



Paediatric Cardiac Unit Annual Report 2009-10

Bristol Congenital Heart Centre

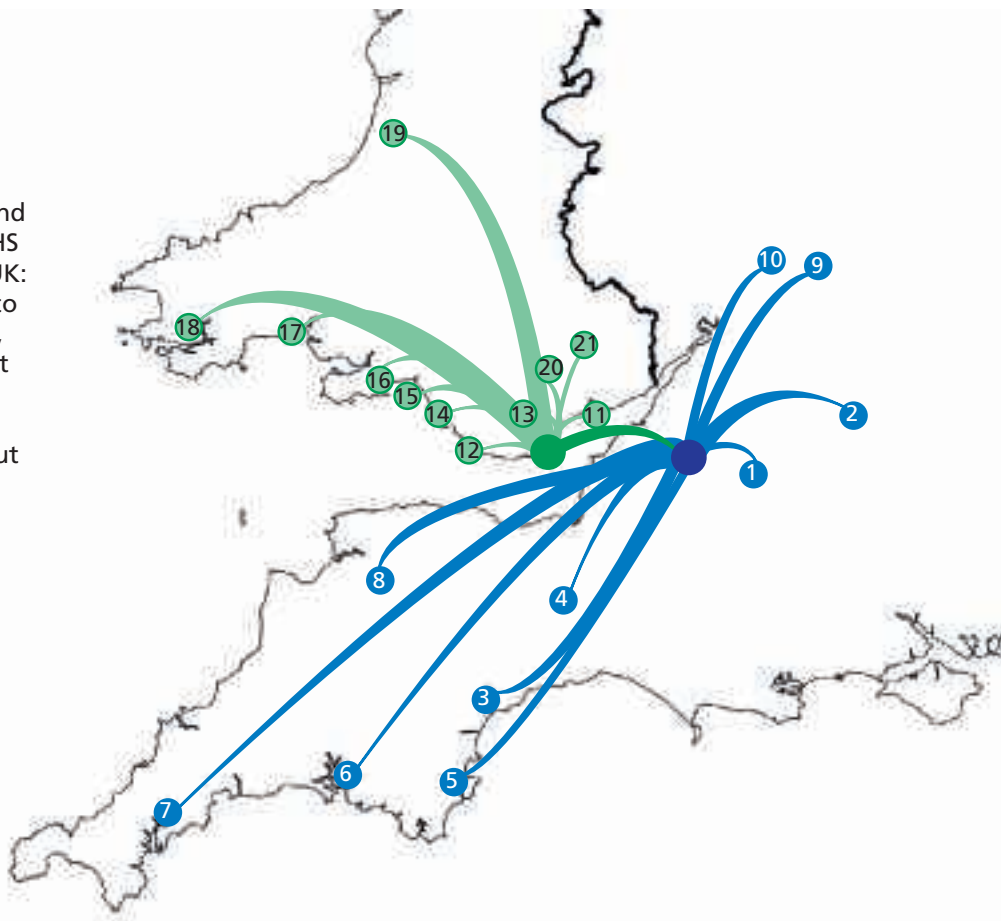
Respecting everyone
Embracing change
Recognising success
Working together
Our hospitals.

Supporting families and children across the South West and Wales

University Hospitals Bristol NHS Foundation Trust brings together a group of hospitals offering more than 100 clinical services across nine sites in the centre of Bristol.

The Paediatric Cardiac Unit is the Trust's specialist centre for the treatment and care of children with congenital heart problems, based at the Bristol Royal Hospital for Children. We provide specialist cardiology and cardiac surgery services for the South West and South Wales.

Our patients come from one of the largest and most diverse NHS regions in the UK: from Cornwall to Gloucestershire, and from Dorset to West Wales — an area containing about 5.5m people.



Tertiary Surgical Centre

- 1 Bristol Royal Hospital for Children, University Hospitals Bristol NHS Foundation Trust

Paediatric cardiology centres

- 2 University Hospital of Wales, Cardiff

Paediatric cardiology peripheral services

- Royal United Hospital, Bath
- The Great Western Hospital, Swindon
- Royal Devon and Exeter Hospital, Exeter
- Musgrove Park Hospital, Taunton
- Torbay Hospital, Torquay
- Derriford Hospital, Plymouth
- Royal Cornwall Hospital, Truro
- North Devon District Hospital, Barnstaple
- Cheltenham General Hospital, Cheltenham
- Gloucestershire Royal Hospital, Gloucester

University Hospital of Wales peripheral clinics

- Royal Gwent Hospital
- Princess of Wales Hospital
- Royal Glamorgan Hospital
- Neath Port Talbot Hospital
- Singleton Hospital
- Morrison Hospital
- West Wales General Hospital
- Withybush General Hospital
- Bronglais Hospital
- Prince Charles Hospital
- Nevill Hall Hospital

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Welcome from the chairman

University Hospitals Bristol NHS Foundation Trust is the largest teaching and research Trust in the South West and I am proud to serve as its Chairman. We recruit and retain the best, most dedicated staff, to deliver our clinical services across nine hospital sites, including the Bristol Royal Hospital for Children, serving the people of Bristol and beyond.

The Trust's mission is to provide patient care, education and research of the highest quality. As the regional centre for the South West we are proud of our areas of specialism: children, cancer and cardiac services.

My Board colleagues and I are committed to enhancing cardiac surgery and cardiology services at the Bristol Royal Hospital for Children. Our children's cardiac services benefit from being co-located with the brand new Bristol Heart Institute, which opened to patients in May 2009.

The Bristol Royal Hospital for Children is the only tertiary children's hospital in the South West and provides acute and emergency services to the local population as well as specialist regional and supra-regional services.

Children's services are managed by Dr Jackie Cornish OBE and Ian Barrington, assisted by a very able, dedicated management team.



John Savage CBE
Chairman, University Hospitals Bristol NHS Foundation Trust

"As the regional centre for the South West we are proud of our areas of specialism: children, cancer and cardiac services."

Many of our staff have developed world-class, leading-edge services, including those in paediatric and adult cardiac surgery.

Our clinicians have built an international reputation and are in demand from patients across the region and the country.

We also have strong links with the University of Bristol and the University of the West of England, continuing our commitment to ensuring that we develop the very best new talent in medicine, nursing and allied health professions.

The Board receives detailed information about our services to provide the adequate level of assurance it requires, but we are

also interested in feedback from parents, carers and ultimately from the children themselves. It is this information that assures us that we continue to put the patient at the centre of all our services.

Later in this report you can read about Samantha. Samantha was 10 when she was diagnosed with atrial tachycardia, which made her heart beat too quickly. She received treatment at the Children's Hospital and now, aged 22, is about to qualify as a teacher.

Samantha was fitted with a pacemaker and comments on her transition from the Children's Hospital to the Bristol Heart Institute, "...having been there twice now for operations I know that it is no different.....the staff are just as kind and helpful."

I commend this annual report to you. I am proud of our reputation for delivering personalised care to children and their families in Bristol and across the South West and South Wales.



Dr Jackie Cornish OBE
Head of Division
Women's and Children's Division



Ian Barrington
Divisional Manager
Women's and Children's Division

Care from the womb into adulthood

The treatment of cardiac conditions often starts with diagnosis before birth – and some of the children we see will continue to need regular care into adulthood. In Bristol we have worked hard to create a comprehensive and continuous congenital cardiac service so that care here lasts a lifetime.

It can even cover two lifetimes. Several times in the last year, young women, themselves diagnosed with congenital heart problems before birth many years ago and successfully treated here as children and adults, have come in to receive an ultrasound scan for their unborn babies.

This report will give an overview of how our team of cardiologists, surgeons, anaesthetists, nurses, perfusionists and cardiac physiologists – who are all congenital cardiac specialists – provide care to the highest standards.

Our consultant paediatric cardiologists provide foetal diagnosis for women in Bristol and across the South West. They also travel to clinics throughout the region to assess paediatric and adult cases, and can use a high-definition telemedicine system to consult referring doctors in their local hospitals. The paediatric cardiologists in Cardiff are an integral part of our team, and refer patients requiring surgery or catheter intervention to us.

Mothers whose unborn babies have been diagnosed with urgent needs are referred to St Michael's Hospital, close to the Bristol Royal Hospital for Children, where our cardiologists provide a foetal cardiology service.

