An Integrated Cardiovascular System (ICVS): Cardiothoracic / Vascular Surgery

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Summary

The joint vision of our groups is to be the premier cardiothoracic/vascular surgical unit in the United Kingdom and Europe.
Both surgical groups recognise, 1) the great potential of a comprehensive integrated service approach (form remains to be decided by our organisations) to delivery of cardiac surgical services for the large population of UCLP, 2) the critical mass that would be created by a unified UCLP approach to care delivery in terms of financial sustainability in a period of limited resources and, 3) the unique opportunity to further develop the sub-specialty services essential to both the care of our cardiac surgical patients in the 21st century and the future growth and development of the cardio thoracic/vascular surgical specialty in our ACSN.

The surgeons in the groups are strongly supportive of these new opportunities, NOT to create just a larger version of the current units, but as a basis for the essential further development of our sub-speciality programmes in, 1) aorto-vascular surgery with co-location of vascular surgery . 2) minimally invasive surgery (including robotics), 3) hybrid surgery, 4) heart failure surgery (ventricular assist systems and Extra Corporeal Membrane Oxygenation) and 5) strategic future recruitment of sub-specialty surgeons.

Introduction

Currently, Cardiothoracic/vascular surgical services are in a period of flux in London including amalgamation of smaller centres to achieve critical mass, commissioning of subspecialty services which require essential collocations not uniformly present in single specialty hospitals and the ‘Safe and Sustainable’ review.

Current Cardiac Surgery Services in UCLP AHSN

Cardiothoracic Surgery is delivered across 3 sites within UCLP: Barts Health and the Heart Hospital (UCLH) serving North East and North Central London, respectively and the Essex CTC (Basildon). This document only refers to Barts and the Heart Hospital which perform 1400 and 900 cardiac surgical operations a year, respectively. In addition, Barts and the Heart perform 500 and 700 thoracic procedures a year, respectively. The activity from a combined unit of Barts and the Heart Hospital will make it one of the largest in the UK and certainly in London (see Figure below). The hospitals have a distinguished reputation for exemplary results (National Adult Cardiac Surgery Audit report 2009-2011), integrated care, patient centric pathways and strength in innovation and research.
**Figure 1:** Cardiac Surgical Cases performed in the large cardiac units in the UK, NCBC data 2011-2

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**Key Areas of Expertise:**

1. **Aorto-Vascular Surgery**

Thoracic aortic aneurysms are estimated to develop at a rate of 5.9 new cases per 100000 person years (1). The risk of rupture / dissection in aneurysms increase with size and surgery is performed to prevent this or in the acute setting of a Type A aortic dissection which is the most catastrophic event affecting the aorta. Type A dissection of the aorta occurs in 5-30 in a million people a year with mortality without surgery up to 1% per hour during the first 48 hours (2-4).

Aorto-vascular surgery is one of the most challenging within cardiac surgery particularly for repair of aortic arch aneurysm and acute dissections. Both Trusts provide surgery for all forms of aortic pathology including aortic valve sparing root replacement (David, Yacoub), Bentall operations), ascending, arch (elephant trunk operation) and descending aortic replacement. Endovascular stenting is also available for descending aortic aneurysms and type B aortic dissections when complications occur. The cardiac surgeons work closely with their vascular surgical and vascular interventional counterparts. Hybrid operations are also performed to treat complex and extensive aorto-vascular disease utilising conventional surgery (debranching procedures) and endovascular techniques. Latest up to date technology has been introduced with the use of the 'frozen' elephant trunk technique allowing for single-stage repair of combined aortic arch and descending aortic aneurysms using a 'hybrid prosthesis' consisting of a non-stented end for conventional aortic anastomosis at the arch and a stented end for the descending aortic aneurysm.
As part of the recommendations from the London Cardiovascular Project commissioned by NHS London, Barts Health and the Heart Hospital currently provide dedicated dissection services to cover the North East and Central London quadrant for acute dissections.

