SCTS CONFERENCE NEWS

Welcome to Wales and the 2024 SCTS Annual Meeting

Welcome to the 2024 SCTS Annual Meeting, the UK's premier cardiothoracic surgical meeting. It is a great pleasure to welcome you to the International Convention Centre (ICC) Wales and the organisers are honoured and delighted with your presence at this meeting. As ever, the meeting will include a wide range of educational formats presenting the latest and the best information on new technologies and techniques in cardiothoracic surgery, the presentations will be of interest to all cardiothoracic surgeons and allied health professionals. By emphasising areas that are important in your daily clinical work, we are hoping to create an interactive meeting with the exchange of knowledge and ideas, facilitating discussions and debates between delegates.

This year's meeting will include presentations of the highest quality from surgical and masterclass presentations to the latest clinical updates and technical innovations. As ever, the meeting will also witness some outstanding debates presented by some of the foremost experts in their field. In addition to the clinical presentations, do not forget to attend this year's Presidential Address by Narain Moorjani (Monday 28 March, 9 am, Auditorium) and later in the same session, witness the tributes paid to Professor John Pepper, who will receive the SCTS' Lifetime Achievement Award.

Outside of the meeting, all delegates are invited to this year's SCTS Annual Dinner, which will be held on Monday 18 March at the ICC. This year's theme is 'Gala'. Some spaces are still available, please ask at the registration desk for further details.

The organisers would like to extend their thanks to industry for their continued support of the meeting, and all the presenters who have taken the time to contribute to this year's *SCTS Conference News* newspaper.

We hope you enjoy the meeting and remember to make in note in your diaries for next year's meeting that will be held in Edinburgh, on 16–18 March 2025!

Creating Innovative ways to enhance patient care
Tuesday 19 March   **15:30-17:00**   HALL 3D

Endoscopic Vessel Harvesting (EVH) – New devices, reduction in learning curve & patient satisfaction

Lesley Scott   Surgical Care Practitioner, Golden Jubilee University National Hospital, Glasgow, UK

Fraser Sutherland   Consultant Cardiothoracic Surgeon, Golden Jubilee University National Hospital, Glasgow, UK

We share our experience of setting up an endoscopic vessel harvesting (EVH) programme, using the New CoreVista system from CardioPrecision and harvesting tools from Getinge. We established our programme with two clear goals. Firstly, to improve the patient experience and secondly, to improve the comfort and wellbeing of staff during surgery. We also hoped to speed up the learning curve.

The patient benefits of EVH are well known. Surgical care practitioners (SCPs) perform vein harvest almost every day over many years so posture is really important for long-term health and well-being. Across the UK a number of SCPs are off work from back or neck strain injuries at any one time, so we wanted our programme to deliver known benefits of EVH for patients but also provide SCPs with a much-improved work posture. We reasoned that over the long term, our approach would reduce sickness absence and prolong the working life of allied health professionals.

EVH is fundamentally an on-screen procedure so the position of the screen is important. Locating the screen immediately above the task space is known to improve speed and accuracy of complex motor tasks, such as those employed during endoscopic harvesting.

In other fields of surgery, the on-screen operation is the main procedure so the screen is positioned optimally for the surgeon. In contrast, EVH is peripheral to the main CABG operation and space around the operating table is limited by an extensive scrub trolley, bypass machine, heater-cooler unit, transoesophageal echo and other equipment like cell savers, intra-aortic balloon pump etc. In the current UK model, the screen has to be positioned around all of this and hence is positioned sub-optimally.

Lesley Scott

Early detection of Lung Cancer
Monday 18 March   **11:00-12:30**   HALL 2D

Evaluating outcomes of lobectomy and sublobar resection for non-small cell lung cancer: A propensity score matched analysis

Duaa Ali Faruqi   King's College London, London, UK

Background

Non-small cell lung cancer (NSCLC) remains the leading cause of cancer mortality worldwide, accounting for over 80% of lung tumours. Lobectomy, the removal of an entire lung lobe, has been the gold-standard procedure for early-stage NSCLC, based on recommendations published in the Lung Cancer Study Group Randomised controlled trial in 1995. However, unprecedented advances in surgical techniques, diagnosis, and disease comprehension have propelled a need to redefine our treatment options and revisit the debate regarding sublobar resection in lieu of lobectomy.

Our research

This was a single-institution retrospective study analysing data from 3,983 patients, comprising of 3,032 lobectomy patients (76%) and 951 sublobar resection patients (24%) between 2013 and 2023. This study aimed to compare the recurrence and survival rates of lobectomy compared to sublobar resection, with significant implications for patient survival and postoperative outcomes. Propensity-matched analysis was employed, yielding 264 pairs, and incorporated eight covariates including age, sex, tumour size, staging, histology, American Society of Anaesthesiologists (ASA) score, smoking status and forced expiratory volume (FEV1). Survival and recurrence outcomes were

Duaa Ali Faruqi

assessed using a log-rank test and Kaplan-Meier curves.

Results

One of the study's key findings is the non-inferiority of sublobar resection when compared to lobectomy in terms of recurrence-free survival (p=0.31) and overall survival (p=0.47) rates. Patients who underwent sublobar resections showed similar survival outcomes to those who had lobectomies, with a five-year survival rate that remained consistent across both groups. Both procedures had comparable lengths of hospital stay, complication rates,

Endoscopic Vessel Harvesting

CoreVista was designed to provide on-table visualisation for complex cardiac surgical procedures, like totally endoscopic aortic valve replacement. During the Covid pandemic, its use was adapted for EVH. A robust frame attaches to the operating table, a linear actuator provides gross height adjustment and a sterile arm supports a custom, state-of-the-art, high-definition surgical monitor. The monitor is covered with a sterile disposable drape with an optically clear window for crystal-clear imaging during surgery. The screen angle can be adjusted with one hand for optimal viewing angle and minimal disruption.

We started the programme in March 2023 and now have three operators fully trained with circa.130 cases performed to date. Feedback from patients has been universally positive and we were able to reduce the average length of stay by one day.

Independent operating was achieved in two weeks, which we believe is the fastest time to train from 'novice-to-independence' in the UK. It can be difficult to measure learning curves, so we took a pragmatic approach and measured our curve from the day the proctor arrived until departure. Verification of learning was evidenced by operators continuing to perform EVH procedures independently after the proctor had left. Of course, we continue to improve as we gain experience.

We were the first NHS hospital to use this combination of devices for EVH and we strongly recommend the set-up to others wanting to start an EVH programme. As harvesting is easier and faster to learn using this system, we also recommend it to experienced operators wanting to train new recruits, such as surgical trainees without the need for external proctors.

Fraser Sutherland

CoreVista System

Evaluating outcomes of lobectomy

and postoperative mortality rates (p=0.21). Additionally, it was noted that the mean number of lymph node sampling was significantly higher in the lobectomy group (median: 5, IQR: 3–6), as opposed to a median of 2 (IQR: 0-4) in the sublobar group (p <0.001). Univariate and multivariate analysis was conducted to identify key drivers and determinants for recurrence. Multivariate cox-regression analysis revealed that sex (p=0.015), age (p=0.018) and ECOG performance status (p=0.020) were significant predictors of recurrence.

Clinical implications

These findings suggest that sublobar resection is non-inferior to lobectomy, challenging the current paradigm of surgical management for NSCLC. One of the pivotal arguments for sublobar resection is its lung-sparing nature. In an era where preserving the quality of life is as paramount as extending it, this less invasive surgery could offer significant benefits, particularly for younger patients who may face the prospect of future cancers, or patients with a high comorbidity index.

The conclusions drawn from this study suggest a shift in the landscape of lung cancer surgery. This study reinforces the need for personalised treatment strategies, emphasising the importance of patient-centred care. As thoracic oncology continues to advance, the balance between preserving healthy lung tissue and ensuring survival becomes ever more critical.

Moderated Posters: Cardiac 3 Tuesday 19 March **15:30-17:00** HALL 4

Endoscopic vein harvesting in CABG: Initial experience in a single centre

Muslim Mustaev, Nisha Nair, Ashwini Chandiramani, Kamran Baig, Michael Sabetai St Thomas' Hospital, London, UK

Endoscopic vein harvesting (EVH) has been well established over the past decades and has developed as the preferred technique for obtaining the long saphenous vein (LSV), a widely used conduit in coronary artery bypass graft (CABG) surgery. The evolution and refinement of EVH techniques aim to address and enhance the shortcomings associated with the conventional open vein harvesting technique (OVH), namely, a higher incidence of wound-related complications, pain and suboptimal patient satisfaction.

In our trust, the EVH program was launched in May 2023 and the proctorship was provided by the industry. At the start of the pilot program, one senior full-time surgical care practitioner (SCP) was proctored on a daily basis. There have been 50 cases performed to date, with the first 20 cases carried out under the close supervision of a proctor and progressing towards independent cases. In the trust, some consultant surgeons use the 'bridging technique' routinely for LSV conduit harvesting in CABG. The experience with the bridging technique has been incremental in creating a platform of experience and skillset advancing towards lesser invasive techniques.

An audit was performed to evaluate the unit's initial experience and patient outcomes post-EVH. Thirty consecutive patients were audited 8-28 weeks after surgery. A dedicated questionnaire was designed to assess patient symptoms, wound healing, analgesia requirements, infection rates and quality of life post-operatively. The patients reported faster wound healing, lesser pain, better patient satisfaction and quality of life post-CABG. The audit results have been analysed and presented at the SCTS 2024 meeting.

The unit's experience has shown that the transition from traditional OVH to EVH was especially challenging due to initially being accustomed to and efficient in performing the OVH and vein-bridging techniques. Some drawbacks of EVH during the initial learning period included the need for expensive equipment, prolonged duration of EVH time (30-40 minutes, compared to the departmental average vein harvesting time of 10–15 minutes with OVH) and vein quality. These drawbacks were offset by gaining more experience by initially taking one vein and by improving an operator's experience. Initially, it was also challenging to overcome difficult intraoperative situations, some of which included double vein branches and bleeding in the tunnel field, especially in obese patients. Over time, this has improved with enhanced hand-eye coordination, equipment handling and stack positioning. The learning curve highlighted the importance of patient selection as some patients have unfavourable vein anatomy (superficial veins, thin-legged patients, varicose veins, and peripheral vascular disease). Therefore, careful selection of the appropriate incision site and preoperative ultrasound of the LSV is essential to assess the vein quality, dimension, depth, and identification of side branches.

Overall, our unit's initial experience with EVH provides evidence that with trust leadership and proctorship, EVH has become one of the major steps for safer CABG, better clinical outcomes, and patient satisfaction. During the initial learning curve, it is vital for a step-by-step approach with multidisciplinary team support, departmental leadership, adequate patient selection and improving operator's experience.

St Thomas' Hospital Cardiac Surgery Team – (left to right) Ashwini Chandiramani, Michael Sabetai, Nisha Nair, Kamran Baig, Muslim Mustaev.

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Join our presentation during the Industry Session

Mastering Endoscopic Vein Harvesting
Peter Bhinda
Surgical Support Specialist TCV EMEA
Monday 18th March 2024
8:00 – 8:30 am in Hall 1C

TERUMO
CARDIOVASCULAR

Transbronchial lung ablation for malignancies – Four-year results

Joyce Chan Prince of Wales Hospital, Hong Kong

Transbronchial microwave lung ablation has been a novel local therapy for early lung cancers and lung oligometastases in selected patients, who typically have high surgical risks or suffer from multifocal cancers. In Prince of Wales Hospital of Hong Kong, where we have access to a hybrid operating room (Figure 1), we have performed transbronchial microwave ablation with EmprintTM Ablation Catheter with ThermosphereTM technology (CovidienTM, Plymouth, MN, USA) using electromagnetic navigation bronchoscopy guidance for over four years. Microwave is superior to radiofrequency ablation in that it provides a more uniform and predictable ablation zone in tissues with high impedance like the lung. It also has less heat sink effects compared to radiofrequency. Transbronchial access compared to percutaneous access also

Joyce Chan   Figure 1

greatly reduces the risk of pneumothorax or other pleural-based complications. In this article, we review the safety and mid-term control rate of this technique.

Between March 2019 and September 2023, 194 nodules in 128 patients were treated. Eligible lung nodules were either proven lung cancers, metastases, or radiologically suspicious. The mean maximal diameter of lung nodules was 12 mm (range 6-29 mm), and the bronchus sign was positive in 28.4% of them. Using transbronchial access tools, we can reach the majority of peripheral lung

lesions even though they do not have a bronchus directly leading into them. The Technical success rate was 100%, although 85 (43.8%) nodules required double ablation and 22 (11.3%) required triple or more ablation for adequate coverage. The mean minimal ablation margin was 6.2 mm (Figure 2). The mean hospital stay was 1.55 days, with 77% and 96% of cases being discharged by post-ablation days 1 and 3 respectively.

Complications rates were low, which included mild pain not requiring hospitalization (8.7%), pneumothorax requiring drainage (4.1%), post-ablation reaction (3.1%), pleural effusion (2.1%) and hemoptysis (2.1%). There were only two cases of bronchopleural fistula which were treated with transbronchial tissue glue injection and endobronchial valve respectively, without long-term sequelae. The mean follow up was 24.6 months. For the 131 nodules which had completed at least one-year follow up computer tomography scan, 9.2% had local recurrence, which can be further treated with repeated microwave ablation or stereotactic radiation therapy.