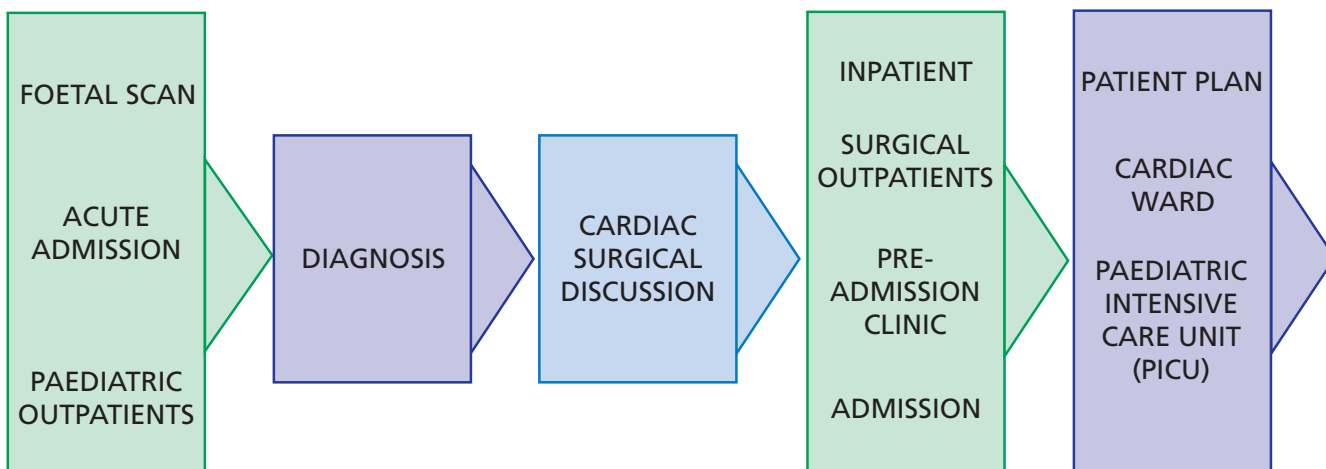
If a child needs to come into the unit for treatment or an intervention, he or she will receive care from our highly experienced and dedicated team in the Paediatric Cardiac Ward or Paediatric Intensive Care Unit. If intensive care is needed, our specialist round-the-clock retrieval service will travel anywhere in the South West or South Wales to collect a child.

The interventions offered by our cardiology and surgical teams are comprehensive, and include every cardiac operation except heart transplantation. Our successful introduction last year of surgery for hypoplastic left heart syndrome (see page 9) – one of the most complex procedures in paediatric cardiac surgery – and our trans-catheter valve implantation programmes show our determination to keep improving the service we deliver. These interventions, like much of our work, are constantly informed by our close links with colleagues in our research institutions, like the Bristol Heart Institute, and specialists elsewhere in Britain and internationally.

Care continues beyond our wards, through our outreach services and clinics. As some patients require further treatment later in life, we ensure that we provide a continuous service from birth to old age. We therefore make the transition from being a patient at a children's hospital to living with heart disease as an adult as comfortable and uncomplicated as possible.

A complex network of specialists supports all patients on their road to better heart health. But that should not make the experience of parents and patients a complicated one.

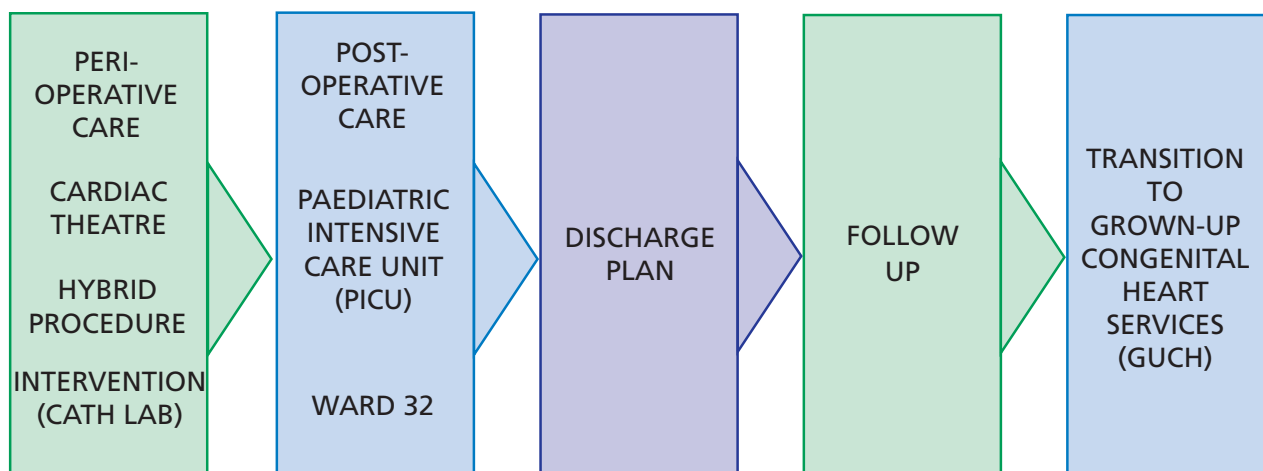
The patient pathway





We know that families with a child receiving treatment for a heart condition can go through considerable emotional and psychological strain. They face practical difficulties, too, such as the costs and organisational difficulties of travel, time, and accommodation.

We strive to alleviate all of these as much as we can, through counselling, advice, and practical support. Our cardiac liaison nursing team meets patients and their families at the earliest stage of diagnosis and continues to support them through their treatment and their lives.



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Embracing new technologies

Congenital heart disease takes many forms, some of which will require little or no treatment for a child to live a full and healthy life.

Others, however, will need one of the many types of intervention provided by this unit, and a significant minority will need urgent and life-saving surgery.

Accurate diagnosis of heart abnormalities is therefore crucial for our team of five consultant paediatric cardiologists and three adult congenital cardiologists, who employ their sub-specialty expertise to provide a high-quality service and travel hundreds of miles across the South West to ensure that any condition is identified as early, and as accurately, as medical science and individual expertise will allow.

Many abnormalities will be detected even before birth. When routine ante-natal checks identify a possible foetal heart abnormality, the mother-to-be will see a foetal medicine specialist and foetal cardiologist in Cardiff or Bristol, either in person or via a telemedicine link. When a foetal abnormality is diagnosed that is likely to need urgent care within the first days of life, mothers may be referred to St Michael's Hospital, close to our team, where we provide an expert peri-natal cardiology service and subsequent care for newborns.

In all cases where a condition has been diagnosed, the children will come under the care of a named paediatric cardiologist.

Some problems may only be identified after birth. These children come to us by referral from paediatricians and GPs, which might lead to an outpatient consultation with one of our paediatric cardiologists in Bristol, at one of the peripheral clinics we run at 10 district general hospitals across the region, or by telemedicine (see opposite).

Others will present as acute cases – sometimes very acute, requiring retrieval to the Paediatric Intensive Care Unit (PICU) and urgent assessment by the on-call cardiologist, intensivist and cardiac surgeon.

In some cases, where an echocardiogram (or ECHO, which is an ultrasound examination of the heart) or electrocardiograms (ECG) have not provided enough information to make a full diagnosis, it will be necessary to investigate further using a diagnostic catheter or state-of-the-art cardiac MRI.

For the rest of those children's treatment, the same consultant will be responsible for managing their care, talking to the families, and ensuring the unit's team works closely together for the benefit of the patient.

A familiar face: the paediatric cardiac liaison nurse

"What might be seen as a relatively routine condition for us will still be something that can disrupt the life of a whole family. Our job is to become the familiar face that the family knows, to be the link through the whole process."

Cathy Harrington is a paediatric cardiac liaison nurse. She meets parents when their child has been diagnosed and stays with them through every stage of the child's treatment, preparing them if their child needs to be admitted to hospital and greeting them on arrival.

She plays an integral part in their discharge, provides vital advice on long-term care, and

arranges follow-up treatment where it is needed.

As well as providing a highly specialised clinical service, the cardiac liaison nurses work with local hospitals, nurseries, schools, and other agencies to ensure that a patient's care is as comprehensive as possible.

Cathy says: "When a child is receiving this sort of treatment, families can feel that their own lives are on hold. Our role is to help normalise patients' lives as far as possible – in the family, in school, and throughout their lives. The help we provide involves getting to know both patients and their families."



Cardiac liaison nurse Cathy Harrington talks to a patient



Dr Andrew Tometzki talks to Dr Helen Liversedge, lead for ultrasound in the Centre for Women's Health, Exeter, via telemedicine

Diagnosis across the region

We are the paediatric cardiac unit serving children with heart disease in both the South West of England and South Wales.

Bristol is the closest unit to both areas, and has excellent motorway and other transport links. However, the geography of the region means that patients could travel for hours by road to see a consultant.

That is why we have developed a 'hub and spoke' model for diagnosis and other aspects of care. We are the hub, providing services for referring hospitals in the South West.

Clinicians at these hospitals are in daily and, if needs be, hourly contact with Bristol – but we also run peripheral clinics in Bath, Barnstaple, Cheltenham, Exeter, Gloucester, Plymouth, Swindon, Taunton, Torbay, and Truro, which specialist paediatric

Retrieval service

Our retrieval service can despatch a team of paediatric specialists to anywhere in the region within 45 minutes, at any time of day or night, seven days a week. On average, one child a day is retrieved to the unit for treatment – where necessary, with a specialist consultant as part of the team.

cardiologists from the unit visit, in most cases, on a monthly rotation.