2. **Valvular Heart Disease**

Barts Health and the Heart Hospital offer a full spectrum of valvular heart surgery including mitral valve repair. The superiority of mitral valve repair over replacement is well documented and requires special expertise(5). Both centres have mitral valve teams with a high rate of repair for degenerative mitral valve disease with a low mortality. Minimally invasive surgery through a small incision is offered in suitable cases.

Minimally invasive aortic valve replacement is also offered at both hospitals and the results of aortic valve surgery in the units are one of the lowest in the country (NACSA report 1999-2011).

The treatment of aortic valve disease has been advanced by the utilization of innovative technology including Transcatheter Aortic Valve Implantation (TAVI) which is particularly suited for high risk patients and those where conventional surgery cannot be offered. Both institutions combined have carried out a total of about 350 TAVI procedures over the last 3 years. The programs in both Trusts have been extremely successful with an increasing demand and a mortality which is below the national average.

An innovative extension of the TAVI procedure has been the introduction of sutureless aortic valves in conventional aortic valve surgery which reduces the operative time and enables conventional surgery to be performed more safely in high risk patients (reoperative surgery, aged, multiple cardiac procedures, calcified roots). Barts Health commenced a sutureless aortic valve program 2 years and is now the leading unit and training centre for one of the main sutureless valves in the UK.

3. **Surgery for Hypertrophic Cardiomyopathy**

The Heart Hospital and Barts Health have active programmes in the treatment of hypertrophic cardiomyopathy consisting of a multi-disciplinary team of cardiac surgeons, inherited disease and imaging cardiologists and electrophysiologists. Treatment modalities include alcohol septal ablation, cardiac resynchronization therapy and surgical septal myectomy. The Heart Hospital has the largest HOCM unit (medical and surgical) in the UK and Europe.

4. **GUCH Surgery**

See congenital heart disease document.
5. **Thoracic Surgery**

The Heart Hospital and Bart’s Health perform 1200 thoracic procedures annually including innovative minimally invasive surgery (VATs lobectomies and EBUS).
Barts Health is moving towards a dedicated thoracic surgical unit with 2 thoracic surgeons.

6. **Surgical Research**

UCL is one of few remaining thriving Cardiac Surgical Research programmes in the UK. Cardiac surgical research at UCL is clinical, translational and basic. All of these components are externally funded (from NIHR in the UK, NIH in the US and from the European Union).
Cardiac surgical research at Barts Health is carried out at Charterhouse Square in collaboration with our cardiovascular colleagues. The new heart research centre is engaged in large clinical trials, extensive genetic and DNA sequencing research. There are active grants (NIHR) on stem cells, renal injury post cardiac surgery, cardiac trauma in conjunction with the trauma centre and the armed forces.

**Challenges to current status**

1. Lack of essential co-dependencies on-site (but within the Trust) (vascular surgery, vascular radiology, nephrology etc)
2. Inability to recruit strategically. With a larger critical mass of patients, it would be easier to recruit and develop sub-specialised surgeons and regional 24/7 services (aortic, mitral, TAVI, thoracic)
3. Lack of financial underpinning to grow and innovate
4. Threat to growth and innovation in the future by lack of sub-specialty services. The innovating centres in the UK have tended to be in the larger units
5. Competition evolving in recognition of some of the above issues in London
6. Lack of facilities to expand at the Heart Hospital

**Potential Benefits of a UCLP Approach**

Although the current units are strong, the surgical groups recognise the potential of a ACSN (UCLP) approach to planning and delivery of cardiovascular surgical care for a large population.

Cardiac surgery continues to be technology-driven and dependent on multi-disciplinary care. These trends are accelerating and the leading units in the country have largely expanded through sub-specialty development and funding (ventricular assist devices, ECMO, pulmonary thromboendarterectomy, hybrid procedures, minimally invasive technologies robotics etc.).
The costs of equipment, facilities, appropriately trained consultants, and support staff in adequate numbers and essential co-locations (interventional radiology, vascular surgery, nephrology, specialist cardiology) demand a critical mass to be achieved. A thriving training programme derives from this. Good examples in the UK are seen in Papworth and the Liverpool Heart and Chest Hospitals, which are amongst the country’s largest and most diversified cardiac surgical units.

