 30,000 surgeons, dental professionals and members of the wider surgical and dental care teams, at all stages of their career.

Royal College of Radiologists (RCR): The RCR leads, educates and supports doctors who are training and working in the specialties of clinical oncology and clinical radiology.

Valve for Life: an initiative launched by the European Association of Percutaneous Cardiovascular Interventions. Valve for Life aims to increase patient access to minimally invasive therapies such as trans-catheter aortic valve implantation (TAVI) and trans-catheter mitral valve leaflet repair, so that patients can be treated quickly, successfully, and equally wherever in the United Kingdom they may be.

Abbreviations

Accelerated Transitional Adoption Scheme (ATAS)
 Allied Health Professionals (AHP)
 Artificial Intelligence (AI)
 Atrial Fibrillation (AF)
 Cardiovascular Disease (CVD)
 Cardiac rehabilitation (CR)
 Cardiac resynchronisation therapy-defibrillators (CRT-D)
 Commissioning through Evaluation (CtE)
 Computerized tomography (CT)
 Electrocardiogram (ECG)
 General practitioners (GPs)
 Health Technology Assessment (HTA)
 Implantable cardiac defibrillators (ICD)
 Innovation and Technology Payment (ITP)
 Magnetic Resonance Imaging (MRI)
 National Clinical Directors (NCD)
 Patent foramen ovale (PFO)
 Remote monitoring (RM)
 ST Segment Elevation Myocardial Infarction (STEMI)
 Transcatheter aortic valve implantation (TAVI)

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