We work closely with four consultant paediatric cardiology colleagues at University Hospital Wales, who refer patients to Bristol from South and West Wales when further investigation, surgery or intervention are needed (see page 14).

Telemedicine – diagnosis in high-definition

On screen, a tiny heart beats in the womb. As he watches it carefully, consultant paediatric cardiologist Dr Andrew Tometzki talks to the mother-to-be and the consultant obstetrician at their local hospital.

A normal consultation – except that the mother, her doctor, and the ultrasound scanner are in Exeter, while Dr Tometzki is here in the Children's Hospital in Bristol.

The unit is expanding its telemedicine service – a live link with referring hospitals that allows consultants to view data from distant machines in real time, and with the extreme precision required for foetal and paediatric consultations, while having a 'virtual' conversation with the family.

In the future, the service will be extended to more of our referring centres. One of telemedicine's greatest benefits is to patients admitted as emergencies, hundreds of miles from the specialist, allowing expert diagnostic help and support to be immediately available.

"It allows us to make an acute diagnosis and helps us and the referring paediatricians decide whether and how to transfer a child to us, using intensive care support if need be," says Dr Tometzki. "The high quality of the link is like being in the room with the patient and looking directly at the scan."



Pre-admission clinics: a further chance to ask

When a child is diagnosed as needing cardiac intervention or surgery which is not acute, we make an appointment for him or her to be admitted to hospital.

Before they are admitted, we see the child in the pre-admission clinic.

In recent years we have used pre-admission clinics more and more. They help patients and their families prepare for a hospital stay, and also help to reduce the child's length of stay in hospital.

At the clinics, patients are given a physical examination, chest radiograph, echocardiogram and screening blood tests to ensure they are fit for surgery and to assess whether their clinical situation has changed in any way. The parents will also

have the opportunity to meet the team responsible for their child's admission and discuss every aspect of their care.

As the clinics are held at the Children's Hospital, it is often possible for a child and his or her parents to see where treatment and recovery will take place, visiting the paediatric cardiac ward, and the Paediatric Intensive Care Unit. Patients and parents can also 'visit' theatre and the catheter lab via video, which gives them a virtual tour of our facilities.

Pre-admission clinics help to reduce cancellations and the possibility of families making unnecessary travel or care arrangements. They also give the child and his or her family the chance to get the answers to any questions they may still have.



Sue Simpson, cardiac physiologist service manager in the ECHO Suite

In theatre: patient safety first



Surgeons and nurses

- Having reviewed the diagnostic data, the surgeon carries out the operation with the help of the assistant surgeon.
- The scrub nurse gets everything that will be needed for the operation ready and acts as the 'go-between' between the sterile surgical team and the non-sterile support nurses.
- The scrub nurse passes the required instruments and equipment to the surgeon.

Perfusionists

- They control the heart-lung bypass machine which keeps the patient alive while the heart is stopped for the operation.
- Two perfusionists are always available for every operation.

Anaesthetic team

- They put the patient to sleep and keep them asleep during the operation.
- They also monitor and keep stable all physiologic parameters in the patient during the operation, and administer drugs and blood products.
- Anaesthetists are supported by highly-trained anaesthetic nurses or operating department assistants.

Cardiologists

- They refer the patients for surgery and ensure the correct information is available to the surgeon prior to the operation.
- They also attend in the operating theatre towards the end of the operation to perform an echocardiogram to confirm that the operation has been successful and that the heart is working well.



The surgical team

In paediatric cardiac surgery, success is measured in terms of children and young people whose lives will be happier and healthier as a result of our work.

Our team – recently expanded to include a third congenital cardiac surgeon – has consistently produced excellent results over the last 15 years.

When a child comes into the Children’s Hospital for surgery, his or her care is placed in the hands of a group of highly-trained paediatric specialists, whose teamwork is essential for a successful outcome.

As children are prepared for their operations in the cardiac ward, they will meet their cardiologist, anaesthetist, and surgeon, all of whom are involved in theatre.

The anaesthetists: easing the patient’s journey

“The part most people know about – keeping the patient asleep during an operation – is only a small element of the role,” says Professor Andy Wolf, paediatric cardiac anaesthetist. “As anaesthetists and paediatric intensivists, we have to have a very good, practical understanding of the physiology of the developing child and how the heart abnormality affects the child’s physiology. This has an impact all the way through the patient’s journey. We make the patient’s journey the least traumatic possible, while still achieving the clinical result.”

Like many of the unit’s clinicians, the team of five paediatric cardiac anaesthetists come to know patients early in their treatment through case planning meetings in advance of any surgery.

Patients are supported before theatre, during an operation, and in intensive care, with pain relief and close monitoring of the working of the child’s whole body. “Because of the nature of cardiac conditions, in some cases we will be intimately involved in a child’s care for many years,” says Prof Wolf.

The team puts strong emphasis on research and links with the University of Bristol. Our work on analgesia (pain relief) and blood pressure control is keeping the unit at the forefront of paediatric cardiac anaesthesia and cardiac intensive care.



Professor Andy Wolf discusses progress in PICU with the child’s mother

As well as academic research, the anaesthetists have learned from outreach work in the developing world.

An emphasis on fast-track surgery – which improves a patient’s care by minimising the amount of time they spend ventilated and on the intensive care unit – has been informed by voluntary work in places such as Egypt, Trinidad, Kenya and Syria.



In theatre: paediatric cardiac surgery

Surgery can be a new beginning for a child born with a heart abnormality. But it lies at the end of a long and careful process of diagnosis, pre-admission discussion, and consultation between the many clinicians in the unit.

At Bristol, we aim to ensure that patients – and their parents – are thoroughly prepared by the time they arrive at the operating theatre and that once there, they receive the highest standard of care.

Advanced research and a willingness to adopt new techniques and technologies have meant that children from the South West and South Wales can now receive every type of heart surgical procedure in Bristol, with the exception of cardiac transplantation.

Last year we successfully introduced a programme for the management of hypoplastic left heart syndrome (see 'New techniques', page 16). This means more children can have life-saving treatment closer to home, it also confirms our place as one of the leading paediatric heart surgery centres in the country, and underlines the fact that our standards are extremely high across all departments.

Every year, more children are being referred to us (in the last five years the number of operations we have performed has increased by 37%) and we are expanding to meet this need. Last year we recruited an additional paediatric cardiac surgeon, Mr Serban Stoica, to join our existing surgeons Mr Andrew Parry and Mr Massimo Caputo.

This has already contributed to a lower rate of cancellations and shorter waiting lists, and in time will mean that our 'theatre days' – broadly speaking, the number of operations we carry out – will rise by a third. PICU, where patients recover following a procedure, has expanded accordingly.

We have close links with the adult congenital heart disease service at the Bristol Heart Institute.

This vital connection provides important exchanges of expertise and technical knowledge – and as the surgeons performing the operations in children and the adults are the same, it also means a surgeon may follow an individual patient's progress from birth to adulthood.



PICU matron William Booth talks to a mother and patient

The Paediatric Intensive Care Unit (PICU)

When a child is admitted in an emergency, or has just undergone surgery or an intervention and requires the closest possible monitoring and care, he or she will come to the Paediatric Intensive Care Unit (PICU).

PICU is at the heart of the Children's Hospital, immediately next door to the operating theatre, and at any time about half of its 15 beds will be occupied by cardiac patients.

A staff of 120 nurses, who undergo at least 12 months of specialist training, provide constant care.

As the only unit of its kind in the South West, and the main resource for cardiac patients from South Wales, PICU is a busy place – it treats about seven children who have had elective cardiac surgery in Bristol every week, as well as emergencies.

It's also the base for our retrieval service – the rapid response team which goes out to collect cardiac patients who need intensive care on their way to Bristol.

Cleanliness and hygiene are obviously a priority, and PICU has had no recorded cases of MRSA bacteraemia or C.difficile in the last year. Clinical staff provide the very highest standards of medical care while making it a safe and welcoming place for parents and their children.

William Booth, the unit's matron, says: "For most families it will be the most traumatic and anxious time in their lives. They need to know that their child is not in pain or distress. We are very good at symptom control, and my practice is to walk around the unit every day and talk to the parents about anything they are concerned about. We want parents to be here – children are children, and their parents are the best people to look after them, with our support."



Cardiology clinics: providing continuing care

Most children we treat will not need invasive interventions or surgery to manage their heart conditions; others will receive successful procedures that set them on course for a healthy life, out of hospital, as outpatients.

Both groups, however, need regular contact with our paediatric cardiologists and specialist nursing staff to monitor their condition, check their treatments, and advise on the lifestyle choices best suited to them.