**Specific Areas of potential benefit**

1. **Regional aorto-vascular centre** - Surgery of the aorta can be complex and may require highly specialised cardiovascular and multi-disciplinary expertise particularly to expand our hybrid programmes. The service would benefit from working within a network unified coherent approach. A single regional unit will provide the critical mass to develop the necessary experience and expertise to achieve world class results and generate the necessary investment for a sub-specialty where results are continuously improving through innovative technology. The presence of the hybrid theatre at Barts is unique amongst the cardiac units in London and most of the country and will enhance and facilitate the growth of this specialty with the potential of making this the premier centre of excellence for complex aorto-vascular disease in London attracting work throughout the capital and nationally. The dissection service would also benefit from a single referral point available to the North East-Central London quadrant where clear referral pathways exist within the Emergency Units and London Ambulance Service.

2. **Mitral valve centre** - There is a general recognition that the results of mitral valve repair are more successful in high volume units and a combined service would ensure this success within the AHSN.

3. **Regional TAVI Service for UCLP** - The merger of two medium sized TAVI units would create one of the largest TAVI units in the UK. TAVI is a growing subspeciality within interventional cardiology and cardiac surgery with an increasing demand as a result of an increasing aged population. As there is a high cost to these procedures, it is likely that future funding of such programs will only be centred in high volume units and the creation of a single centre would favour this.

4. **Ventricular assist device programme** – The number of heart transplants in the country are steadily decreasing due to a lack of available organs and with the advancement of 3rd generation ventricular assist devices (VADs), there is a general recognition that destination therapy with LVADs may be more widely adopted when patients are not eligible for heart transplantation.

5. **Dedicated Thoracic Surgical Unit** - There is a growing demand for thoracic surgery particularly within cancer and a need to expand and improve these services by thoracic sub-specialisation within cardiothoracic surgery. Although there are many advantages towards having a thoracic unit operational within an integrated cardiothoracic surgical centre, we recognise that these issues are being addressed
separately with London Cancer in partnership with UCLP to improve Thoracic Surgical care to our patients.

5. Improved training and recruitment - The creation of one of the largest surgical units in the UK will enhance education and training. Barts Health have already expanded the number of national surgical trainees from 1 to 4 over the last 3 years and the increase in activity and expertise will be seen by trainees and the deanery to be desirable as part of their curriculum and training program, respectively. A unit with such strength in numbers and diverse subspecialty expertise will also find it easier to attract eminent appointments to strengthen its position.

6. Research, basic science and clinical trials - The significant critical mass resulting from the merger of the two units will see a unique base for the development or trials for new technology in industry and successful national funding for clinical trials, outcome and epidemiological studies. The continuing development of the Yale-UCL collaboration has the potential to be a national / international leader in research.

7. Wealth creation (UCL/Yale) - Invention and development of a new heart valve (currently underway)

8. Intellectual Property - Exemplary surgical results, innovative surgery, clinical education and research within one of the largest surgical units in the UK will be used to create a brand for the AHSN. This brand could be used to assist or set up cardiac surgical units in other regions of the world.

Proposal

The cardiac surgical groups at Barts and the Heart Hospital are ambitious and successful, but recognise the challenges for our future in our current environment. We support an aspirational UCLP approach to cardiovascular and thoracic surgical service delivery. This document reflects a broader development than simply a possible hospital merger. The potential benefits, outlined above, are clear. A larger, more of the same, unit will NOT achieve these benefits and is not regarded as meeting the needs of cardiothoracic surgery for London in the future. We look forward to working together as cardiothoracic surgeons with leadership of our Trusts and UCLP in developing this initiative.
References