Cardiac centre of excellence

Royal Brompton Hospital, London

Mark Nicholls profiles Royal Brompton Hospital—and its partners Harefield Hospital and the National Heart and Lung Institute—as a cardiac centre of excellence

Royal Brompton Hospital locally known as The Brompton, can trace its origins back to the 1840s. As a tuberculosis and respiratory hospital, it pioneered treatment in the field but it was only in the late 1940s that cardiac care was explored.

Today, from its West London site in Chelsea, it is still renowned for its respiratory work but throughout the second part of the 20th century, and into the 21st, evolved into a leading cardiac centre. Partnered with Harefield Hospital near Uxbridge, sharing the same management, and working alongside the National Heart and Lung Institute (NHLI) at Imperial College London as the university arm of the National Health Service (NHS) trust, it is a centre which prides itself on leading innovative research whilst providing first class care to patients.

Particular areas of specialty in cardiology and research expertise include heart failure, cardiovascular genetics and inherited cardiac conditions, congenital heart disease, arrhythmias, device implantation, and remote monitoring, as well as percutaneous valve replacements, and imaging advances (particularly magnetic resonance imaging), with the umbilical link to Harefield as one of Europe’s main transplant centres.

Martin Cowie, Professor of Cardiology at the NHLI and Consultant Cardiologist at Royal Brompton & Harefield NHS Foundation Trust, explained: ‘We view ourselves as the first place to come to in the UK, and probably in Europe, for many innovations across the board of cardiac disease. If somebody is developing a new drug, diagnostic technique or procedure, we want to be the first into that space when it moves from animal work into first-in-man trials and early randomized trials’. Consequently, for example, the hospital was the first to work in Europe with the CardioMems system with a microchip placed in the pulmonary artery for patients with heart failure to facilitate remote monitoring. Royal Brompton took on the first 12 cases and then led a pan-UK study in 15 hospitals. Another example, in an overlap with respiratory specialists at Royal Brompton, was in developing new ventilation and mask technologies within SERVE-HF, the world’s largest randomized trial of treatment of sleep apnoea and heart failure.1

Gene therapy work led by Dr Alexander Lyon, saw the Brompton deliver the UK element of the global CUPID 2 trial2 focussing on a virus to transfect the myocardium with genes that in heart failure are switched off. ‘We used the virus to put the genes back into the heart’, added Professor Cowie, who stressed that trials are not always about delivering positive results but also about changing guidelines and clinical practice. ‘Electrophysiology has also rapidly expanded and we are very interested in exploring new techniques, equipment, and procedures, not just with cardiologists but with cardiac surgeons with hybrid procedures for some patients with complex issues. This organisation is not siloed, there is a lot of cross talk within the organisation.’

Royal Brompton has a cardiac sarcoid clinic as a sub-speciality with a large cohort of patients jointly working between respiratory consultants and cardiologists.

In addition to heart failure (led by Professor Cowie), congenital heart disease is a stand-out area of research and care and the world’s first adult congenital heart disease unit in the world, set up by Professor Jane Somerville, now sees 10,000 patients a year. Other areas of strength are in cardiac magnetic resonance imaging—developing, imaging, training, and working with inherited cardiomyopathies—and with a new sleep centre focussing on sleep apnoea and cardiac problems as well as cutting edge aortic and mitral valvular procedures.

The hospital also hosts world-class research facilities including an advanced cath lab—with a showpiece magnetically guided catheter—and consulting room facilities that underpin much of the research in areas ranging from drug studies to complex interventions. The Genetics and Genomics Group is integral to cardiovascular research at the trust, with research focused on identifying new genes and mechanisms for inherited cardiac conditions.

Leading experts at Royal Brompton include Dr Ali Vazir for acute heart failure; Drs Sabine Ernst and Tom Wong for electrophysiology; Professor Stuart Cook in cardiovascular genetics, notably in inherited dilated cardiomyopathies; and Professor Dudley Pennell in cardiovascular imaging. Innovation in imaging includes using three-dimensional imaging and printing to create replicas of patients’ hearts—research led by Dr Sonya Babu-Narayan—to help plan and carry out surgery with CMR.

They follow a long line of renowned cardiologists and cardiac surgeons associated with Royal Brompton and Harefield including Professor Sir Magdi Yacoub for transplantation; coronary stent pioneer Dr Ulrich Sigwart, Professor Carlo Di Mario for various complex procedures; Neil Moat in the aortic arena; Professor Jane Somerville for adult congenital heart disease; and Professor Philip Poole-Wilson for heart failure.
Royal Brompton Hospital has more than 2200 staff, 312 beds, and 15 day-case beds. In addition to five operating theatres and one hybrid theatre, there are five catheter laboratories. It has 27 cardiologists, 7 adult cardiac surgeons, and 4 congenital cardiac surgeons.

During 2016/17 adult procedures conducted included 508 coronary artery bypass grafts, 404 valve repairs or replacements (242 Aortic, 132 Mitral, 29 Tricuspid, 1 Pulmonary), 684 angioplasties (508 elective and 176 urgent/emergency), 924 cardiac ablations, and 573 first time pacemaker implantations.