In most cases, children don't need to come to a children's hospital for this contact – it is often least disruptive to

family life if they see our specialists as near to home as possible. This is where our cardiology clinics come into their own.

Our cardiologists hold more than 15 clinics per week, in Bristol and in our network of peripheral clinics across the South West and, with our colleagues in Cardiff, South and West Wales.

The clinics are essential in bringing together patients, their families and clinicians, and ensuring that treatment – in particular for those who have undergone major surgery – continues to meet the requirements of the child.



Dr Alison Hayes, consultant paediatric cardiologist and lead for echocardiography

Room for families on the paediatric cardiac ward



Judith Hernandez
Lead nurse for
cardiac services

"Because we see some children from birth until they are approaching 18, there are nurses here who know patients for many years. This reassures children and their families, who really appreciate the security of a familiar environment."

Judith Hernandez is the cardiac unit manager, an experienced paediatric nurse now responsible for running the 16-bed Paediatric Cardiac Ward – Ward 32 – in the Children's Hospital.

Ward 32 is staffed by paediatric cardiac nurses and attended by every specialist branch of the cardiac team. And because it is exclusively for children with cardiac conditions, the ward is adapted to suit families as far as

possible without compromising care. There is a bed next to every child for a parent who wants to sleep on the ward; sometimes two parents can stay, and rooms are also available at nearby Ronald McDonald House.

A family room allows parents to prepare food and relax, while trained play specialists visit children who cannot leave their beds to use the play centre.

Although many patients will come for a short stay, children who have had major surgery may need care for ten days or more. When receiving a planned intervention or surgery, they will be prepared on the ward by the full team of clinicians involved in their treatment. They will come back to the ward after treatment – although many surgical patients will require additional monitoring in PICU for the first 24 to 48 hours.

"We try to reduce the time children spend in PICU. Wherever possible, we like to bring children



back onto the ward on the same day after an intervention. Here, school and play can be brought to them at their bedside."

Ward staff are trained to deliver clinical care to the highest standards, but are also available to deal with parents' practical concerns about treatments, long-term health concerns, or the practicalities of having a child in hospital. "I strongly encourage parents to speak to me or any of the other senior nurses whenever they have any questions. Every case is different; we treat each child as an individual."

Growing up in the Trust's family

Many years ago, children were told almost nothing about their heart conditions until they became 'adults' – at which point they had a complete change of clinicians, hospital and status.

But times have changed and we place great emphasis on gradually introducing children and teenagers to the nature of their condition, likely future care, and to the fact that they, not their parents, will assume responsibility for their health.

The paediatric cardiac unit and the adult congenital heart disease service work together to make this transition as seamless as possible.

Dr Graham Stuart is a consultant cardiologist specialising in congenital heart disease. He works with children and adults – he fitted a 15-year-old with the country's first-ever lead-free defibrillator earlier this year.

"There are now more adults with congenital heart disease than children, and to give them the best chances of living a full life, we need to gradually empower teenagers and introduce them to the issues around their condition. It is a process that can start at around 12 or 13 and is largely a matter of how you talk to the young people. Many of the boundaries between paediatric and adult services are, when it comes to teenagers, artificial.

"Most children with heart disease will require some sort of follow-up treatment as adults. It may not need to be frequent, but it will need to be expert. One of the big benefits of Bristol is this can all happen on one campus."

Samantha's story

Graduate Samantha is 22 and in the final stages of teacher training. At 10 she was diagnosed with a condition that made her heart beat too quickly and she was fitted with a pacemaker. Here, she tells the story of her recovery.

"Throughout my childhood I was a lively child; hyperactive was often a word used to describe me. I used to get what I called 'dizzy heads' where I would feel dizzy and see flashing lights. I had some tests done on my brain and on one occasion an ECG, but there appeared to be nothing wrong.



difficult location and my heart being so weak it needed a quick fix, my pacemaker at this time controlled the bottom of my heart. When I came out of hospital my heart slowly got better. I went for regular check-ups and went back to school starting by doing half days and increasing.

"Then, when I was 10, I was playing netball in my garden and felt very ill, so I called my mum who noticed when glancing at my chest that my heart was beating very fast.

"We went to the doctor who told us to pop into hospital. We weren't expecting to be there long; as far as we were concerned there wasn't much wrong. After walking up St Michael's Hill, we arrived at the hospital and staff were waiting for us; it was then that we realised something was wrong.

"I had atrial tachycardia and because I'd had it long term with no awareness, my heart was very weak and enlarged. I went into intensive care, and while I was here I had some operations in an attempt to zap the node that was making my heart beat too fast. The staff were lovely and entertaining, accompanying me in watching my favourite TV programme, Friends, and having hat competitions!

"While in intensive care my heart went into cardiac arrest, which is when I had my pacemaker fitted. Due to the AV node being in a

"My family and I were so pleased when we went for check-ups as it got a little better each time. When I was 16, it was time to have my pacemaker changed as the battery only had a life of about six years. I had this operation in the new Children's Hospital, which was lovely.

"As my heart was a lot better, the top part of my heart was beating at a slower pace so the settings of my pacemaker were changed so that my heart mostly beats like a normal one; an electrical signal is sent from the top chambers of my heart through the pacemaker to the bottom (that's my understanding of it in my own language).

"I had a few problems with my pacemaker after this operation. I had a lot of swelling around the area which caused the wires of my pacemaker to move and rub against my skin, so I had one more operation in the Children's Hospital, but then had to start going to the BHI. But having been there twice now for operations, I know it is no different – the staff are just as kind and helpful. And the check-ups are great, just to hear that everything is going OK."

Working with partners in Bristol and beyond

In recent years we have invested more and more effort into building relationships with other institutions so that shared knowledge and expertise can benefit our patients and society at large.

We are fortunate that we are at the centre of the University Hospitals Bristol family, which, as the major regional centre of medical research, is connected in turn to a wider network of research partners.

The opening of the Bristol Heart Institute (BHI) last year, as part of the Trust, has made Bristol a regional and national centre of excellence for clinical care and research into the treatment of heart disease. As the Paediatric Cardiac Unit is part of the Bristol Congenital Heart Centre, we are part of this wider family, alongside colleagues in the Grown Up Congenital Heart unit (GUCH). The BHI building itself is around the corner from the Children's Hospital.

Many of our clinicians conduct research in conjunction with the BHI, and all of them benefit from the ground-breaking work being carried out in cardiac surgery, cardiology and anaesthesia. Surgeon Dr Massimo Caputo is a principal investigator in the BHI's programme of research into paediatric cardiac surgery.

All of our surgeons and some cardiologists also treat adult patients with congenital heart disease there, creating a strong personal and professional link. Many of the children we treat will go on to receive care as adults at the BHI.

Few congenital heart disease centres in the country can offer an equivalent level of continuity of care between paediatric and adult treatment in such close proximity.



The BHI attracts world-class academics undertaking basic scientific research – and we are already translating this to care at the bedside. The links between teaching, training, research and clinical care are strong throughout the Trust. In our own team, clinicians both teach and have studied at the University of Bristol and the University of the West of England.

Biomedical Research Unit

The Biomedical Research Unit (BRU) for cardiovascular disease, based at the Bristol Heart Institute, is carrying out world-class research into heart disease. Two of the six areas of its research involve conditions that affect children – congenital heart abnormalities, and paediatric cardiac surgery.

Clinicians from our paediatric cardiac unit are closely involved in both conducting this research and translating its benefits to the children in our care. One example is the work of Professor Andy Wolf, consultant paediatric anaesthetist. His research into blood pressure control at the BRU may lead to better understanding of – and ways to treat – life-long high blood

pressure among patients born with abnormalities in the aorta.

The BRU is a joint project between the Trust and University of Bristol, and received £3.8m of Department of Health funding in 2008.

Bristol Medical Simulation Centre

Training in critical situations and clinical procedures has benefited from our links to the Bristol Medical Simulation Centre (BMSC), across the road from us in the University Hospitals Bristol Education Centre.

At the BMSC, the first centre of its kind in the UK, critical events that might be encountered in the Paediatric Intensive Care Unit or in theatre can be rehearsed using virtual models. Computer-controlled manikins play the part of patients, while training staff conduct scenarios designed to test and improve clinicians' reactions to pressure and unexpected situations.

The simulator is particularly valuable for practising very rare events or unusual procedures, so clinicians are prepared when a child's health is at risk.

Our links with South and West Wales

In recent years we have built a strong partnership with a team of four Consultant Paediatric Cardiologists at the University Hospital of Wales in Cardiff, who see children with heart conditions from across South Wales. In 2008/09, 199 children were referred to us by consultants in Wales for in-patient treatment.

In general, children from South Wales who need cardiac surgery, a cardiology intervention or cardiac intensive care, now come to us in Bristol for treatment.