With this review, transbronchial microwave ablation at Prince of Wales Hospital is a safe and feasible local treatment option for lung malignancies, including both primaries and secondaries. Case selection is important taking into account both patient characteristics (oligometastases, small lung nodules in poor surgical candidates, multifocal lung cancers) and nodule
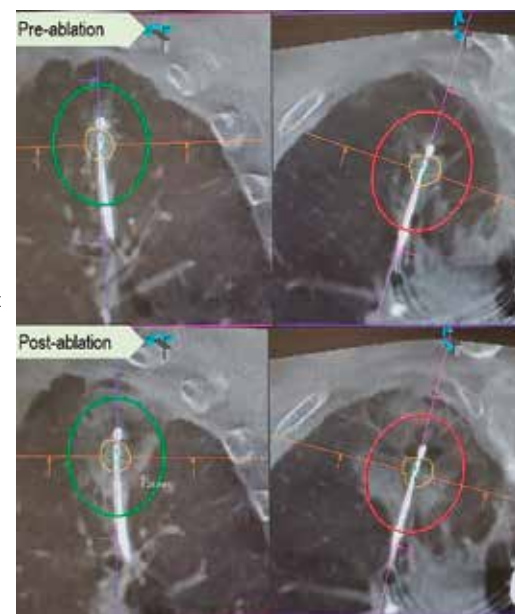

Figure 2

characteristics (size, location, proximity to blood vessels). The mid-term local control rate is reasonable and comparable to similar local treatment modalities like stereotactic radiation therapy, although direct comparison studies are lacking.

Paravalvular leak and clinical outcomes following transcutaneous aortic valve implantation (TAVI) vs surgical aortic valve replacement (SAVR): A systematic review and meta-analysis

Karim Moawad

University Hospital Southampton NHS Trust, Southampton, UK; University Hospitals Coventry and Warwickshire, Coventry, UK

Introduction

Aortic valve stenosis is a prevalent cardiac condition necessitating timely intervention for symptom alleviation and prognostic improvement. Surgical aortic valve replacement (SAVR) and transcatheter aortic valve implantation (TAVI) are the mainstay treatments for this condition. While TAVI offers the advantage of being less invasive, it is associated with a higher incidence of paravalvular leaks (PVLs) compared to SAVR. Understanding the impact of PVLs on clinical outcomes following aortic valve interventions is crucial for optimizing patient care and treatment strategies.

Objective

This review aims to systematically assess the impact of PVLs on survival, progression of heart failure, and the need for re-intervention following aortic valve interventions, with a focus on both SAVR and TAVI approaches.

Methods

A comprehensive systematic literature search was conducted from the inception of TAVI in 2002 until
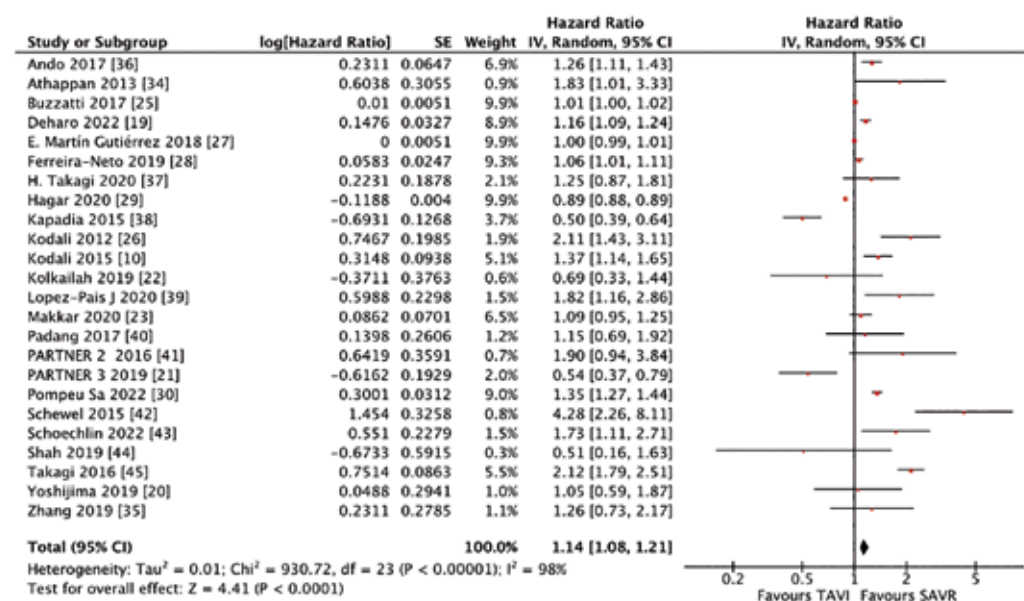
December 2022. Databases including Embase (Ovid), MEDLINE (Ovid), Science Direct, and CENTRAL (Wiley) were utilized. The review protocol was registered in PROSPERO (ID: CRD42023393742), and PRISMA guidelines were followed. Eligible studies were selected based on predetermined criteria, and data were extracted for analysis. Meta-analysis was performed using Revman V5.4, employing a random-effects model for calculation.

Results

Twenty-eight studies met the eligibility criteria, with 24 included in the meta-analysis, while four were synthesized narratively. The meta-analysis revealed a significant association between PVLs and all-cause mortality (HR 1.14, 95% CI 1.08 – 1.21, P < 0.0001) across follow-up durations ranging from 30 days to five years. Furthermore, the incidence of PVLs was notably higher with TAVI compared to SAVR, emphasizing the importance of monitoring and managing PVL-related complications in both intervention arms.

Discussion

The presence of even mild or higher degrees of PVLs following aortic valve interventions is associated with unfavourable clinical outcomes, including increased all-cause mortality and diminished quality of life. The higher incidence of PVLs in TAVI underscores the importance of careful patient selection and procedural techniques to minimize this complication. Strategies to mitigate PVLs, such as optimized valve sizing, meticulous procedural

Study or Subgroup	log[Hazard Ratio]	SE	Weight	Hazard Ratio IV, Random, 95% CI
Ando 2017 [36]	0.2311	0.0647	6.9%	1.26 [1.11, 1.43]
Athappan 2013 [34]	0.6038	0.3055	0.9%	1.83 [1.01, 3.33]
Buzzatti 2017 [25]	0.01	0.0051	9.9%	1.01 [1.00, 1.02]
Deharo 2022 [19]	0.1476	0.0327	8.9%	1.16 [1.09, 1.24]
E. Martín Gutiérrez 2018 [27]	0	0.0051	9.9%	1.00 [0.99, 1.01]
Ferreira–Neto 2019 [28]	0.0583	0.0247	9.3%	1.06 [1.01, 1.11]
H. Takagi 2020 [37]	0.2231	0.1878	2.1%	1.25 [0.87, 1.81]
Hagar 2020 [29]	-0.1188	0.004	9.9%	0.89 [0.88, 0.89]
Kapadia 2015 [38]	-0.6931	0.1268	3.7%	0.50 [0.39, 0.64]
Kodali 2012 [26]	0.7467	0.1985	1.9%	2.11 [1.43, 3.11]
Kodali 2015 [10]	0.3148	0.0938	5.1%	1.37 [1.14, 1.65]
Kolkailah 2019 [22]	-0.3711	0.3763	0.6%	0.69 [0.33, 1.44]
Lopez–Pais J 2020 [39]	0.5988	0.2298	1.5%	1.82 [1.16, 2.86]
Makkar 2020 [23]	0.0862	0.0701	6.5%	1.09 [0.95, 1.25]
Padang 2017 [40]	0.1398	0.2606	1.2%	1.15 [0.69, 1.92]
PARTNER 2 2016 [41]	0.6419	0.3591	0.7%	1.90 [0.94, 3.84]
PARTNER 3 2019 [21]	-0.6162	0.1929	2.0%	0.54 [0.37, 0.79]
Pompeu Sa 2022 [30]	0.3001	0.0312	9.0%	1.35 [1.27, 1.44]
Schewel 2015 [42]	1.454	0.3258	0.8%	4.28 [2.26, 8.11]
Schoechlin 2022 [43]	0.551	0.2279	1.5%	1.73 [1.11, 2.71]
Shah 2019 [44]	-0.6733	0.5915	0.3%	0.51 [0.16, 1.63]
Takagi 2016 [45]	0.7514	0.0863	5.5%	2.12 [1.79, 2.51]
Yoshijima 2019 [20]	0.0488	0.2941	1.0%	1.05 [0.59, 1.87]
Zhang 2020 [35]	0.2311	0.2785	1.1%	1.26 [0.73, 2.17]
Total (95% CI)			**100.0%**	**1.14 [1.08, 1.21]**

Heterogeneity: Tau² = 0.01; Chi² = 930.72, df = 23 (P < 0.00001); I² = 98%
Test for overall effect: Z = 4.41 (P < 0.0001)

Favours TAVI Favours SAVR

planning, and novel device technologies, warrant further investigation to improve patient outcomes.

Conclusion

Paravalvular leaks represent a significant concern following aortic valve interventions, with implications for patient survival, heart failure progression, and

the need for re-intervention. Vigilant monitoring and management of PVLs are paramount, particularly in the TAVI setting, where the incidence is higher. Future research efforts should focus on refining procedural techniques and developing adjunctive therapies to minimize PVL-related complications and optimize patient outcomes.

Early results of Repair of Acute Type-A Aortic
Dissection using the Ascyrus Medical Dissection Stent- A Single Centre Experience

Firas Aljanadi, Jenna Doherty, Chris Austin, Pushpinder Sidhu, Reuben Jeganathan, Gwyn Beattie, Mark Jones, Alsir Ahmed Department of Cardiothoracic Surgery, Royal Victoria Hospital, Belfast, UK.

Acute type A aortic dissection (ATAAD) is associated with a high risk of operative mortality and significant perioperative morbidity. Ascyrus Medical Dissection Stent (AMDS) is an innovative uncovered aortic stent graft, used as an adjunct to standard acute aortic dissection repair. It is designed to prevent distal anastomotic new entry (DANE) tears, thereby enhancing true lumen re-expansion, false

Firas Aljanadi

Alsir Ahmed

lumen obliteration, and aortic remodelling. We avoided using the AMDS device in those patients with a dilatation of, or an intimal tear in the aortic arch. We hereby describe

our early outcomes of the AMDS use in our centre.

This is a case series with retrospective data acquisition at our institution, which encompassed the

perioperative outcomes of patients who received an AMDS as part of their ATAAD repair between November 2021 and February 2023. This included operative and short-term mortality, device-related complications, malperfusion, as well as false lumen obliteration and true lumen expansion.

Twenty consecutive patients underwent an ATAAD repair, nine of whom (45%), received an AMDS. Eight patients underwent emergency repair and one was a salvage procedure. The median age was 53 years [interquartile range (IQR) (48 – 59 years] and seven patients were male(78%).

All AMDS devices were deployed successfully in zone 0. There were no incidences of device-related

complications. Operative and 30-day mortality was 0%. Median cardiac intensive care unit (CICU) and hospital stay were seven days [IQR 5-9]and 21 [IQR 13-23] days, respectively. Post-operative complications included acute kidney injury requiring temporary renal replacement therapy in two patients, re-exploration for bleeding in one patient, and a new stroke in two patients.

Clinical or Radiological malperfusion was reduced from 78% preoperatively to 22% after AMDS insertion, including in a patient with a pre-operative lower limb paralysis.

Follow up was 100% complete. The follow-up duration was 201[IQR 78-291] days. There

was no operative or short-term mortality, and no device-related complications were encountered. Re-hospitalisation occurred in three patients. The false lumen was completely or partially obliterated in 67%, and the aortic diameter was stable in the majority of patients (78%).

In conclusion, AMDS usage is safe and effective in the surgical treatment of ATAAD repair. Our early results suggest that it is reproducible, it helps to reduce malperfusion significantly, promote false lumen obliteration, and true lumen re-expansion. Long-term follow-up is needed to further understand the role of AMDS and its usefulness in treating ATAAD repair.

Creating Innovative ways to enhance patient care Tuesday 19 March **15:30–17:00** HALL 3D

Creating innovative ways to enhance patient care: Using video-based discharge instructions as an adjunct to standard verbal and written instructions to improve patient comprehension and experience

Joseph Renwick
South Tees Hospitals NHS Foundation Trust

Introduction

In order to improve the delivery of patient information, innovative technologies are being developed with an emphasis on addressing comprehension barriers. The focus of our project was utilising video-based discharge instructions to improve patient comprehension and experience within the evolving landscape of the NHS.

The need for improved discharge instructions: The information given before discharge is important for the patient's well-being. At discharge, healthcare professionals must explain critical information, such as patients' diagnoses, treatment, and planned follow-ups. The literature suggests that not all patients will understand or remember the information provided, resulting in confusion and misinterpretation. It has been reported that about 45-50% of patients or caregivers cannot understand discharge instructions. Several factors contribute to this issue, including language barriers, a lack of health literacy, cognitive impairments, or inadequate communication by healthcare providers. Clear and effective discharge instructions are often impeded by obstacles, resulting in decreased treatment compliance, patient safety, satisfaction and increased hospital readmissions. These challenges have the potential to harm patients and increase healthcare costs.

The introduction of video-based discharge instructions: Video-based discharge instructions are often short videos viewed before discharge that provide clear, concise, and standardised information based on a patient's diagnosis, management, and follow-up arrangements. Those currently in practice show promising results and have been associated with higher comprehension rates of instructions given at discharge.

Methods

A pre-and post-test design was utilised to assess the impact of video-based discharge instructions on improving comprehension and experience post-cardiac surgery. The project included a convenience sample of 20 postoperative cardiac surgical patients. Before receiving the video-based discharge instruction, participants completed a pre-test of five multiple-choice questions assessing their comprehension of postoperative care instruction. Upon completion, participants received a mobile electronic device to view the video-based discharge instructions. Approximately 10 minutes later, participants completed a post-test identical to the initial assessment. Statistical analysis used a paired t-test to compare pre-and post-test scores.