Royal Brompton’s congenital work for the same period saw it conduct 350 paediatric and 125 adult surgical procedures, 310 paediatric and 134 cardiology procedures, and 107 paediatric and 101 adult diagnostic catheter procedures. The hospital also offers extracorporeal membrane oxygenation.

Harefield Hospital has more than 1300 staff, 168 inpatient beds, and 17 day-case beds. 5 theatres, and 4 catheter labs and is one of the largest and most experienced centres in the world for heart and lung transplants. It has 22 cardiologists (equivalent to 14 whole time equivalents) and 9 cardiac surgeons.

Procedures conducted in 2016/17 included 1570 Percutaneous Coronary Intervention procedures (697 primary, 212 NSTEMI, 661 elective), 586 cardiac ablations, 484 first time pacemaker implantations, 567 coronary artery bypass grafts, 483 valve repair or replacements (281 aortic, 145 mitral, 53 tricuspid, 4 pulmonary), and 22 heart transplants.

Research, innovation, and education have been constant themes at a hospital that has seen many firsts; Royal Brompton cardiologists were the first to use ‘closure devices’ as an alternative to surgery for children born with a cardiac septal defect and a coronary sinus reducing device for refractory angina. The hospital became an international leader in the treatment of heart failure, with large research trials, such as EUROPA and COMET); 3,4 and invested in the first dedicated cardiac magnetic resonance imaging scanner in the UK in 1984 and undertook the first clinical magnetic resonance heart scan.
With collaborations across Europe and the world, funding from the British Heart Foundation and other charities, the Medical Research Council, Wellcome Foundation, EU grants, industry, and the hospital trust, ongoing or recently completed studies include REM-HF to evaluate implantable devices for management of heart failure patients; studies in genomic and regenerative medicine; and interaction with environmental medicine in areas of pollution and nano-technology and a focus on precision/personalized medicine.

‘Royal Brompton sees itself not just as a busy clinical centre but one of its major points is to find new therapies and get them into practice quickly’, said Professor Cowie, who has been at the hospital for 15 years and is a past-Chair of the British Society for Heart Failure. He also sat on the Board of the Heart Failure Association of the European Society of Cardiology (ESC) and is a Non-Executive Director of the National Institute for Health and Care Excellence (NICE).

Royal Brompton remains acutely aware of its history and past achievements and is also grateful to its patients in supporting research, many whom have donated their hearts over the years as specimens for a fascinating Morphology Museum (including that belonging to a World War One soldier with a bullet lodged in it!)

‘This organisation is pleased about its past results but it is always looking to the future’, adds Professor Cowie.

Kim Fox, Professor of Clinical Cardiology and Head of the National Heart and Lung and a Consultant Cardiologist at Royal Brompton Hospital, is keen to emphasize the hospital’s defining ethos. ‘It is cradle to grave; we treat the patient from before they are born right up until they die’, he states, pointing to aortic valve procedures conducted in a foetus. He also underlines the link with Harefield Hospital (the two sites became a unified trust in 1998) with patients with congenital heart disease or heart failure going on to transplantation as well as the interaction between cardiac and respiratory care. Together, they care for more than 190,000 patients in outpatient clinics and over 40,000 patients on wards. The hospital performed the UK’s first coronary angioplasty in 1980 and implanted the first coronary stent in 1988. Professor Fox points to cutting edge care in organ support and replacement; the UK’s largest and most experienced centre for heart and lung transplants; and a large left ventricular assist device (LVAD) programme. In 1983, Professor Yacoub carried out the world’s first heart/lung transplant at Harefield, and in 1995 pioneered the development of LVADs. ‘It was Magdi Yacoub who led the whole concept that you could put in a LVAD so the heart could rest and then take out the device, meaning the patient did not end up needing a heart transplantation’, said Professor Fox, a former ESC President and Editor-in-Chief of the European Heart Journal.

Professor Fox has led numerous collaborations on multi-scale clinical trials in interventional cardiology and the epidemiology and pathophysiology of coronary artery disease (CAD). That saw his team involved in identifying the use of ACE inhibitors in the management to improve prognosis of patients with CAD, with Professor Fox leading the highly-cited EUROPA study. He has played a major role in further clinical trials such as ASCOT and SEARCH, with his research covering management of coronary disease across Europe, and many other coronary disease drugs from betablockers, calcium antagonists, and nitrates.

The third RAND analysis (2016) of influential biomedical and health research highlights that the Trust produces more highly cited publications about respiratory and cardiovascular medicine than any other NHS trust in England.

But Professor Fox emphasizes that while advanced research and pioneering treatments are carried out, the patient remains at the core of the activities of Royal Brompton and Harefield. ‘Everything we do at Royal Brompton and Harefield is based on our patients’, he concluded. ‘Our research is patient focussed and we believe we can give the best care to our patients by having a high-profile interaction between our clinical and research colleagues’.

Conflict of interest: none declared.

References
References are available as supplementary material at European Heart Journal online.