The relationship requires close collaboration between our team, the patients' local paediatrician, and our colleagues in Cardiff.

Consultant paediatric cardiologist Dr Dirk Wilson, who is clinical director in Cardiff, says the partnership means comprehensive care can be offered to every patient. "We provide core cardiology care for our patients, so we have a close link with the team in Bristol. When a child needs to have some form of intervention, we jointly agree the treatment with the team in Bristol before the patient is formally referred. It requires very close

"We provide core cardiology care for our patients, so we have a close link with the team in Bristol... It requires very close communication between the two teams, and it is clinically effective."

Dr Dirk Wilson

Consultant paediatric cardiologist

communication between the two teams, and it is clinically effective. The feedback from parents and patients is that largely they are very satisfied."

As a result of the collaboration, our links to South Wales have grown. Last year, we received referrals from 12 Welsh hospitals, with a geographical spread extending from Withybush General Hospital in Haverfordwest, to Bronglais Hospital in Aberystwyth, and Nevill Hall Hospital in Abergavenny.

Our intensive care retrievals service collects acute cases which need to be admitted to our Paediatric Intensive Care Unit, and our cardiac liaison nurses provide one of a number of outreach and outpatient services that extend throughout the region.

Advances in telemedicine – which allows consultations to be done remotely between consultants and patients in Cardiff or their local District General Hospital, and consultants here in Bristol – are likely to see these links with South Wales grow further.



Leading our experts in South Wales

Dr Wilson was born in Ohio and moved to the UK aged 11. He has a medical degree from University of Wales College of Medicine (1989), with an intercalated BSc in physiology (1986). He completed specialist training at the University Hospital of Wales in Cardiff and Johns Hopkins University,

Dr Dirk G Wilson

Consultant Paediatric Cardiologist and Clinical Director, University Hospital of Wales in Cardiff

Baltimore, USA. Appointed as consultant paediatric cardiologist in Cardiff in 1999, he oversaw service reconfiguration with formal agreement to link with Bristol from 2001. Dr Wilson has been Clinical Director

(Child Health) of University Hospital of Wales in Cardiff since 2007 and Divisional Director (Children and Women's) since April 2010. **Key clinical interests:** Adult congenital heart disease and Marfan syndrome.



Leading our experts in Bristol



Mr Andrew Parry
Consultant Congenital
and Lead Cardiac Surgeon

Trained at Oxford University and undertook basic surgical training in the South of England. Completed adult cardiac surgical training at the Oxford Heart Centre and Papworth Hospital in 1995 then went to San Francisco for a specialised congenital period of training, initially for a year. After this, was invited to stay on for a year of research, during which time was appointed to permanent role of assistant professor in 1997. In 1999, returned to UK to take up a post in Bristol. Mr Parry is now the senior surgeon.

Key clinical interests: Neonatal cardiac surgery, management of patients with hypoplastic left heart syndrome, adult congenital cardiac surgery, and difficult pacing problems. Undertook research leading to Doctor of Medicine thesis into prospects for foetal cardiac surgery. Current research interests are the physiology of single ventricle circulations, brain injury associated with cardiac surgery, and the use of new and novel technology in the management of patients with congenital cardiac disease.

Dr Andrew Tometzki

Consultant Paediatric and Foetal Cardiologist and Lead for Cardiac Services



Qualified at Sheffield University in 1985, trained initially in paediatrics before concentrating on paediatric cardiology at Liverpool, Edinburgh and San Francisco. Dr Tometzki moved to the Bristol Royal Hospital for Children in July 1999. He has a particular interest in interventional cardiology and foetal cardiology. He set up the Bristol Children's telemedicine Service to allow remote foetal and paediatric cardiac diagnosis, counselling, multi-disciplinary meetings, as well as remote teaching of doctors, nurses and technicians.

Key clinical interests: Interventional cardiology, Foetal cardiology and telemedicine.

Dr Peter Davis

Consultant Paediatric Intensivist and Lead Clinician Paediatric Critical Care



Trained in paediatrics in Cardiff, Birmingham and Leicester. First trained in paediatric intensive care and retrieval medicine at Leicester Royal Infirmary, followed by training at Birmingham Children's Hospital, Glenfield Hospital in Leicester as an ECMO fellow, British Columbia's Children's Hospital in Vancouver, Great Ormond Street Hospital, and as chief registrar at the Royal Children's Hospital in Melbourne. Appointed as a consultant in Bristol in 2003 and became director of PICU in 2007.

Key clinical interests: Paediatric critical care epidemiology and organisation (member of PICANet Clinical Advisory Group and medical lead of South West Audit of Critically Ill Children). Chapter XB Expert Working Group member developing the Paediatric Critical Care Minimum Data Set.

Dr Mark Turner

Consultant and Lead for Grown-Up Congenital Heart Disease



Trained in Medicine at the University of Bristol and graduated with Honours in 1990. Served in the Royal Navy, where he trained in diving medicine as well as being a submarine escape instructor and ship's diving officer, before training in general medicine. Between 1996 and 2005 he trained in cardiology in Plymouth, Cardiff, Great Ormond Street Hospital and at University College London Hospitals. He completed a Doctorate of Philosophy at Cardiff University

in 2004 and was appointed as a consultant in Bristol in 2005. He is a member of the UK Sports Diving Medical Committee and an Approved Medical Examiner for Professional Divers.

Key clinical interests: Congenital and structural heart interventions, pacemaker therapy (especially cardiac resynchronisation) and diving medicine, particularly with respect to patent foramen ovale.

Looking to the future

Technology: the hybrid lab

The Bristol Heart Institute's new hybrid lab is one of the first in the country to allow cardiologists and surgeons to combine procedures that would normally be separated between a catheter lab and an operating theatre.

The lab contains advanced radiographical and other imaging equipment, which will support image-guided interventions like valve insertions from the groin, as well as a conventional operating table. By allowing multiple procedures to be carried out under the same anaesthetic, the lab minimises the time a patient spends in theatre and the number of hospital admissions they have.



The Bristol Heart Institute atrium

Research: open heart surgery

When children undergo open heart surgery to repair heart conditions or abnormalities that starve the body of oxygen, there is a danger their organs and brain could be damaged when they begin to receive their oxygen from a life-support machine.

Research* carried out by our unit in conjunction with the Bristol Heart Institute last year found that by limiting the amount of oxygen the child receives initially during surgery, the damage is reduced. The technique is likely to be adopted worldwide.

Our clinicians have built a tradition of research work, both with the University of Bristol and with academic and commercial research establishments across the UK. Our team is currently working on 19 major research projects.

New techniques: surgery for hypoplastic left heart syndrome

The hearts of children born with hypoplastic left heart syndrome (HLHS) have underdeveloped left side chambers and blood vessels, which means blood cannot be pumped directly into the aorta and around the body. Untreated, sadly the condition is fatal.

Treating HLHS requires a series of intricate operations, considered among the most technically complex procedures in cardiac surgery.

The first stage, the Norwood procedure, involves connecting the aorta to the right ventricle of the heart; a shunt is required so that blood continues to flow to the lungs. Last year, after a nearly a decade of preparation and research, our unit began to carry out this procedure, with excellent results.

We successfully performed seven of these procedures, with all of these babies discharged home well.

* The effects of normoxic versus hyperoxic cardiopulmonary bypass on oxidative stress and inflammatory response in cyanotic pediatric patients undergoing open cardiac surgery: a randomised controlled trial. Caputo M, Mokhtari A, Rogers CA, Panayiotou N, Chen Q, Ghorbel MT, Angelini GD, Parry AJ.