Key findings

The implementation of video-based discharge instructions saw, on average, that participants demonstrated a 26% increase in comprehension from approximately 60% (mean score of 3 out of 5) rising to 86% (mean score of 4.3 out of 5) after engaging with the video-based discharge instructions. Moving from a moderate level of comprehension to a higher level of post-video-based discharge instructions suggests that visual aids and multimedia can significantly improve comprehension compared to written and verbal instructions alone. The p-value of 0.000264 in the paired t-test strongly supports the observed improvement. Therefore, the project's success over traditional methods is affirmed, providing additional validation, strength, and support to the findings. The vast majority of participants, a notable 93% (63% Excellent and 30% Good), reported a highly positive experience after engaging with the video-based discharge instruction. A very minor proportion, just 6%, reported a satisfactory experience.

Conclusion

Video-based discharge instructions represent a promising approach to improving comprehension and experience for postoperative cardiac surgical patients. This project has demonstrated the effectiveness of integrating technology to bridge communication gaps and optimise patient care. Further studies are needed to confirm the validity of the findings.

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Caption

Congenital 2 Abstract Session Monday 18 March **15:30–17:00** HALL 3E

Does the initial amount of pulmonary blood flow affect outcomes in patients with Tricuspid Atresia/ VSD and normally related great arteries?

Natasha Bocchetta, Dr Betul Cinar, Mr John Stickley, Dr Adrian Crucean, Dr Chetan Mehta Birmingham Children's Hospital and University of Birmingham

The initial palliation of patients with Tricuspid Atresia and normally related great arteries (TA/NRGA) is dependent on their initial amount of pulmonary blood flow (PBF). This is predominantly determined by the amount of right ventricular outflow tract obstruction and ventricular septal defect size. Patients with initial low PBF undergo augmentation procedures such as mBTT shunt and patent ductus arteriosus stenting.

Those with high PBF and pulmonary congestion have pulmonary artery banding to reduce this and protect the lungs. Meanwhile, patients with balanced PBF progress to the second stage of palliation, a cavopulmonary (CP) anastomosis when clinically indicated. Patients continue down this univentricular palliation from CP shunt to Fontan circulation. There is scarce literature on the impact of the initial amount of PBF on outcomes in this cohort.

Figure 1: Patient Palliation Pathways. Includes patients who were alive without further intervention and have not reached the next palliation stage. Key: CP= cavopulmonary, mBTT= modified Blalock-Taussig-Thomas, PA= pulmonary artery, PBF= pulmonary blood flow, PDA= patent ductus arteriosus.

Therefore, we aimed to investigate this, focusing on the impact on reintervention rates, palliation timings and survival between patients with differing initial amounts of PBF.

This retrospective study was conducted from 2000-2023 and included all patients managed at Birmingham Children's Hospital with TA/NRGA. PBF groups were determined based on Stage 1 palliation. There were 55 patients included in the study, 28 in the low, 17 in the balanced and 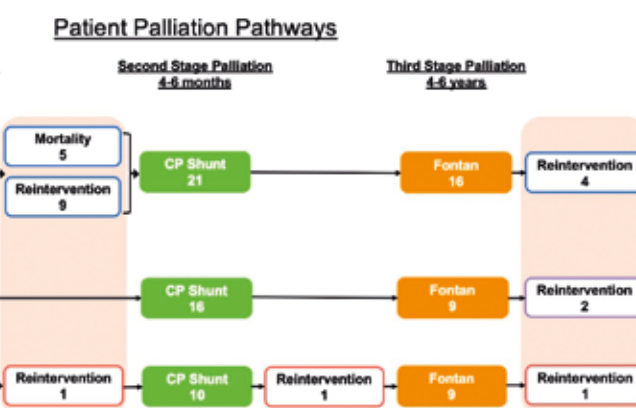10 in the high PBF groups (Figure 1). Overall, there were 26 reinterventions, in 16 patients, with most reinterventions taking place between Stages 1 and 2 of palliation. The low PBF group was almost two times more at risk of reintervention than the high PBF group (HR=1.9, 95% CI=0.5-6.7, p=0.34). For palliation timings, the median time for Stage 1 palliation was 25.9 days (IQR=14.3,44.7). The high PBF Group Received Stage 2 and 3 palliations later than the other groups (p=0.11 and 0.07 respectively). Regarding survival outcomes, all five deaths were in the low PBF group and took place between Stages 1 and 2 of palliation. Therefore, the low PBF group was three times more likely to have mortality compared to the high PBF group (HR=3.1, 95% CI=0-inf, p=0.16).

In conclusion, patients with initial low PBF are at a higher risk of adverse outcomes, and higher reintervention and mortality rates compared to the high PBF group. These results highlight the importance of PBF as a factor influencing patient outcomes in this cohort and will help inform family counselling and clinical practice regarding palliation timings and outcomes.

CABG Tuesday 19 March **15:30–17:00** HALL 1C

There may be survival benefits of using BIMA in diabetics: Systematic review and meta-analysis

J Khan, G Beattie, H Parissis Royal Victoria Hospital, Belfast, UK

Utilization of bilateral internal mammary arterial revascularization remains poor. Despite increasing evidence of the late survival benefit of arterial grafts, the fear of sternal dehiscence and disastrous mediastinitis has led surgeons to shy away from this procedure. Skeletonization preserves the arterial arcs arising from internal mammary perforators and, together with the in-situ preservation of the venous supply of the sternum, results in lower rates of sternal infection. Yet, this technique is rarely utilized. Two systematic reviews (2013 and 2015) have reported results on bilateral versus single internal mammary arteries in diabetic patients. The first report, published in v, mainly focused on the incidence of deep sternal wound infection (DSWI). The only other systematic review, published in 2015, demonstrated a survival benefit of using skeletonized BIMA; however, the authors did not specify the survival benefit against time. Furthermore, skeletonized BIMA was not associated with an increased risk of DSWI in diabetic patients. Since then, several good-quality observational studies have been reported. Hence, we felt that there is a need to conduct a new meta-analysis and gather all the newly reported published data pertinent to the subject. In this article, we examine the accumulating reports in the literature over the last fifteen years regarding the benefits of the use of bilateral internal mammary arteries in the diabetic population. More specifically, the aim of this systematic review and meta-analysis was primarily to revisit the incidence of DSWI and compare pedicle versus BIMA skeletonization; secondly, to investigate if there is a survival benefit of using the second internal mammary artery and what the timescale of this effect is.

Gwyn Beattie, Jamal Khan and Harry Parissis

Aortic Surgery: Aneurysm Monday 18 March **11:00-12:30** HALL 1A

DECIDE-TAD: A Partnership between Aortic Dissection Awareness UK & Ireland and the University of Leicester to develop Family Screening in Thoracic Aortic Disease

Riccardo Abbasciano University of Leicester

Despite improved surgical outcomes and revised acute care pathways for diagnosis and treatment, aortic dissection continues to carry a high burden of morbidity and mortality, impacting not only affected patients but their families too. While guidelines recommend cascade screening for relatives to identify individuals at increased risk, uptake remains low. DECIDE-TAD, a collaborative research program between the University of Leicester and Aortic Dissection Awareness UK & Ireland, aims to address this gap and improve the prevention of aortic dissection.

The initiative was co-created with patients and relatives at the 2019 Aortic Dissection Awareness Day UK conference in Leicester. This large-scale Patient & Public Involvement event involved 160 patients, relatives, clinicians, and researchers. Co-led by aortic dissection survivor Gareth Owens and Prof. Gavin Murphy (BHF Chair of Cardiac Surgery at the University

of Leicester), the program benefits from the active participation of patients and relatives associated with the national patient charity, overseen by a central team of five PPI partners: Dr. Gordon McManus, Lisa Skinner, Mark Lewis, Anne Cotton and Dr. Alison Prowle, who contribute to

all aspects of research, including planning, design, and dissemination.

Mr. Owens and Prof. Murphy presented the initial results of Phase 1 as a keynote talk at the SCTS 2023 Annual Meeting. More than 200 members of the national patient charity have participated in the

DECIDE-TAD research. Dr. Riccardo Abbasciano, a trainee academic cardiac surgeon working in Leicester and London, is coordinating the program and is lead author for its publications to date.

Phase 1 of the program employed a mixed-methods approach. Analysis of national data on over 33,000 AD patients revealed inequalities in access to screening and treatment for certain groups, including women, ethnic minorities, and individuals from areas of socioeconomic deprivation. Surveys with survivors and families (n=225) further identified limited awareness about the genetic nature of the disease, concerns about cost-effectiveness, and a lack of shared decision-making in the screening process. Delphi consensus exercises with experts and stakeholders confirmed the currently low to very low certainty of evidence on the effectiveness of cascade screening.

DECIDE-TAD made considerable progress in identifying a potential solution to these barriers. Crucial knowledge to build a prototype decision-support tool was obtained, with the aim of facilitating informed decision-making for families,

alongside a comprehensive screening pathway. The program's commitment to inclusivity has attracted interest from 24 UK cardiac surgery centres, potentially paving the way for nationwide testing and implementation within the NHS. Additionally, DECIDE-TAD's shortlisting for Phase 2 funding indicates its potential to translate research into real-world impact.

DECIDE-TAD aims to foster informed decision-making about aortic dissection screening. Its focus on equitable access ensures diverse populations benefit from potentially life-saving interventions. Finally, the program's commitment to evidence-based practice ensures that screening pathways are optimised based on the latest research. Through effective collaboration, data-driven insights, and dedication to patient-public involvement, the program has the potential to rewrite the narrative for families affected by aortic disease. The success of Phase 1 of DECIDE-TAD and the collaboration between Aortic Dissection Awareness UK & Ireland, the University of Leicester, SCTS and UK-AS promise a future where proactive screening and prevention empowers families and saves lives.

Miscellaneous Thoracic Surgery Tuesday 19 March **15:30-17:00** HALL 2D

Management of benign airway stenosis: Predictors of tracheal resection

Akshay Patel University Hospitals Birmingham NHS, Birmingham, UK

Our work delved into the intricate realm of benign airway stenoses, multifaceted disorders characterized by progressive dyspnoea, stridor, and significant respiratory distress. These conditions, often challenging to diagnose accurately, present with symptoms that can mimic other respiratory ailments such as asthma or chronic obstructive pulmonary disease (COPD). Moreover, delays in diagnosis and treatment, lasting up to four years in some cases, exacerbate the challenges in managing these conditions effectively. Benign airway stenoses predominantly affect adults and can stem from various causes, including but not limited to intubation or post-tracheostomy

procedures, idiopathic factors, systemic diseases, trauma, radiotherapy, and infections.

The study, conducted retrospectively at a single centre over 14 years, aimed to scrutinize the treatment outcomes of patients with benign tracheal stenoses and pinpoint the predictors indicative of the necessity for definitive tracheal or laryngotracheal resection. In this retrospective analysis of 97 patients, the majority of whom were females (81%), subglottic stenosis emerged as the predominant presentation (79%). The severity of stenosis quantified using the Myer-Cotton grading

system and the presence of pre-operative tracheostomy were identified as significant predictors for tracheal resection. Additionally, a risk model amalgamating smoking status, Myer-Cotton grading, pre-operative tracheostomy, and the number of affected airway subsites exhibited high predictability for surgical intervention, underscoring the utility of such a model in guiding clinical decisions.

While surgical resection demonstrated favourable long-term outcomes, it was emphasized that decision-making concerning surgery should not solely focus on short-term post-

operative metrics but also incorporate patient-reported outcomes and functional considerations in the post-operative period. Therefore, there exists a pressing need for prospective studies to meticulously assess both pre- and post-operative functional parameters, encompassing aspects such as voice quality, respiratory function, and overall quality of life. Additionally, further exploration into patient-reported outcomes post-surgery, particularly emphasizing voice quality and breathing patterns, is warranted to garner comprehensive insights into the efficacy of surgical interventions in improving patients' well-being.

The paper also underscored the necessity for conducting subgroup analyses in larger cohorts to discern nuances in management strategies across different healthcare settings. Moreover, the development of a robust risk calculator

or model, leveraging identified predictors, holds promise in facilitating informed clinical decision-making regarding the necessity for surgical intervention. Furthermore, exploring alternative management modalities, particularly for patients who exhibit resistance to initial endoscopic therapies, is paramount in ameliorating long-term outcomes and mitigating the risk of recurrence.

In essence, the study sheds light on the intricate landscape of benign airway stenoses, emphasizing the importance of early diagnosis, personalized treatment approaches, and comprehensive post-operative care. While surgical resection emerges as a viable therapeutic option for many patients, further research endeavours are imperative to refine management strategies and enhance patient-centred care in this challenging clinical domain.
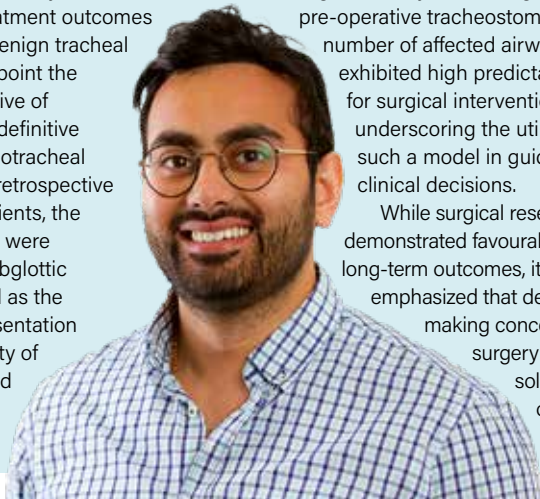
Enhancing Patients' Care in CT Surgery Monday 18 March **15:30-17:00** HALL 3D

Atrial fibrillation after cardiac surgery (AFACS) prevention care bundle: assessment of implementation fidelity and sustainability

Rosalie Magboo, Raquel Acala-Taylor, Ankan Paul, Edward Parkinson, Mary Jane de Guzman, Maricar Lasar, Martina Buerge St Bartholomew's Hospital, London, UK

Atrial fibrillation after cardiac surgery (AFACS) affects approximately 30-50% of patients. It is associated with longer lengths of stay, increased rates of heart failure, chronic AF, and death. An international practice advisory tool was developed in 2019 and an adapted version of this was implemented as a care prevention bundle at St Bartholomew's Hospital. Baseline and post-implementation audits in 2019 revealed a reduction in AFACS from 36% to 23.3%. Three years later, we revisited the bundle to assess adherence in practice and indicate if it is indeed sustaining improved care by investigating all patients undergoing cardiac surgery over seven days. Five components comprise the bundle as follows.