Data report: April 2007 – March 2010

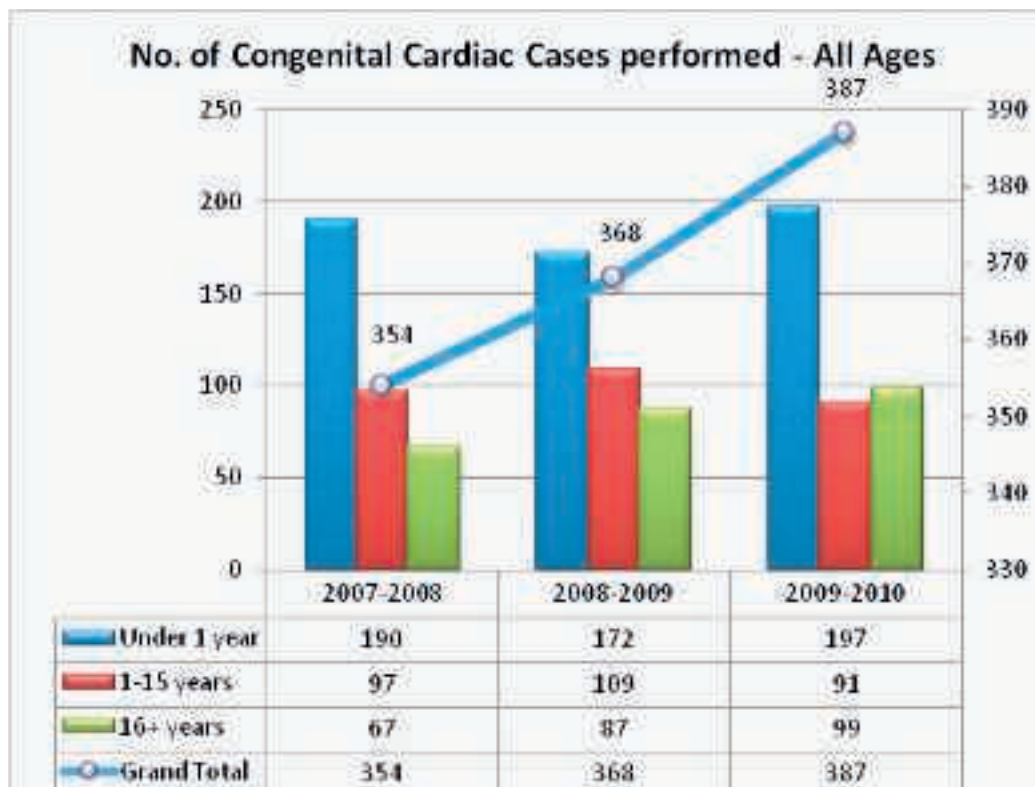
INTRODUCTION

This report presents in detail the activity and results of the congenital cardiac surgical service for the financial years 2007-2010. All data for the current year (2009-2010) has been internally validated and submitted to the Central Cardiac Audit Database (CCAD) www.ccad.org.uk who will be validating the data independently throughout the next calendar year. In previous years, the internal validation of the data presented within this report has been verified by CCAD.

SURGICAL ACTIVITY

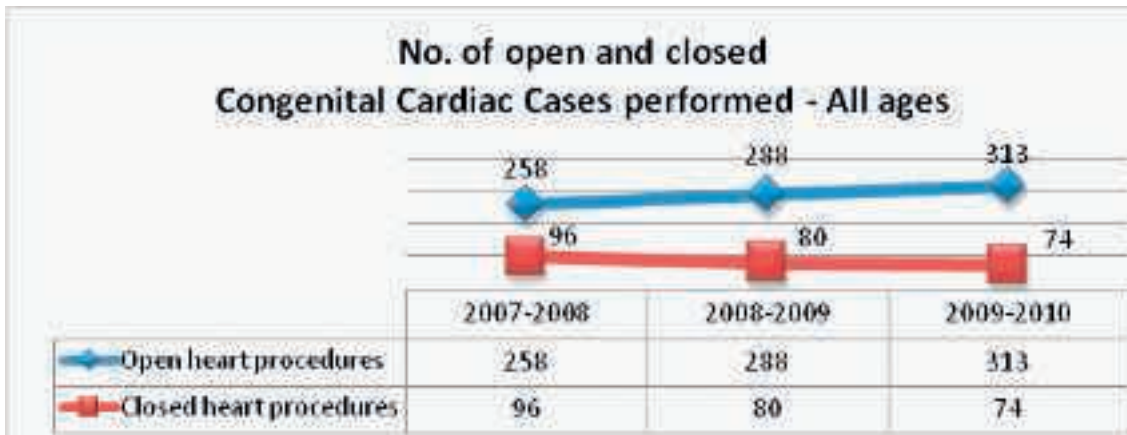
In the past three years, April 2007 to March 2010, the number of operations performed has increased year on year, from 354 to 387 (an increase of 9.32%). The breakdown in activity by patient age and year is as shown in Figure 1. Patients aged under 16 years were treated in the Bristol Royal Hospital for Children. All patients aged over 17 years were admitted to Bristol Royal Infirmary (BRI), or the new Bristol Heart Institute (BHI) from May 2009. Between the ages of 16 and 17, depending on family/patient preference and appropriateness of the care environment, patients were managed at either the Children's Hospital or BRI/BHI.

Figure 1.



Of these operations, 859 were open, meaning the heart-lung bypass machine was required to perform them, and 250 were closed, not requiring the use of the heart-lung bypass machine (Figure 2). Most of the closed cases (85.2%) were performed in children aged under one. During this period, the proportion of closed cases performed fell from 27% to 19% overall, and from 42% to 31% in children aged under one. This reflects our move away from a policy of staged palliation to primary repair in children with a two-ventricle circulation.

Figure 2.



DEMOGRAPHIC DATA

Of the patients treated, 50.9% were male and 49.1% female. 38.14% of patients had a Welsh postcode.

RISK STRATIFICATION

Operative risk is dependent on many factors. These include urgency of surgery (operative priority), age and size at the time of operation, pre-operative status, the number of previous operations, the complexity of the underlying cardiac anomaly, and the procedure being performed. These risk factors are considered individually and data from the current year has been compared with the previous years' data. Direct comparison with other UK centres is not possible within this timeframe due to the limited data available. The most robust data available comes from the Central Cardiac Audit Database (CCAD) initiative since all the data is independently validated. However, there is a time lag due to the process of validation and currently only data up to 2006-2007 is available.

When comparing figures from a single institution with national data, care must be exercised due to the potential for bias (in either population or institution) in the frequency and management of high-risk patients which may skew a surgeon's or institution's results. This is of particular relevance in the neonatal group, where the most complex and difficult patients require surgical management. In order to obtain meaningful comparisons with national data, we have reviewed those surgical procedures undertaken frequently where the patient population requiring treatment is relatively uniform and clear national comparative data are available.

OPERATIVE PRIORITY

Operative priority was categorised according to accepted definitions. The bulk of the workload for each year is elective, with 36-45% of all procedures being urgent or emergency operations and 55-64% elective (Table 1).

Table 1. Priority of procedure all ages (2007 to 2010)

	2007-2008		2008-2009		2009-2010	
	No. Cases	% Total	No. Cases	% Total	No. Cases	% Total
Under 16 years						
Elective	142	49.48%	147	52.31%	165	57.29%
Urgent	133	46.34%	124	44.13%	106	36.81%
Emergency	12	4.18%	10	3.56%	17	5.90%
Under 16 years total	287		281		288	

	2007-2008		2008-2009		2009-2010	
	No. Cases	% Total	No. Cases	% Total	No. Cases	% Total
Over 16 years						
Elective	54	80.60%	79	90.80%	84	84.85%
Urgent	11	16.42%	6	6.90%	13	13.13%
Emergency	2	2.99%	2	2.30%	2	2.02%
Over 16 years total	67		87		99	

AGE VERSUS OPERATIVE PRIORITY

Within the population of patients with congenital heart disease requiring surgery we continue to see a significant difference between age groups in the balance of elective to urgent or emergency cases (Table 2). The majority of procedures undertaken in neonates are urgent, whereas the majority of procedures undertaken in children aged over one year or in the adult population are elective. This reflects the fact that children with complex congenital cardiac disease and/or duct dependent circulation present early in life. For some infants, irreversible changes can occur early in the heart and lungs, even within the first few weeks or months of life, and surgery must therefore be undertaken promptly.

Table 2. Priority of case load by age and category

2007-08

Age category	Elective		Urgent		Emergency	
	No. cases	% Age	No. cases	% Age	No. cases	% Age
Neonate	1	1.67%	56	93.33%	3	5.00%
Infant	54	41.54%	69	53.08%	7	5.38%
Child	87	89.69%	8	8.25%	2	2.06%
16+	54	80.60%	11	16.42%	2	2.99%
Total cases	196	55.37%	144	40.68%	14	3.95%

2008-09

Age category	Elective		Urgent		Emergency	
	No. cases	% Age	No. cases	% Age	No. cases	% Age
Neonate	2	3.77%	48	90.57%	3	5.66%
Infant	50	42.02%	64	53.78%	5	4.20%
Child	95	87.16%	12	11.01%	2	1.83%
16+	79	90.80%	6	6.90%	2	2.30%
Total cases	226	61.41%	130	35.33%	12	3.26%

2009-10

Age category	Elective		Urgent		Emergency	
	No. cases	% Age	No. cases	% Age	No. cases	% Age
Neonate	8	10.67%	59	78.67%	8	10.67%
Infant	75	61.48%	41	33.61%	6	4.92%
Child	82	90.11%	6	6.59%	3	3.30%
16+	84	84.85%	13	13.13%	2	2.02%
Total cases	249	64.34%	119	30.75%	19	4.91%

NUMBER OF OPERATIONS — INCLUDING CURRENT PROCEDURE

In the under one year age group over this time, 15% had previously undergone surgery (Figure 3); this is consistent with our results for previous years. Most of those patients who underwent more than one operation were on a pathway of staged palliation for their cardiac problem. It is our policy to perform second stage palliation for single ventricle defects at four to six months of age, and complete correction for two ventricle morphologies at six to eight months of age. For children aged between one and 16 years, 27% had previously undergone at least one cardiac surgical procedure (Figure 4).

Figure 3.

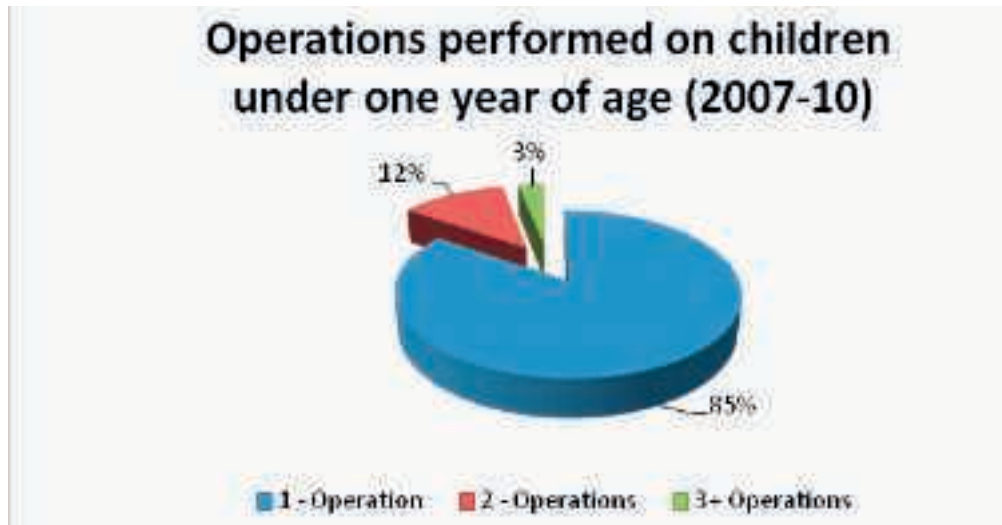
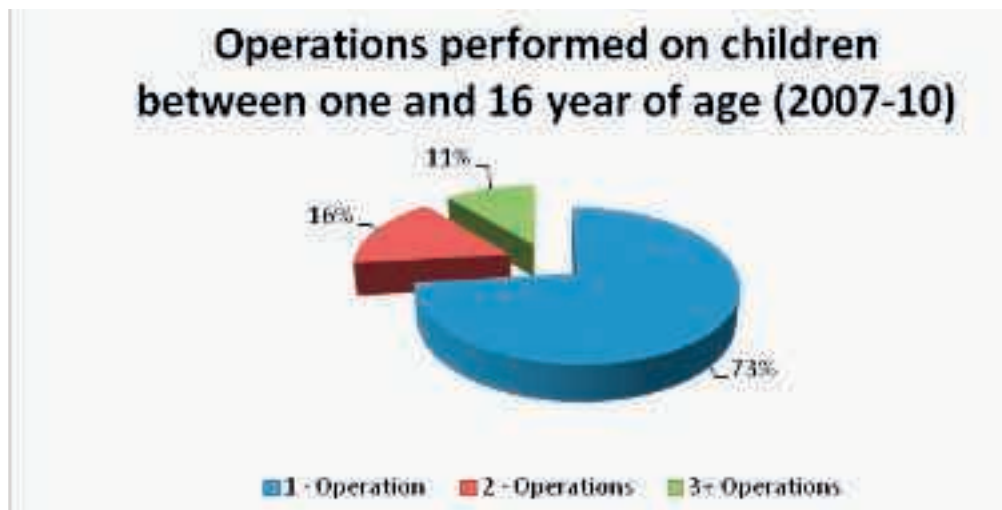


Figure 4.



SURGICAL OUTCOME

Since priority of the procedure, the complexity of surgery, and the number of previous operations have previously been shown to be independent predictors of outcome after surgical procedures, surgical outcome is presented below with these considerations. All data relate to the initial operative procedure performed; for patients requiring re-operation for a residual lesion during the same hospital stay, outcome is attributed to the primary procedure. This is the same premise on which the Central Cardiac Audit Database (CCAD) reporting is based and data should therefore accurately reflect the risk of surgery for any particular congenital cardiac lesion – visit www.ccad.org.uk/congenital for more information. In this section, deaths are recorded if they occurred within 30 days of surgery or during the primary hospital stay, whichever is the shorter.

MORTALITY VERSUS PRIORITY OF PROCEDURE

Any operation which is necessary as an urgent or emergency procedure is associated with an increased risk as there is less time available to stabilise the child, and the deleterious effects of the defect cannot be completely alleviated before intervention is required. The more urgent the surgery, the sicker the child is and the less time is available to prepare the child for surgery. This is reflected in the outcomes. Overall mortality for the years 2007-2010 was 1.2% for elective cases, 1.3% for urgent cases, and 6.7% for emergency cases (Table 3).

Table 3. Mortality by priority of procedure all ages (2007-10)

Age group	Priority	No. of cases	No. deaths	% Mortality
Under 1 year	Elective	190	3	1.6%
	Urgent	337	4	1.2%
	Emergency	32	2	6.3%
Under 1 year total		559	9	1.6%
1-15 years	Elective	264	1	0.4%
	Urgent	26	1	3.8%
	Emergency	7	1	14.3%
1-15 years total		297	3	1.0%
16+ years	Elective	217	4	1.8%
	Urgent	30	0	0%
	Emergency	6	0	0%
16+ years total		253	4	1.6%
Total overall		1109	16	1.4%

MORTALITY VERSUS COMPLEXITY OF SURGERY

Operations for congenital heart disease are divided into 'closed' (those not requiring the use of a heart-lung bypass machine) and 'open' (those requiring bypass) operations. 'Open' cases are further divided into 'simple' or 'complex'. More complex surgery is associated with increased risk (Table 4).

Table 4. Mortality by operation type all ages (2007-10)

Year	Operation type	No. cases	No. deaths	% mortality
2007-2008	Closed	96	4	4.2%
	Open/Simple	67	0	0.0%
	Open/Complex	191	3	1.6%
2007-2008 total		354	7	2.0%
2008-2009	Closed	80	0	0.0%
	Open/Simple	102	0	0.0%
	Open/Complex	186	3	1.6%
2008-2009 total		368	3	0.8%
2009-2010	Closed	74	1	1.4%
	Open/Simple	126	2	1.6%
	Open/Complex	187	3	1.6%
2009-2010 total		387	6	1.6%

As demonstrated below (Table 5) the majority of open heart procedures in neonates were not only urgent, but also complex.

Table 5. Age and type of operation (2007-10)

	Closed no. cases	No. deaths within 30 days	Open/ Complex	No. deaths within 30 days	Open/ Simple	No. deaths within 30 days
Neonate	91	1	82	2	15	0
Elective	4	0	6	0	1	0
Urgent	78	1	72	2	13	0
Emergency	9	0	4	0	1	0
Infant	122	2	146	2	103	2
Elective	19	1	85	1	75	1
Urgent	97	1	54	0	23	0
Emergency	6	0	7	1	5	1
Child	27	1	158	2	112	0
Elective	17	0	140	1	107	0
Urgent	10	1	15	0	1	0
Emergency			3	1	4	0
16+	10	1	178	3	65	0
Elective	7	1	153	3	57	0
Urgent	2	0	21	0	7	0
Emergency	1	0	4	0	1	0
Total overall	250	5	564	9	295	2

MORTALITY VERSUS NUMBER OF OPERATIONS INCLUDING CURRENT PROCEDURE

As indicated previously, many patients with congenital heart disease will require multiple cardiac surgical procedures. Due to the normal healing process, scar tissue forms around the heart which must be dissected through at all further operations; the greater the number of operations the thicker the scar tissue. The risk of subsequent operations is therefore likely to increase. Further, those patients requiring multiple cardiac surgical procedures are usually those with more complex anomalies. Previous cardiac surgery is therefore recognised as being associated with an increased risk for subsequent procedures. From our own data the only single year which fulfils this prediction is 2009-2010, while from the overall data for the three years the mortality for first, second, and third operations is 1.29%, 2.39%, and 1.07% respectively (Table 6).