1 – Send in the β-blockers
If cardiovascular parameters and co-morbidities allow, β-blockers should be

(re)initiated early, typically post-op D1. Avoid if bradycardic, pacing-dependent, or requiring higher doses of inopressors (e.g. norad >0.05 mcg/kg/min).

2 – Electrolytes at the higher end
Frequent monitoring and context-appropriate replacement of potassium if <4.5 mmol/L and magnesium if <1 mmol/L.

3 – Optimise fluid balance
Avoid over-hydration or aggressive diuresis. Aim for a euvolemic patient and allow fluid shifts to equilibrate.

4 – Minimise pain
The catecholamine surge can precipitate AF and patients like their pain even less than you do. Make sure there's space to document pain scores on the peri-operative chart and be generous with intra and post-op analgesia if symptomatic.

5 – Avoid hypoxia
Cardiomyocytes are very sensitive to oxygen and upset rapidly if they run out. Keep saturations at levels appropriate for the patient e.g. 94-98%, 88-92%, and pO2 >8 kPa.

Revisiting and auditing this bundle three years later (n=129) we found that appropriate β-blocker initiation occurred in 88% of patients, electrolyte abnormality correction in 76%, continuous adequate oxygenation in 81% and analgesia in 85%. Rates of AFACS in our patients had reduced from a baseline of 36% to

18.1% (p=0.001). This had maintained an improvement from the initial post-bundle implementation of 23.3% (p=0.29).

Surgical, anaesthetic, and peri-operative factors have been considered. We believe this quality improvement cycle has demonstrated an effective implementation of the bundle, succeeding due to an initial emphasis in daily huddles, and continuing in the form of training at two-weekly team days

in addition to staff rotations and inductions.

Qualitatively, we have recognised a change in the culture of our practice due to these implementation techniques. We hope these results are both encouraging and motivating for cardiac units to formally implement the facets of this bundle, and empower clinical staff to care for patients following cardiac surgery both sustainably and effectively.

St Bartholemew's Hospital near St Paul's Cathederal.

AORTIC NURSES SYMPOSIUM

Friday 7th June 2024
The Kings Fund, London

THE **AORTIC DISSECTION** CHARITABLE TRUST

The Aortic Nurse Symposium offers in-depth exploration of aortic nursing, including patient care, and follow-up practices. Hear patient stories, join expert discussions on disease complexities, and receive evidence-based lifestyle guidance.

Open to nurses and allied health professionals with an interest in aortic dissection.
Free admission. Travel bursaries also available.

Reserve your space:
tadct.org/nurses

SCTS dashboard update

Uday Trivedi Consultant Cardiothoracic Surgeon, Royal Sussex County Hospital; Brighton and Hove, and SCTS Adult Cardiac Surgery Audit Lead

The SCTS dashboard has continued to expand. All units have been sent the data sharing agreement and to date, 18 units have signed and returned them. These units will be supported by the SCTS and Dendrite Clinical Systems to upload their data and be able to start using contemporary national data for benchmarking.

The SCTS is aware of a recent letter that has been circulated by NHS England about the value of submitting data to the dashboard. The SCTS have responded to this and all units should have received our response. The key points to collecting this data are that it is free, the speciality and the professional body representing it now have ownership of data and finally that this data can be made available at a future date for audit and research purposes. Again, the aim is to provide this data for free through an appropriate framework which acts within the national information governance and data protection guidance. There is no intention to duplicate the outlier process that NICOR undertakes with the support of the SCTS.

The radar plots of units on the SCTS website have been positively received and the aspiration is to add to these with data from the dashboard and further questions on the quarterly quality assurance forms.

Should units encounter any issue with getting the data sharing agreements signed or data upload they should not hesitate to contact either the SCTS. We are more than happy to assist you overcome any hurdles.

Uday Trivedi
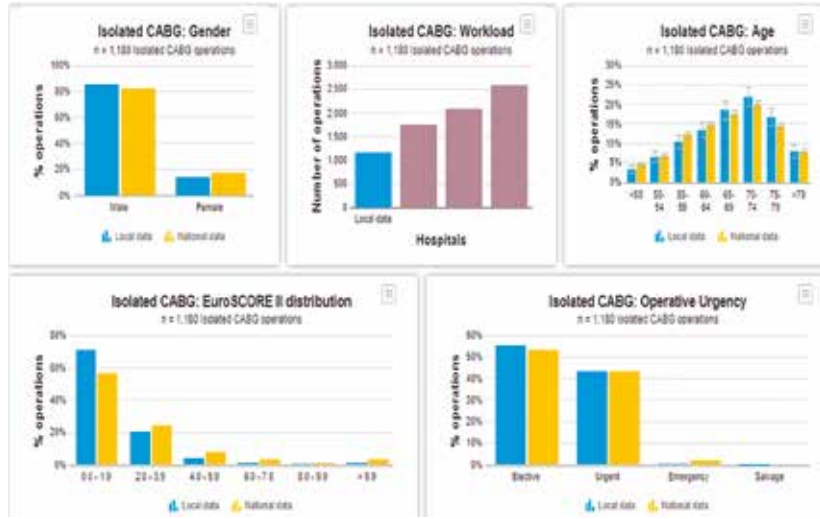
Example of a Cardiac Surgery Dashboard for isolated-CAGB
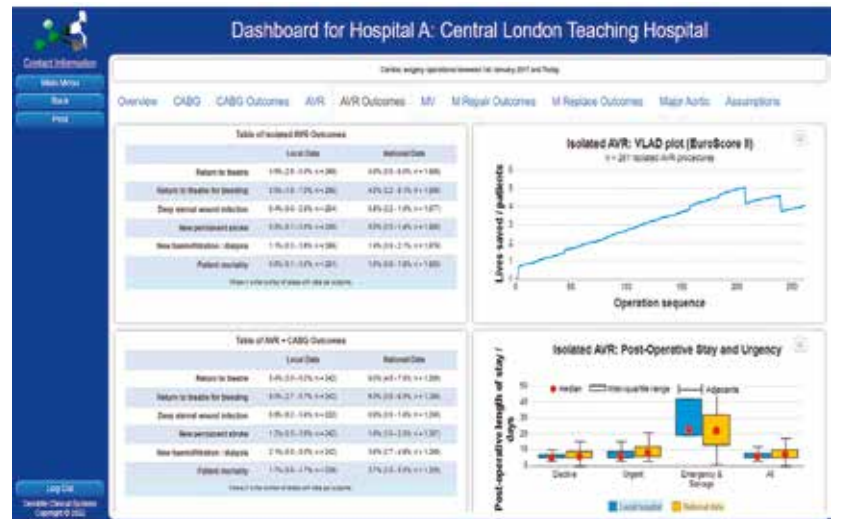
Example of a Cardiac Surgery Dashboard comparing local vs national data

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Aortic Surgery: Aneurysm Monday 18 March **11:00-12:30** HALL 1A

Robotic Transcranial Doppler in aortic surgery: A new standard of care

Muhammad Usman Shah
Aortic Fellow
Liverpool Heart and Chest Hospital

In the realm of complex aortic surgery, safeguarding neurological function stands as a paramount concern. Antegrade and/or retrograde cerebral perfusion (ACP/RCP) coupled with hypothermia have undoubtedly improved outcomes. However, the risk of neurological complications persists, contingent upon factors like cerebral perfusion, temperature, and circulatory arrest time during deep hypothermic circulatory arrest (DHCA). Enter Robotic Transcranial Doppler (TCD), an emerging modality poised to revolutionize cerebral perfusion monitoring and enhance cerebral protection. In our retrospective study which was conducted at Liverpool Heart and Chest Hospital; a high-volume Aortic Centre in the UK, we sought to evaluate the feasibility of Robotic TCD as the new standard of care in cerebral protection in Complex Aortic Surgery.

This was a retrospective observational study encompassing 22 patients undergoing Major Aortic surgery, the utility and outcomes of Robotic TCD were meticulously evaluated. We aimed to assess the feasibility and ascertain the potential benefits of this novel approach.

Key Findings:
Through Robotic TCD, we meticulously monitored cerebral blood flow during critical phases of surgery. Notably, we documented baseline flow during ACP, delineating a "Minimal Therapeutic Target (MTT) flow." Intriguingly, we discovered that achieving MTT necessitated ACP flows as low as 3 mls/kg/min, a departure from the standard recommendation of 10 mls/
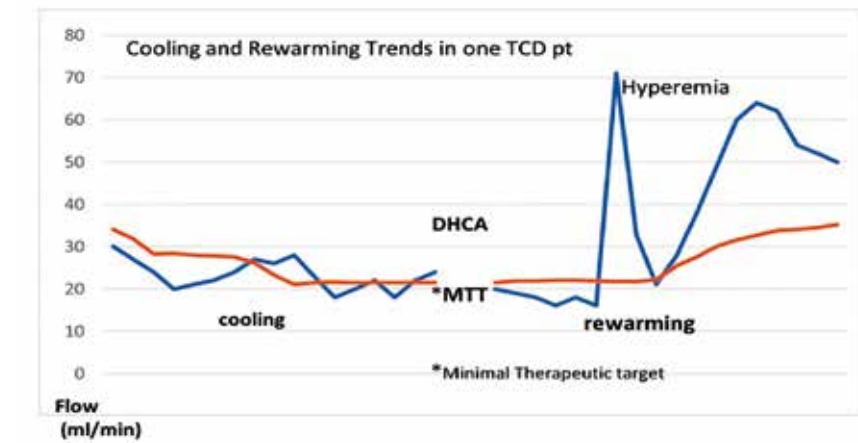

Figure 1

Robotic TCD setup

Lateral TCD setup

kg/min. Furthermore, we observed reduced reliance on selective cannulae, offering a streamlined approach to cerebral perfusion management.

Robotic TCD afforded a comprehensive assessment of blood flow across the Circle of Willis (CoW) and detected hyperemia upon rewarming (Figure 1). Remarkably, RCP induced measurable flow reversal in the middle cerebral artery (MCA) bilaterally, underscoring its pivotal role in maintaining cerebral perfusion. ACP via the right common carotid artery demonstrated bilateral MCA flow, obviating the need for bilateral instrumentation and mitigating stroke risk.

Additionally, supplementing flow through the left subclavian artery proved effective in enhancing left MCA perfusion.

In select cases (n=3), lateral TCD unveiled contralateral MCA flow through a single sensor, further augmenting our understanding of cerebral hemodynamics.

Conclusion:
Our study heralds a paradigm shift in cerebral perfusion management during aortic surgery. TCD-guided, patient-specific adjustments in ACP and RCP flows, coupled with reduced instrumentation of cerebral vessels, offer promising avenues for minimizing delirium and stroke risk. While our findings are compelling, further data analysis is imperative to elucidate the impact on critical outcomes such as stroke and delirium. Through further studies Robotic TCD can potentially evolve into a standard of care, underscoring our commitment to advancing patient safety and surgical excellence in the field of aortic surgery. As we continue to explore new horizons in aortic surgery, collaboration, innovation, and a patient-centric approach remain paramount. The insights gleaned from this study pave the way for further advancements in the field, ultimately benefiting patients worldwide.

> "Robotic TCD afforded a comprehensive assessment of blood flow across the Circle of Willis and detected hyperemia upon rewarming"
>
> **Muhammad Usman Shah**

Aortic Surgery: Dissection
Tuesday 19 March **13:30 – 15:00** HALL 1F

In patients requiring Concomitant Aortic Arch and Root Surgery; is Valve sparing root replacement an effort worth taking?

Muhammad Usman Shah
Aortic Fellow, Liverpool Heart and Chest Hospital

In the ever-evolving landscape of cardiovascular medicine, the quest for innovative approaches to complex aortic pathologies continues to drive advancements in surgical techniques. Aortic arch surgery embodies a multifaceted challenge, with intricate layers of complexity spanning surgical, anaesthetic, and perfusion domains. Introducing valve-sparing aortic root replacement into this intricate mix is akin to navigating a labyrinth within a labyrinth.

While some may view this confluence as excessively intricate, we firmly believe it presents a compelling proposition with profound long-term benefits for our patients. The successful integration of these procedures demands not only technical mastery but also a wealth of experiential insight, underscoring the indispensable role of expertise and seasoned proficiency in orchestrating this delicate symphony of surgical innovation. In our retrospective study which was conducted at Liverpool Heart and Chest Hospital; a high-volume Aortic Centre in the UK, we sought to evaluate the feasibility and outcomes of valve-sparing aortic root replacement (VSRR) surgery combined with concomitant Aortic Arch surgery.

The objectives were clear: to assess the viability of this approach and to understand whether the increasing complexity of such procedures would impact immediate postoperative survival. Through a retrospective observational study spanning from January 2019 to October 2023, 48 patients were identified from our database who underwent VSRR alongside Aortic Arch surgery, providing invaluable insights into the intra-hospital outcomes.

Among the cohort of patients, with an average age of 53.8 years, 26 had VSRR with Arch surgery for emergent type A acute aortic syndromes (mean Eurocscore II 6.9) whereas 22 had non-emergent surgeries for (mean Eurocscore II 5.1) chronic dissections, syndromic patients, bicuspid aortic valve with aortopathy and sporadic aneurysms. In the emergent group: 18 patients had concomitant Hemiarch replacement and total arch with frozen elephant trunk was done in 8. The Arch procedures in the non-emergent group: Hemiarch replacements 14, total arch with elephant trunk 6 and total arch in two patients.

Preoperative and postoperative echocardiographic assessments revealed encouraging results, with trivial to minimal aortic regurgitation postoperatively and stable ejection fractions. Despite the complexities involved, the study demonstrated an overall in-hospital and 30-day mortality rate of 0%. While complications such as re-explorations, neurological complications, and reintubations were noted, they were effectively managed, further underscoring the safety and efficacy of the approach.

In conclusion, the findings of this study support the notion that in high-volume centres with expertise, valve-sparing root replacement with concomitant Aortic Arch Surgery is not only feasible but also safe. Regardless of emergent or non-emergent scenarios, this integrated approach represents a significant advancement in the management of aortic pathologies. It is an endeavour worth pursuing, offering patients optimal outcomes and surgeons with expanded avenues for therapeutic success.
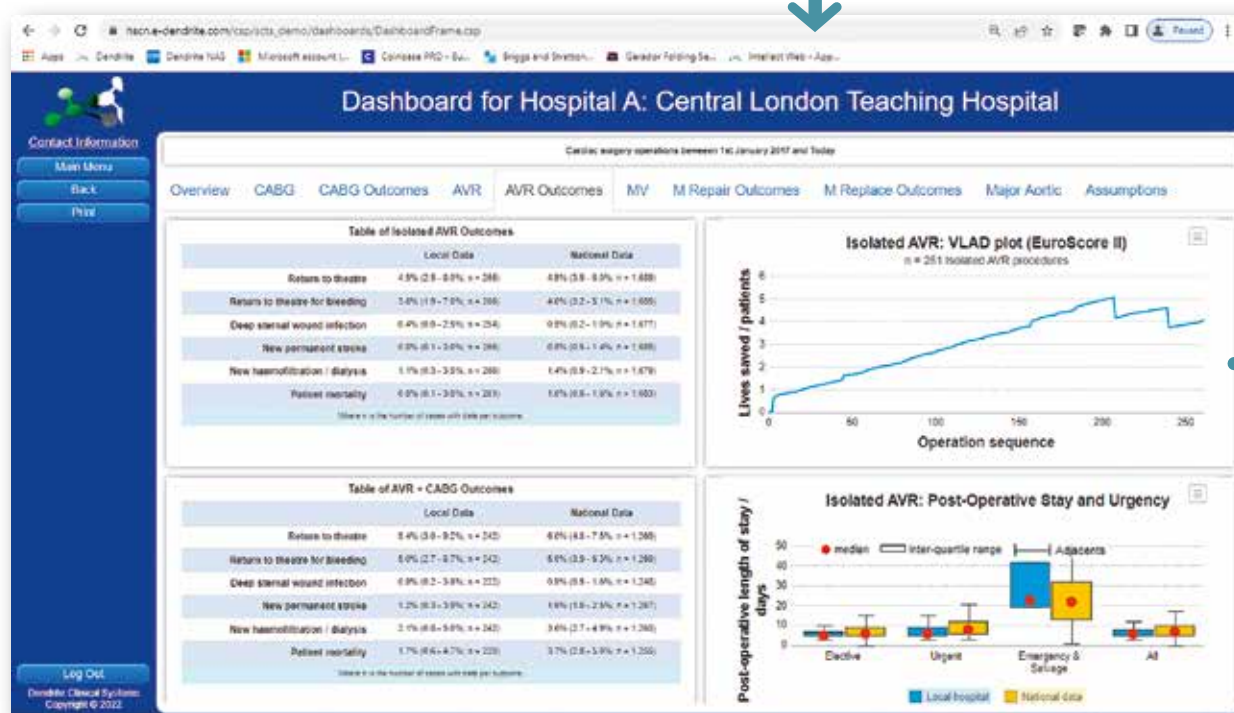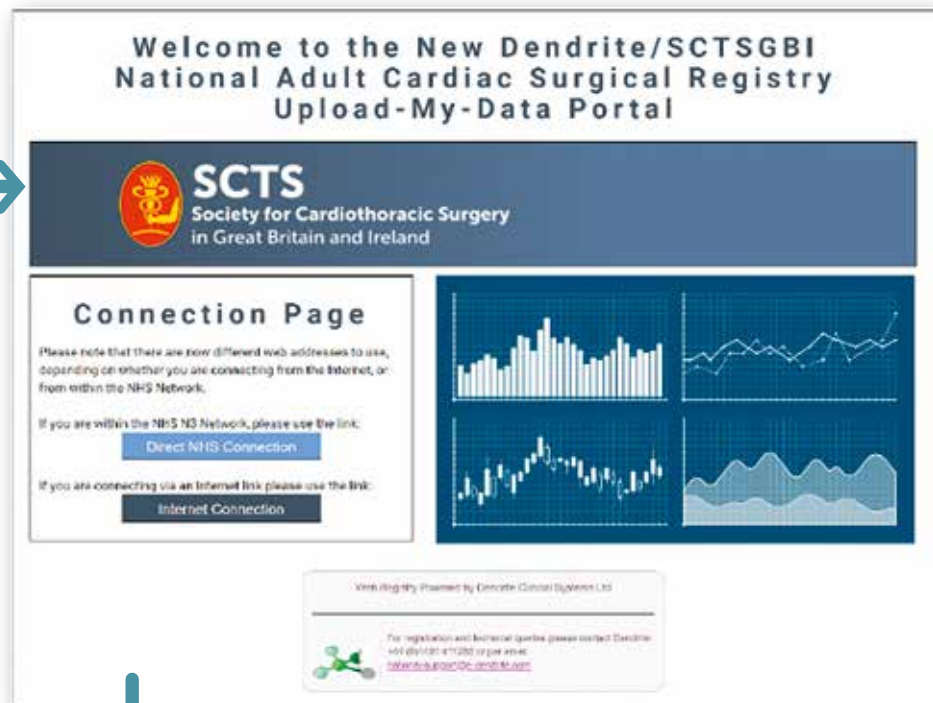
DENDRITE'S SCTS DASHBOARDS
ON-LINE REAL-TIME BENCHMARKING

Individual units or centres can instantly benchmark their results via an on-line database for internal consumption for clinical governance and for auditing purposes

Hospitals upload their data to the central Dendrite National Cardiac Surgical Registry

✓ Instant

✓ on-line

✓ real-time

✓ benchmarking of surgical outcomes

✓ compared to national results

✓ risk-adjusted analyses results

Reveal · Interpret · Improve

Mitral Valve Surgery Tuesday 19 March **9:00–10:30** HALL 1F

Long-term outcomes from mitral valve surgery in elderly patients: A single centre experience

Anupama Barua, Lognathen Balacumaraswami
Royal Stoke University Hospital, UK

In recent decades, there has been improved life expectancy in the general population and a consequent clinical need for decisive cardiac surgical treatment for elderly patients. Patients ≥75 years of age have a disproportionate burden of comorbidity which complicates outcomes from valvular heart disease treatment. Furthermore, patients with mitral valve pathology tend to present late with a significant degree of decompensated heart failure and poor physiological reserve. This adversely impacts on postoperative morbidity and mortality rates.

A recently published study, following a review of the UK national database between 2013 and 2018, reported 2.2% mortality after aortic valve surgery in elderly patients and a 15-year review of our institutional results concurs with this report.

Likewise, a multicentre UK study regarding mitral valve surgery in patients ≥75 years published in 2018 reported a 30-day mortality of 13.8%, five-year survival of 63.7% and 10-year survival of 45.5%. We

Anupama Barua

Lognathen Balacumaraswami

reviewed our surgical experience in patients ≥75 years undergoing mitral valve surgery along with other concomitant procedures in the last 10 years. We obtained prospective data derived from the Adult Cardiac Surgical Database of Royal Stoke University Hospital from January 2013 to July 2023. We present early and long-term outcomes following mitral valve surgery in patients ≥75 years.

The study includes 168 patients from the database. The mean age is 79±1.2 years, median EuroSCORE II

of 4.7 and a median Logistic EuroSCORE of 11.02. Surgery was undertaken as urgent in 41.6% and emergency in 1.7% of patients. The most common valve pathology was degenerative with a tendency to higher mitral valve calcification in this population. In this elderly patient population, 56% received mitral valve repair. Triple valve surgery was performed in five patients (3%); double valve surgery with concomitant aortic valve or tricuspid valve surgery was performed in 16% and 11% respectively; concomitant coronary artery bypass grafting (CABG) in 35% of cases; AF ablation in 7% and left atrial appendage occlusion in 10% of cases. 12 patients (7.1%) had re-exploration for bleeding. This study reports 3.6% 30-day mortality, with 6.1±1.9 days mean ITU stay and 20.0 ±2.3 days hospital stay. Long-term survival was 77% at 5 years and 72% at 10 years.

This study demonstrates that mitral valve surgery in association with concomitant valve or CABG operative procedures can be safely performed in patients ≥75 years with good early and late clinical outcomes. In our experience, excellent 10-year survival outcomes are seen with minimal attrition in the region of 1% per year in those patients who have survived to five years.

Training in CT Surgery Tuesday 19 March **13:30-15:00** HALL 1C

Cardiothoracic training in the United Kingdom: A comprehensive survey– based analysis

Mohamed Elshalkamy, Mohammed Salmassi, Ahmed Shazly, Mohamed Osman, Sunil Bhudia Royal Brompton and Harefield Hospital, Harefield, London

Amongst other surgical specialties, cardiothoracic surgery is renowned in its complexity for the patient cohort, technical challenges, and above all, non-linear training pathways. Trainees in the specialty need to spend many years of extensive training and a protracted learning curve to be capable of operating. This usually follows a disciplined surgical mantra along with an organized mentorship. The UK cardiothoracic training programme has gained international recognition over the past few decades, based on a comprehensive effort by the hands of pioneering surgeons who left their fingerprints in the world of cardiothoracic surgery. The

Mohamed Elshalkamy

Surgical skills competancy

new national training programme is competency-based and incorporates a comprehensive curriculum to allow for an organised progression of the trainee within a specific deanery over the period of seven years.

To understand the variation in perceptions of trainees
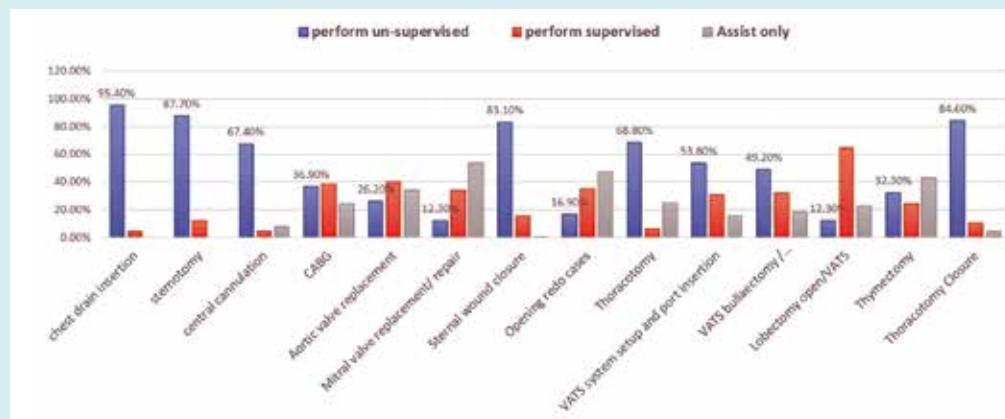
engaging with the UK system, we conducted a comprehensive survey to obtain feedback from cardiothoracic surgeons including overseas-trained doctors and national trainees. Our goal was to evaluate the level of satisfaction of surgical trainees (both NTN and non-NTN), and the

challenges facing them, and gather suggestions along with ideas about potential points of improvement.

The survey included 65 trainees from eight centres all over the UK. This included 51 males and 14 females, categorized as 39 holding national training numbers (NTNs) and 26 overseas trained doctors

(OTD). Participants possessed various experience levels, with 41% having >10 years of experience and 49% holding 4-10 years. Questions surrounded the level of training, their satisfaction with the training, competencies, research, publications, challenges they are facing, and their suggestions to

improve the quality of training.

Expectedly, >80% of trainees were satisfied overall with the UK training programme. All surgeons raised concerns about work-life balance. Those who were not in a formal UK training programme cited a lack of mentorship, which highlights an important disparity between formalised and nonformalized training.

Our findings suggest the need for more online platforms that link non-NTNs with suitable mentors who supervise progression. In addition, there is a role for simulation-based learning to facilitate the progress of all trainees alike. The SCTS has also opened its national training courses to non-NTNs to provide equal training opportunities.

Overall, we could witness yearly progress in cardiothoracic training along with education without neglecting the working environment and social balance.

Improving Quality in Thoracic Surgery Tuesday 19 March **13:30-15:00** HALL 2D

A quality improvement initiative to safely reduce unnecessary chest X-rays after elective lung resection and mediastinal surgery

Jacie Jiaqi Law, Peter Mhandu, William Lee Kah Howe, Michael Calderwood, Ralitsa Baranowski, Nial McGonigle, Rory Beattie and Mark Jones Royal Victoria Hospital, Belfast

Chest X-rays are empirically performed after elective thoracic surgery and are commonly misperceived as low effort, low cost and low risk to patients. Existing literature consistently demonstrates that routine chest X-rays have limited impact in changing patient care, with analysis typically performed in three classic context-routine chest X-rays performed immediately after elective thoracic surgery(also known as recovery chest X-ray), daily routine chest X-rays in the absence of clinical changes and after chest-drain removal. Concurrently, there is limited evidence regarding the safety surrounding withholding chest X-rays after thoracic surgery. There are also no evidence-based guidelines establishing best practices amongst thoracic surgery units globally.