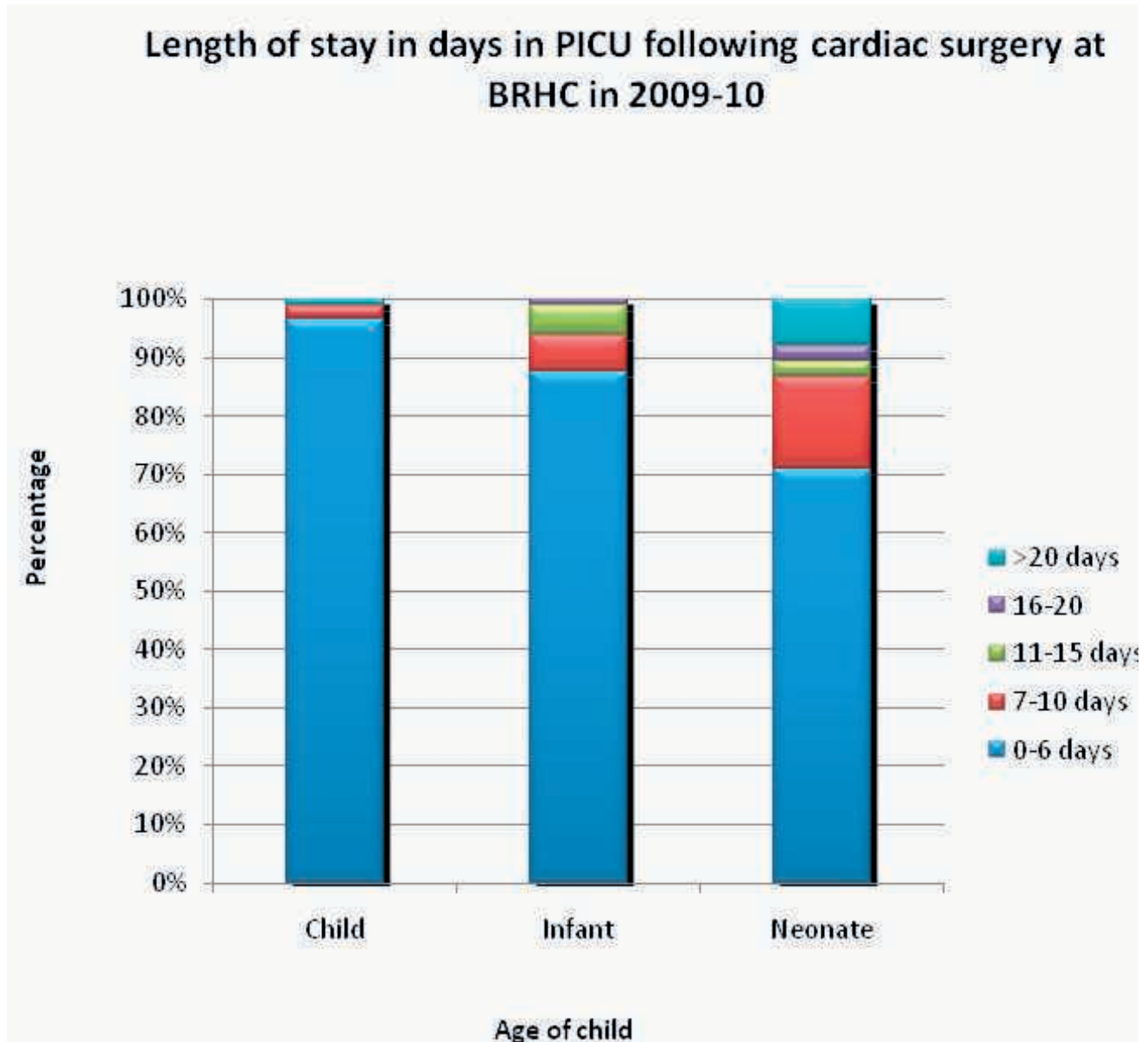
Table 6. Mortality by number of operations – open and closed (all ages)

Year	Operations performed	No. cases	No. deaths	% mortality
2007-2008	1 Operation	261	6	2.3%
	2 Operations	60	1	1.7%
	3+ Operations	33	0	0.0%
2008-2009	1 Operation	282	1	0.4%
	2 Operations	53	2	3.8%
	3+ Operations	33	0	0.0%
2009-2010	1 Operation	306	4	1.3%
	2 Operations	54	1	1.9%
	3+ Operations	27	1	3.7%

POST-OPERATIVE RECOVERY AND HOSPITAL STAY

The duration of intensive care required following cardiac surgery depends on the severity of the heart disease (and therefore also the complexity of the surgery performed) and the pre-operative status of the child. As could be predicted from this, the neonatal group had the longest Paediatric Intensive Care Unit (PICU) stay with a median post-operative stay of three days, compared to two days for infants and one day for children (Figure 5).

Figure 5.



SURGICAL DATA – CASE MIX AND PATIENT SELECTION

As patients and parents strive to ensure that their surgery or that of their child is performed only in a centre where the results are good, it is not uncommon for results from different surgical units to be compared. This exercise must, however, be undertaken with great care due to inherent bias potentially present within the data. The prime factors in this consideration are case mix and patient selection. If coarse data were simply compared without appreciating the complexity of the case mix, a very biased conclusion could be reached: a centre doing only low-risk procedures would appear to be performing better than one in which all procedures, including very high-risk

cases, were being treated. Similarly, for two centres offering the same surgical procedures, if one centre refused to treat patients considered to be 'high risk', this centre would appear 'better' than the other in which all patients underwent surgery.

The identification of national 'benchmark' procedures has been an attempt to minimise confounding factors and to allow fairer comparison between centres. However, the type and number of procedures identified as 'benchmark procedures' are limited and make up less than 50% of the surgical workload. In Table 7 we report categories of congenital cardiac surgical procedures which are undertaken in sufficient number with a patient profile of predictable complexity to allow reasonable comparison. In order for further comparison of overall mortality data with other units to be valid we need to address any potential concerns that our cases are somehow less complex or different from other centres. Over the last year, after 10 years of preparation and training, we started a programme for the surgical treatment of patients with hypoplastic left heart syndrome. Therefore, we now offer surgery for every congenital heart defect. The results we publish reflect our experience with all these children. Further, all children, except those with co-existent, lethal, extra-cardiac abnormalities, are offered treatment in our unit.

BENCHMARK PROCEDURES

In 1998 the Society of Cardiothoracic Surgeons of Britain and Ireland proposed that an individual surgeon's performance should be continually monitored through selected 'benchmark' procedures. Six were identified: ASD closure, VSD closure, repair of complete AV septal defect, correction of Tetralogy of Fallot, arterial switch procedure in 'simple' transposition and repair of coarctation. Data for our unit for these common benchmark procedures and other common abnormalities are presented in Table 7. The death following PDA ligation in 2007-2008 was in a very premature infant who recovered from the operation but died of complications of prematurity.

Table 7. Benchmark procedures

	2007-2008		2008-2009		2009-2010	
	cases	Deaths	cases	Deaths	cases	Deaths
Closed heart procedures						
CoA	34	0	21	0	26	0
PDA	22	1	30	0	27	0
Closed heart procedures total	56	1	51	0	53	0
Open heart procedures						
ASD	27	0	35	0	30	0
ASO	23	0	21	0	13	0
CAVSD	11	0	10	0	11	0
Fallot	20	0	25	0	25	0
Fontan	10	1	5	0	5	0
Norwood					7	0
PAVSD	5	0	12	0	9	0
Truncus	1	0	3	0	2	0
VSD	41	0	37	0	43	0
Open heart procedures total	138	1	148	0	145	0
Grand total	194	2	199	0	198	0

Key of abbreviations:

CoA	Repair of aortic coarctation	PDA	Ligation of persistent ductus arteriosus
ASD	Closure of atrial septal defect	ASO	Arterial switch operation
CAVSD	Repair of complete AV septal defect	Fallot	Repair of Tetralogy of Fallot
PAVSD	Repair of partial AV septal defect	Truncus	Repair of truncus arteriosus
VSD	Closure of ventricular septal defect		

Acknowledgements

With thanks to José Velázquez, information and data manager, and Mike Wakelam, information analyst, at Bristol Royal Hospital for Children for their efforts in assisting with data acquisition, data analysis and the preparation of this report.

“This report demonstrates that Bristol continues to meet the challenges of new and innovative techniques in congenital heart surgery. These results are testimony to the dedication of the whole clinical network, from early and accurate diagnosis to the necessary teamwork in the theatre and intensive care arenas, as well as the support following discharge home by our colleagues in Cardiff and the peripheral hospitals in the South West and South Wales.”

Mr Andrew Parry

Lead Consultant Paediatric Cardiac Surgeon, Bristol Royal Hospital for Children
June 2010



The paediatric cardiac team – nurses, AHPs, doctors and surgeons – in the Children’s Hospital outdoor play area

If you would like this report in any other language or format, please contact:

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A copy of the data report April 2007–March 2010 is available to view or download on our website, www.uhbristol.nhs.uk, under ‘Key Publications’.

Through our patients' eyes...



BRISTOL ROYAL HOSPITAL FOR CHILDREN



DR ANDREW TOMETZKI



DR GRAHAM STUART



DR GRAHAM STUART



RADIO LOLLIPOP



'MY NURSE'



PLAY LEADER MICHELLE