From June 2022 to September 2023, the Department of Thoracic Surgery at the Royal Victoria Hospital Belfast embarked on a 3-phase quality improvement initiative using the "plan-do-study-act" (PDSA)

methodology. Each audit cycle spanned across four months and a total of 265 elective patients were monitored in this initiative. The four main objectives are as below:
1. To investigate existing unit practise
2. To quantify the effects of performing empirical recovery chest X-rays in changing patient postoperative care in an elective setting.
3. Introduce measures to reduce routine recovery chest X-ray, including education sessions with evidence review targeted at the MDT team during clinical governance, streamlining CXR ordering practises through formalization of department protocol and regular feedback gathering to encourage stakeholder buy-in.
4. Perform re-audits to assess the effectiveness of quality improvement strategies and regularly review unit patient safety data.

The main patient exclusion criteria were patients who underwent thoracic surgery in a non-elective setting, thoracic surgeries without intraoperative chest drain insertion, pleural surgeries or procedures, pneumonectomies and patients with a hospital length of stay of less than one day. All postoperative chest-X-rays were

Figure 1: Overview of events after routine recovery chest X-ray in PDSA 1-3

retrospectively reviewed and classified as either radiologically abnormal (expected postoperative changes including pleural space, subcutaneous emphysema and pleural effusion) or clinically abnormal (grossly abnormal chest X-ray features and evidence of patient deterioration). Patient demographics, operative data and postoperative outcomes were collected and compared between the pre and post-intervention patient cohorts to assess the safety of this quality improvement initiative. Cost saving was estimated using NIHR

Costing Tool (iCT).

Preliminary audit data (first audit) revealed an excessive mean daily rate of 1.25± 0.8 chest X-rays performed per patient with 100%(112)undergoing recovery chest X-ray. When routine recovery chest X-rays were performed, only 23% (20) were classified radiologically abnormal with 2%(3)classified clinically abnormal. Each audit cycles also demonstrated that only 2-3% of routine recovery chest X-rays led to actual changes in patient care in the form of procedural intervention (Figure 1).

From PDSA cycle 1 to cycle 3, the mean daily rate of CXR performed per elective patient successfully reduced from 1.25±0.8 to 0.8±0.3 while recovery CXRs reduced from 100% (112), 87% (70) to 73%(48). Patient characteristics and operative data were also similar between pre and post-intervention cohorts. There was no difference in postoperative complications classed Clavien-Dindo ≥3 (13% vs 14% ,p=0.53), hospital length of stay(7±6 vs 7±13 days,p=0.65), return to theatre (7% vs 6%,p=0.86), hospital readmission within 30 days(6% vs 6%,p=0.86) and death within 30 days (1% vs 1%,p=0.85) before and after intervention. Conservative estimate of the total cost saved through this initiative was GBP 76,908 per year.

Our institutional experience demonstrated that routine CXR utilisation after elective thoracic surgery can be reduced safely and systematically, especially empirical recovery and daily chest X-ray ordering practice. An on-demand chest X-ray strategy (based on patient clinical condition) is advocated in view of the limited impact of routine chest X-ray on postoperative patient care. Further PDSA cycles are still ongoing within our institution to sustain this patient-benefiting and NHS cost-saving initiative.

Impact of real-world pulmonary prehabilitation classes on lung cancer surgery patients' outcomes: Matched-case analysis

Matar Alzahrani[1], Salma Kadiri[1], Helen Shackleford[1], Aya Osman[1], Hazem Fallouh[1], Maninder Kalkat[1], Vanessa Rogers[1], Babu Naidu[1], Rajnikant Mehta[2], Saffana Algaeed[3]
1 University Hospitals Birmingham;
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Matar Alzahrani

Babu Naidu

Pulmonary rehabilitation classes for COPD patients are widely available across the UK and have been shown to improve outcomes, including recovery from exacerbation. Many lung cancer surgery patients have COPD, and surgery could be considered a fixed COPD exacerbation. In real-world practice, it's uncertain whether referral to pulmonary prehabilitation classes improves surgical and patient-reported outcomes. We aim to answer this question by performing a propensity-score analysis (PSA) of participants in an enriched cohort study (10/H1208/41).

Methods

An enriched cohort study offering rehabilitation pre and post-surgery pragmatically by local providers in patients undergoing lung cancer resection and compared to a contemporaneous control group who just had usual care. The study recruited 873 participants (Rehabilitation (PG) n=135, non-intervention or control (NG)n=738). Regression exposed and unexposed matching, effect-estimate, and standard-errors calculations were performed.

Results

118 participants were matched PG (n=59) NG (n=59). The multivariate-linear regression indicated a reduction in length of stay (LOS) by 33% from four to three days in the PG (EE- 0.33) Table 1. The multivariate log-binomial regression revealed no difference in both groups in hospital postoperative pulmonary complications (PPC) rate (EE 0.03). Lastly, the multivariate-linear regression showed an improvement in quality of life five months after surgery (QoL) by 3.5% in the PG (EE 3.5), yet the maximum improvement could be 10 units (95%CI = -3.4 – 10), which is considered clinically meaningful.

Conclusion

Engagement in 'real world' pulmonary prehabilitation before surgery appears to result in better patient and clinical outcomes after lung cancer surgery. However, timely access to pulmonary prehabilitation remains a real issue post-COVID.

Table: Multivariate regression results for the outcomes in the prehabilitation group

Outcomes / Groups	LOS			PPC				QOL		
	95% CI[1]	EE[2]	SE[3]	antilog	95% CI[1]	EE[2]	SE[3]	95% CI[1]	EE[2]	SE[3]
Prehabilitation Group (PG)	-2.2–1.6	-0.33	0.80	1.03	-1.1–1.3	0.03	0.57	-3.4 – 10	3.5	3.46

[1] CI = Confidence Interval, [2] EE = Effect Estimate, [3] SE = Standard Error

Advanced Nurse Practitioner-led ward rounds improve service delivery in the thoracic department

Charlotte Bartlett
Southampton General Hospital, Southampton, UK

Effective ward rounds can only be delivered in a well-organised ward by a team that is likely to include new and extended roles of healthcare professionals. Traditionally, the ward round is undertaken by a registrar who is accompanied by an Advanced Nurse Practitioner (ANP). On an average day the ward round could take between one to 2 hours depending on the number of patients and their demographic location around the hospital. Due to the amount of time the registrars commit to the ward round, it would often result in missed training opportunities in theatre.

On reflection of how to improve the thoracic service, increase training time for the registrars and develop the ANP role. An ANP-led ward round policy was written and put through the trust's clinical governance to ensure patient safety and set a standard for practice.

There was an agreed inclusion and exclusion criteria for patients who could be included in the ANP-led ward round. Patients of level 1 in a ward environment and over the age of 18 are included whilst patients who are of level 2/3 and in a high dependency or intensive care setting were excluded. The ANP must have completed all masters modules on the pathway in order to undertake the ward round. Once the ANP-led ward round has been completed, the registrar or consultant attends the ward area and the ANP presents the patients along with the decisions made on the ward round.

The policy was then implemented into practice and audited over 17 months. Our objective was to demonstrate the safety of the ANP undertaking the traditionally doctor-led daily ward round. Perspective data was collected from February 2022 to July 2023. Data collection focused on the decisions that were modified by the registrar or consultant on the post-ANP-led ward round review.

A total of 117 ANP-led ward rounds were captured which included 2,231 individual patient medical plans being made by the ANP. 440 patient reviews were excluded as per criteria. Out of the 2,231 medical plans, 30 were modified on the post-ward round review which equates to 1.3% statistically. One near miss was documented and 0 major incidence occurred. Between May 2023 and August 2023, the time spent on ward rounds was recorded with a result of an average of two hours concluding that 58.5 hours was released to registrar training in theatre.

Our service improvement provides evidence that the ANP can safely undertake the traditionally doctor-led ward round. It has increased training opportunities for the registrars whilst developing the role of the ANP and enhancing our service delivery.

Charlotte Bartlett

A new multidisciplinary lung cancer One-Stop Clinic (OSC) in a large tertiary referral centre has led to a strongly positive impact on treatment pathways for high-risk patients

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Survival of patients with lung cancer remains low despite continuous improvement of diagnostic and referral pathways. This reflects late presentation with advanced stage, poor compliance to standard referral routes and the aggressive nature of the disease.

Efforts were made to set up a standard timed pathway to shorten the time from presentation to first specialist contact and expedite the delivery of definitive treatments. Therefore, the NHS England Clinical Expert Group for Lung Cancer launched the National Optimal Lung Cancer Pathway (NOLCP) in 2017, updated in 2020 aiming to establish or exclude lung cancer diagnosis within 28 days of referral. Furthermore, in 2016 an ambitious initiative by Wythenshawe Hospital, we introduced the Rapid Access to Pulmonary Investigation and Diagnosis (RAPID) program offering a next-day computed tomography scan which is reported by a specialist thoracic radiologist. However, the Cancer Waiting Times Annual Report, 2020-21 showed that only 68% of patients with suspected lung cancer met the two-month wait standard to receive treatment.

One-Stop Clinic (OSC) is an integrated joint service dedicated to the comprehensive management of high-risk patients delivered in a holistic multidisciplinary approach. Patients are offered the opportunity to meet surgeons, oncologists, anaesthetists, specialist nurses, onco-geriatricians, and nurse specialists in one hospital visit. This service addresses several aspects: comprehensive assessment, discussion of alternative treatment options, and optimisation of modifiable risk factors without breaching the target of timely management. This initiative provides a better patient experience and obviates the need for multiple hospital appointments with resultant increased costs and delays in treatment.

We audited the efficiency of OSC in accelerating treatment pathways namely, time from referral to decision to treat (DTT), treatment outcome, and median time from DTT to treatment. We compared these findings to a historical cohort of high-risk patients prior to the introduction of OSC. The median time of DTT was five days, compared to 35 days of pre-clinic launch with a total of 30 saved days. The median time to commencing treatment from DTT was 28 days. These results showed the significant positive impact of OSC in enforcing the delivery of a timely patient-tailored cost-effective management in such a complex cohort of patients while maintaining a high standard of care.

Longer waiting times are associated with increased patients' anxiety and increased risk of disease progression with subsequent potential drop of surgical resection rate and receipt of curative treatments, increased extent of surgical resection, higher costs, and ultimately worse prognosis. These negative outcomes are more pronounced in high-risk patients who are increasingly detected during the newly established national lung cancer screening program.

We continue to monitor waiting times of patients referred to OSC as a key performance metric; OSC service is expanding to include patients referred for surgery following neoadjuvant treatment in which DTT and time from decision to treatment should be meticulously kept to the shortest possible length.

Hanan Hemead (left) and Felice Granato

Impact of the introduction of a multi-disciplinary clinic ("One-Stop Clinic") on the outcomes of higher risk patients with resectable Non-Small Cell Lung Cancer (NSCLC): A single centre experience

Hanan M. Hemead, Florentina Popescu, Linda Kimani, Matthew Evinson, Kandadai Rammohan, Siobhan Keegan, Marcus Taylor, Felice Granato Department of Thoracic Surgery, Manchester University Hospital NHS Foundation Trust, Wythenshawe Hospital, Manchester, United Kingdom

The last National Lung Cancer Audit (NLCA) report shows worsening Performance Status scores of patients with resectable non-small cell lung cancer (NSCLC). Longer life expectancy with subsequent increased frailty and comorbidity burden have increased surgical referrals of high-risk patients. Several studies showed higher mortality and morbidity in this high-risk cohort. Surgery is the gold standard treatment for early-stage lung cancer, offering less recurrence and better survival rates. However, careful pre-operative assessment and counselling of patients with limited cardiorespiratory reserve and multiple comorbidities is critical. Pre-operative assessment should focus on identifying modifiable risk factors that can be potentially optimised. Furthermore, patient counselling should include a thorough discussion of anticipated mortality risk and peri-operative complications as well as alternatives to surgery.

One-stop clinic (OSC) is a comprehensive service aiming to improve outcomes of high-risk patients with NSCLC. It has been introduced to Manchester University Hospital since June 2022 to augment the lung cancer pathway. OSC is designed to provide patients with a high standard of care within a multidisciplinary approach to deliver timely patient-personalised management. This service delivers exceptional patient experience by active engagement and support throughout the decision-making process. In addition, it reduces waiting times and maximises utilisation of resources by offering patients the opportunity to explore alternative treatment options, enrol in pre-operative rehabilitation programs and be reviewed by the anaesthetic team in a single hospital visit. The criteria for referral to OSC include but are not exclusive to body mass index (BMI) <20kg/m², proposed pneumonectomy, Performance Status ≥2, clinical frailty score ≥5, interstitial lung disease and post-operative predicted FEV1 and/or DLCO <40%. Prior to patient counselling, a mini-MDT discussion of cases takes place to formulate provisional plans and identify areas of potential pre-operative optimisation.

Patient support is provided through a standardised nurse-led assessment. Personalised patient optimisation services include smoking and alcohol cessation, prehabilitation and nutritional and psychological support. During the clinic day, patients have access to a variety of resources such as leaflets, and videos covering rehabilitation, radiotherapy and surgery as well as the opportunity to meet the multidisciplinary team: surgeons, oncologists, oncogeriatricians, exercise specialists, and cancer nurse specialists.

We conducted a retrospective comparative analysis of the impact of the introduction of OSC on post-operative 90-day mortality and length of hospital stay on the high-risk group (HR) and a matched group of non-high-risk (NHR) patients who underwent surgery during the same period. The results showed no significant difference in outcomes for the HR group compared to the NHR despite the higher surgical and physiological complexity of the HR group.

These results demonstrate the importance of selecting and optimising HR patients within a multidisciplinary clinical environment to ensure optimal outcomes. Further research is needed to compare long-term outcomes of HR patients undergoing surgical and non-surgical management. Continuous refinement and improvement of the service are mandatory to ensure high standards are maintained. Ongoing auditing and monitoring of key performance metrics is regularly conducted to identify areas of improvement.

Hanan M. Hemead

Raphe realignment technique in Siever's type 1 BAV repair improves leaflet motion and transvalvular gradients

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Introduction

Aortic valve repair for regurgitant bicuspid aortic valves has gained popularity in recent years. Continuous refinements in the understanding of valve pathology and technique are ongoing. It has been observed, however, that valve gradients following BAV repair are constantly higher than TAV. This may be explained by the eccentric valve orifice but also by the higher insertion of the conjoined leaflet raphe which makes it sit in a more horizontal obstructive position in the outflow tract. These higher stresses may in the long term lead to earlier valve degeneration.

Our Research

We have changed our repair technique in these patients and have started to implant the raphe at the annular level (realignment) rather than at its original anatomical level within the surgical graft during David's procedure. We hypothesise that this may improve leaflet mobility, coaptation height and postoperative flow patterns compared to reimplantation at the supra-annular level.

wFrom November 2017 to March 2022, 170 patients underwent valve-sparing aortic root replacement with the reimplantation technique at our institution. 51 (30%) patients had a bicuspid aortic valve and 44 of these had a Siever's type 1 phenotype which was included in this study. Patients' operative data and discharge echocardiograms were assessed for valve function. Patients were subdivided into two groups: Group S who were early in the experience and had a standard reimplantation of the raphe at its anatomical position above the aortic annulus and Group R in whom the raphe was realigned and implanted at the annular level.

The aim of this study is to compare our results pre and post this refinement.

Results

In the study period, 43 patients had L-R configuration and 1 R-N. There were 12 patients identified in Group S and 32 in Group R. There were no demographic or preoperative differences in clinical presentation between both groups. Preoperative mean aortic annular and root diameter and degree of preoperative AR were equal among the groups. Valsalva grafts were used in all patients and there was no difference in graft sizes among groups: (S vs R: 28,5±1.9 mm vs 30,0±2.9 mm; p=0.1). Postoperatively, patients in group R had significantly lower peak transvalvular gradients and a tendency to lower mean gradients across the aortic valve. Postoperative aortic annular diameter did not differ among the groups (Group S vs Group R: 21.9 mm±1.8 vs 21.8 mm±2.4). All patients in both groups had grade 0 residual AR. Postoperative coaptation length and height were equal in both groups.

Clinical implications

The study highlights that realignment of the raphe at the level of the aortic annulus during type 1 BAV repair is associated with better flow characteristics and lower peak transvalvular gradients for the same aortic annulus and graft size. This may have a theoretical long-term benefit on repair and durability.

Agni Salem

A decade of 'Hello, My Name Is…': measuring human touch in cardiac care

Eteesha Rao
Newcastle University, Newcastle, UK

Ten years have elapsed since the National Health Service (NHS) embraced the '#Hello, My Name is…' campaign, a simple yet pivotal movement aimed at fostering personal connections between healthcare professionals and patients. As we mark this decade-long journey, our recent study sheds light on how well UK cardiac surgery centres have integrated the campaign's ethos into their daily ward rounds.

In 2013, Dr Kate Granger MBE, a Consultant Geriatrician, founded the '#Hello, My Name is…' campaign during her battle with terminal cancer. This began as a clarion call for clinicians to introduce themselves to patients, initiating interactions with a personal touch. Advocated by various organizations, including the Care Quality Commission and the Medical Defence Union, the initiative sought to establish a foundation for effective therapeutic relationships.

We undertook a multi-centre observational study of daily ward round interactions to evaluate the campaign's impact on patient awareness of the medical professionals involved in their care. Conducted in two leading UK cardiac centres, the research employed a prospective review in an audit form through ward round observations followed by patient interviews utilizing a standardised proforma.

Whilst many healthcare professionals adhered to the practice of introducing themselves, the study revealed that 1 in 5 still failed to do so. Moreover, it highlighted a significant room for improvement in communication, with 23% of interactions potentially benefiting from more accessible language and better opportunities for patients to ask questions.

Despite a high percentage of effective communication reported in Centre 1 (85.1%) and Centre 2 (96.9%), many patients still struggled with medical jargon, with terms like 'transfuse' and 'anaemic' causing confusion. This language barrier, as patients articulated, hindered their understanding and comfort. Good bedside manners were generally observed, but

Eteesha Rao

22% of patients remained unaware of the roles of the staff attending to them, a gap that could impede effective care. Patient autonomy was the weakest area noted, with less than 78% of patients at Centre 1 feeling involved in decision-making processes – a figure that dropped to 62.5% at Centre 2. The personal aspect of care fared better, with over 87% of patients recognising personal touches in their treatment. Heartfelt patient quotes praised the dedication of all staff members, from the housekeeping staff to surgeons, suggesting that compassion remained a strong suit in these cardiac centres.

Overall, our study highlighted three key opportunities for enhancement – refining communication, clarifying roles, and bolstering patient autonomy. The latter is crucial, as it is essential that one keeps patients engaged as active participants at the 'heart' of all care decisions.

To conclude, despite the positive changes since the inception of the '#Hello, My Name is…' campaign, significant strides are still needed. With up to 38% of patients experiencing a paternalistic approach to their care and a notable use of medical jargon, the call for a more patient-centred care paradigm is clear and urgent.

As medical practice continues to evolve, these findings underscore the importance of not just clinical expertise but also the human connection in the healing process. The '#Hello, My Name is…' campaign may have started as a simple introduction, but as this study reveals, its principles are a cornerstone for compassionate, quality care – something to be built upon for more decades to come.

Impact of Advanced Nurse Practitioner-Led POCUS on Length of Stay and Cost Savings

Katie Shiner, Lead Advance Nurse Practitioner Cardiothoracic Surgery; Mr Shahzad Raja, Consultant Cardiac Surgeon; Dr Hatem Soliman-Aboumarie, Consultant Intensivist Harefield Hospital, Harefield, UK

Point Of Care Ultrasound (POCUS) of the lungs has gained prominence since the Covid 19 Pandemic. Its use is commonplace within critical care, to aid diagnosis and alter decision making, creating individualised care. Application outside of this area seems limited within literature. Within the surgical wards at a tertiary-based cardiothoracic centre, access to Ultrasound (US) is via radiology. With one US room serving an entire hospital, it was apparent patients were experiencing delays leading to delayed discharges.

A retrospective audit over a period of six-months was undertaken, examining radiology requests for US Thorax in post-operative cardiac surgical patients in Level 1 areas. It demonstrated 78 requests were made to the department. Delay from time of request to time of scan was 2.9 days and delay from time of request to Ultrasound-Guided (USG) drain insertion was 4.1 days. This resulted in a total cost expenditure to the Trust in bed days of £138,893 over the six-month period.

The results were presented to the Trust at a Governance Meeting to engage vital stakeholders. A proposal for Advanced Nurse Practitioner (ANP) led US was presented as a Quality Improvement Project (QIP). The QIP was approved and implemented utilising the PDSA framework. The initial cycle lasted three months and consisted of an ANP undertaking training and accreditation in POCUS. The second cycle entailed the ANP taking referrals from the surgical team and performing POCUS of the lungs on patients at the bedside. This was audited prospectively over a two-month period to examine the volume of requests and determine the time from referral to scan.

The results from the re-audit demonstrated that the ANP undertook 14 scans within the two-month period. The time from referral to US was 6.5 hours and the time from referral to USG drain insertion was 2.5 hours, resulting in a reduction of Length of Stay (LOS) of 2.6–4 days respectively. This calculated to

Left to right: Mr Shahzad Raja Katie Shiner Dr Hatem Soliman Aboumarie.

a cost saving of £44,092 during the two-month period.

The QIP has highlighted delays in patients obtaining US and presented a viable alternative to reduce LOS. Not only has this shown the cost-saving implications, but patients would also benefit from optimised care facilitating

an earlier and safer discharge. In an era when there is increased pressure on Trusts nationally to reduce LOS, reduce waiting lists and maximise productivity, investing in ANPs skills set may be a small yet effective initiative to tackle the complex problem of extended length of stay post-cardiac surgery.

Implementation of SMS follow-up in a thoracic surgery clinic

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Glenfield Hospital, Leicester, United Kingdom

Follow-up after thoracic surgery is human resource-intensive, often involving multiple patient visits over several years, particularly after surgery for cancer. The average lung cancer patient will traditionally attend 14 clinic appointments afterwards, mostly concentrated in the first two years. This can be burdensome to both patients (who often have to travel large distances to the clinic) and clinicians (where time and resources are limited). We sought to explore text message-based follow-up as a means for improving patient experience and the efficiency of our service, whilst reducing the environmental impact of avoidable travel.

Between December 2022 and April 2023, we piloted a new SMS-based follow-up system, across a single consultant practice, based on the AccuRx platform (Accux©, London). Eligible patients were selected for SMS-message-based review. Patients who had abnormal imaging findings, symptoms, queries or concerns were invited for face-to-face or telephone review as appropriate. Following the implementation period, we surveyed patients who had experienced the system.

Overall, 128 patients responded, with a significant

Nathan Tyson

proportion of patients coming from further afield within our catchment area. A large proportion of patients reported experiencing a high degree of anxiety prior to clinic appointments, irrespective of the modality used.

It was particularly interesting to note that the SMS clinic was highly regarded amongst the group, as measured by a 10-point Likert scale. In particular, the

Nathan Tyson

AccuRx system was felt to reduce the environmental impact of the clinic (median score 8.0; IQR 2.75 - 10.0) whilst saving on travel costs (6.5; IQR 2.0 - 9.0) and reducing disruption caused by scheduled appointments (8.0; IQR 4.5 - 10.0). In particular, this system scored very highly in the domain of efficiency and use of healthcare resources (9.0; IQR 8.0 - 10.0).

Despite this, a vast majority of patients would choose face-to-face follow-up if they were able to select a preference. This was particularly true of patients who had experienced several types of clinics. Additionally, and as expected, those from outside of the immediate area around our centre were more likely to select telehealth follow-up methods. Interestingly, there was no difference in declared preference between patients with benign and malignant pathologies.

Additionally, we hosted a facilitated patient experience day. Here, discussion was facilitated by the clinical team with patients to gauge opinions not captured by the online survey. The patients involved in this process appreciated that there were competing demands in healthcare delivery, between patient experience and resource allocation. However, there was strong support for remote clinics and SMS-based communication of normal imaging results.

Our pilot study showed that patients are receptive to the use of technology, including SMS-delivered follow-up, to facilitate remote alternatives to face-to-face consultations. They are also strongly supportive of its adoption in their own clinical pathways. Nonetheless, when specifically questioned, many still prefer a traditional approach and value direct face-to-face contact with a member of their clinical team. A hybrid model of care delivery is currently being developed with direct patient involvement.

The integral role of the Surgical Care Practitioner for thoracic robotic surgery

Esther Lewis and Karen Elbrow
University Hospitals Plymouth NHS Trust, Plymouth, UK

The field of thoracic surgery has undergone a transformative shift in recent years with the widespread adoption of minimally invasive techniques. Robotic-assisted thoracic surgery (RATS) offers numerous advantages over traditional open surgery and video-assisted techniques (VATS), including enhanced visualization, improved dexterity and reduced patient morbidity.

One of the primary benefits of RATS lies in its ability to provide surgeons with a three-dimensional, high-definition view of the surgical field. This advanced visualization allows for precise identification of tissue planes and structures, enabling more complex procedures, such as segmentectomies to be performed with greater accuracy. Additionally, the fully articulated robotic arms afford surgeons enhanced dexterity, surpassing the capabilities of traditional VATS.

At University Hospitals Plymouth NHS Trust, the Cardiothoracic Surgical Care Practitioners (SCPs) play an integral role with involvement in every step of the patient's journey from pre-assessment to post operative care.

The implementation of thoracic robotic surgery has enhanced the role even further.

SCPs played a crucial role in setting up the initial programme but also evolved to become key members of the surgical team, improving the continuity of care throughout the patient journey. Responsibilities have expanded the first assistant role, necessitating the acquisition of new skills such as port insertion, robot docking, table side management and the insertion of drains and paravertebral blocks, as well as supervising and training junior surgical trainees.

A retrospective analysis conducted over 16 months from May 2022 included 59 patients undergoing a wide variety of thoracic procedures, combining data from a local electronic database and the intuitive app revealed

the significant impact of SCPs on surgical efficiency and team dynamics.

SCPs always participated in robotic surgical procedures alongside the primary surgeon, offering support to seven different rotating training registrars. While the initial learning curve may have resulted in longer surgical times, the efficiency and safety of thoracic robotic lists have steadily improved over time. Notably, the skin incision to robotic docking time has improved to as low as 10 minutes (mean 15 mins)

Improving efficiency and surgical patient flow. Competent SCP presence at the operating table has also allowed more senior surgical trainees time at the console with direct Consultant supervision.

In conclusion, the evolution of thoracic robotic surgery has been greatly facilitated by the expertise and adaptability of Surgical Care Practitioners. The indispensable role as first assistant has not only improved surgical outcomes and patient experiences but has also paved the way for

Esther Lewis (left) and Karen Elbrow

continued advancements in minimally invasive thoracic procedures, as well as enhancing training opportunities for thoracic surgical trainees. Within our institution, as the field of robotic surgery continues to evolve, SCPs will undoubtedly remain at the forefront, driving innovation and excellence in patient care.

Should all trainees be taught to repair an acute type A Aortic dissection?

Bothayna Amien, Ayman Kenawy
Liverpool Heart and Chest Hospital NHS Foundation Trust, UK

Surgical repair of acute type A aortic dissection (ATAAD) still carries a significant risk of mortality and morbidity despite refinement in surgical and anaesthetic techniques, including cerebral protection.

Training in (ATAAD) repair is particularly challenging due to multiple factors. Firstly, these operations are done on an emergency basis and are commonly out of hours. There are technical challenges in handling dissected tissues, bleeding risks due to poor-quality tissues and hypothermia-related coagulopathies. Moreover, familiarity with establishing peripheral cardiopulmonary bypass, managing circulatory arrest and cerebral protection techniques are essential skills that are lacking in non/low volume Aortic units. The combination of the above-mentioned factors leads to a lack of surgical contribution from the trainee.

At Liverpool Heart and Chest Hospital (LHCH), we have an established aortic fellowship program whereby we overcome these challenges. The aortic fellow is expected -not only by the aortic

Bothayna Amien   Ayman Kenawy

consultants but also by the anaesthetic team, perfusionists, and theatre scrub practitioners- to be the primary operator in all acute type A dissection operations, after appropriate, stepwise training.

The success of our aortic fellowship program is underpinned by several factors that start with appropriate recruitment. The aortic fellow is expected to have completed surgical training and is an independent operator in general cardiac surgical cases. Training starts with elective, first-time, single aortic segment surgery, peripheral cannulation, management of hypothermic circulatory arrest and cerebral protection strategies. The fellows progress thereafter to operate

on emergency aortic dissection cases. An important contributory factor is a standardised approach to managing these patients across all aortic consultants.

Results
In order to evaluate the safety of training in aortic surgery, we conducted a retrospective analysis to compare the outcomes of trainees vs consultants as primary operators at LHCH in the last five years. We identified the number of type A aortic dissection repair procedures between October 2018 and September 2023; the total number of cases was 128, of which 70 were performed with a consultant as the primary operator vs 58 with a trainee as a primary operator. Of the 128 patients, 36 had aortic root replacement, of which 22 patients were operated by the aortic fellows, and 19 patients had valve-sparing David re-implantation of which seven patients were operated by fellows.

Thirty-three patients had total arch replacement of which 24 had frozen elephant trunk, trainees performed 12 of the total arch and seven of the frozen elephant trunk.

The overall in-hospital mortality was 9.4%, 11.4% in the consultant group vs 6.9% in the trainee group (p=0.57). 90-day overall
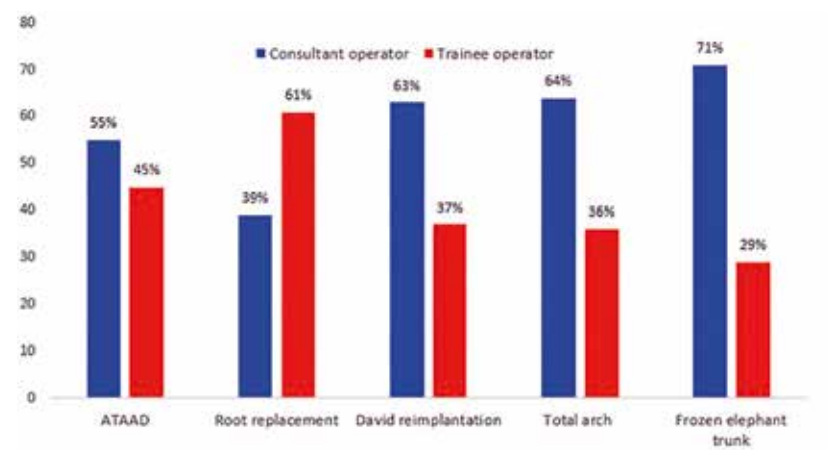
mortality was 14.1%, 15.7% in the consultant vs. 12.1% in the trainee group (p=0.74. The total number of days in ITU was similar in both groups.

Elective and urgent surgeries play a pivotal role in the fundamentals of training. In the same time period, we performed elective /urgent 166 root replacements, 179 David re-implantations, 57 total arches of which 29 had frozen elephant trunks. of those 29,10,6 and five were operated by trainees as single operators respectively. Of

note, a number of patients were operated on by either two consultants or a consultant and fellow as dual operators due to case complexities. These are counted as dual operators and not included in fellow as primary operator.

Conclusion
Training in ATAAD repair is safely feasible in high volume aortic centres with standardised surgical approach and established aortic fellowship programs.

Navigational Bronchoscopy in Thoracic lesions and its effect on the cancer pathway

Shabarishan Mathava
University of Southampton, Southampton

Diagnosing cancer has always been a challenge and over the years there has been a lot of emphasis on reducing the time it takes to diagnose patients. Electromagnetic navigational bronchoscopy (ENB) is a specialised medical procedure that uses a unique bronchoscope to examine thoracic lesions. This technique develops a three-dimensional map to guide the surgeon through the airways to the target lesion, allowing the physician to take biopsies safely. Attaining these biopsies has impacted the management of patients and helped healthcare professionals identify

whether the lesion is malignant or benign. In my research, I focused on assessing the effectiveness and safety of ENB in the management of lung tumors and its influence on cancer management.

The Southampton thoracic surgery department takes referrals from eight regional lung cancer MDTs, so data collection was complex. Initially, we had 138 patients, however there were only complete data for 90 patients. All the cases were done as a day case with an average procedure time of 45 min (11-173) and 49 (54.4%) of the patients showed cancerous lesions. The average time taken from the initial referral procedure to the treatment plan after removing anomalies and outliers was 115.6 days. Surgery was the definitive management in the majority of the cases (Figure 1). There were only two complications noted. The number of referrals per month from cancer teams increased over time (Figure 2). Overall, ENB is effective at attaining biopsies in smaller lesions allowing for earlier diagnosis and better outcomes for the patients.

As a medical student aspiring to go into cardiothoracic surgery. This research project was the perfect opportunity to gain insight into how the cardiothoracic
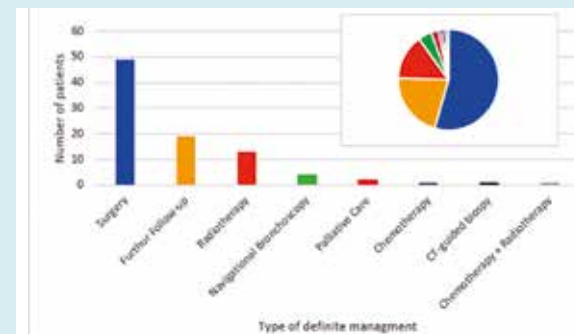

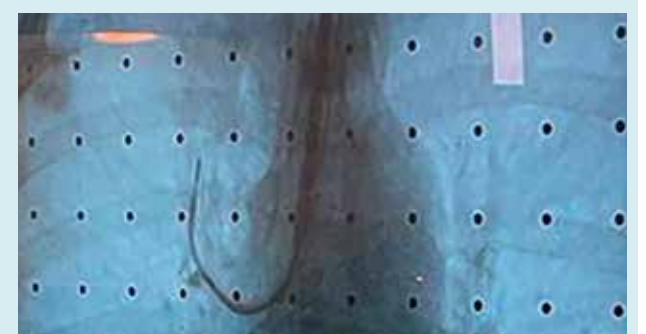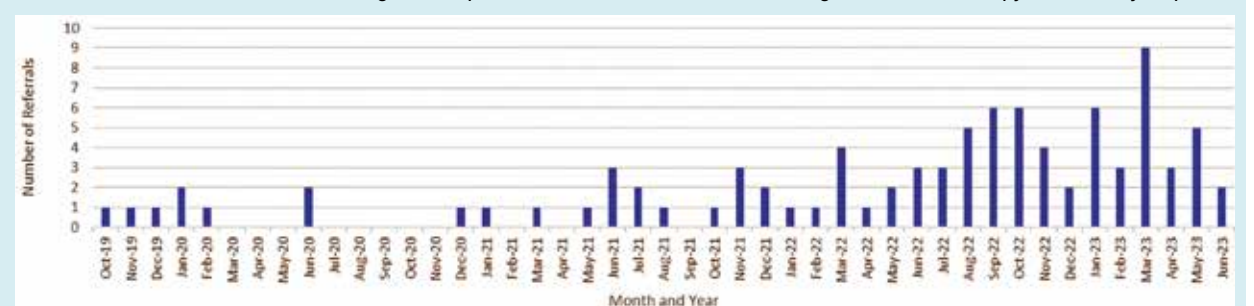Figure 1: Represents the definite management for patients.

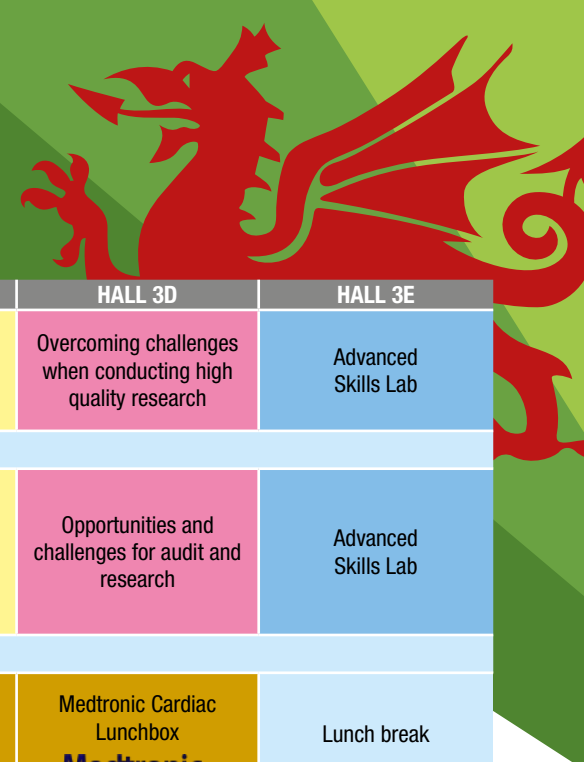Figure 3: Live CT scan during Navigational Bronchoscopy.

Figure 2: Represents the number of referrals to Navigational Bronchoscopy over a four-year period.

team works and the current advances in this field such as robotic-assisted thoracic surgery (RATS) and ENB. After witnessing the effects surgery can have on families

and patients, I understood the importance of reducing complications and improving current practice to allow for more minimally invasive surgeries which aids in reducing

recovery times. There is plenty of new research being conducted in this field and I am excited to see how cardiothoracic surgery will develop in the future.

SCTS ANNUAL MEETING 2024

SUNDAY 17th MARCH

	Lounge	HALL 1A	HALL 1B	HALL 1C	HALL 2D	HALL 2E	HALL 3D	HALL 3E
09:00-10:30	NAHP Wetlab	Minimal access valve interventions: Technical considerations	New Technology in Acute Mechanical Circulatory Support for Cardiac Surgeons	Pectus Deformities		Medical Student Session	Overcoming challenges when conducting high quality research	Advanced Skills Lab
10:30-10:50	Coffee							
10:50-12:20	NAHP Wetlab	British Heart Valve Society section: Aortic valve interventions	AtriCure session AF Surgery: Preventing AF related morbidity and heart failure AtriCure	Robotic Thoracic Surgery		Medical Student Session	Opportunities and challenges for audit and research	Advanced Skills Lab
12:20-12:30	Grab lunch box to attend session							
12:30-13:30	Lunch break	EDWARDS Cardiac Lunchbox Edwards	TADCT Cardiac Lunchbox TERUMO Aortic	Intuitive Thoracic Lunchbox INTUITIVE	Abiomed Cardiac Lunchbox ABIOMED	AtriCure Thoracic Lunchbox AtriCure	Medtronic Cardiac Lunchbox Medtronic	Lunch break
13:30-15:00	NAHP Wetlab	Contemporary approaches to Surgical coronary revascularisation	UK AS session 1: Aortic guidelines and risk assessment	Lung Cancer		Medical Student Session	Improving patient care through research	Advanced Skills Lab
15:00-15:30	Coffee							
15:30-17:00	NAHP Wetlab	State of the art Mitral Surgery Edwards	UK AS session 2: Current innovations in complex aortic surgery	Malignant pleural disease		Medical Student Session	Perfusion & AHP Interactions	Advanced Skills Lab
17:00-19:00	WiCTS Networking Event (18:00-19:00)	Welcome Reception Exhibition Hall			Trainee Meeting (17:00-19:30)	Welcome Reception Exhibition Hall	Cardiac Surgery Sub-committee Executive Boardroom (17:00-18:00)	Welcome Reception Exhibition Hall
19:30-22:00	Pub Quiz Plaza Foyer							

MONDAY 18th MARCH

	HALL 1A	HALL 1B	HALL 1C	HALL 2D	HALL 2E	HALL 3D	HALL 3E	HALL 4	EXECUTIVE BOARDROOM	MEETING ROOM 6
08:00-09:00	KIMAL Cardiac Symposium KIMAL		Terumo Cardiac Symposium TERUMO	BMS Thoracic Symposium Bristol Myers Squibb	Ethicon Thoracic Symposium ETHICON					
09:00-10:30	Main Plenary - Auditorium									
10:30-11:00	Coffee - Exhibition Hall									
11:00 - 12:30	Aortic surgery: Aneurysm	Cardiac General: Outcomes	Transplant & MCS	Early detection of Lung Cancer	Chest wall disease and trauma	Clinical effectiveness and patient experience in CT surgery	Congenital 1: Abstract Session	Moderated posters: Thoracics 1	E, D & I Sub-committee Meeting	RESOLVE National PPI Meeting
12:30-13:30	Lunch - Exhibition Hall								Student Committee Meeting	SCTS digital rehabilitation Fit4Surgery trial in Lung Meeting
13:30 -15:00	Research Plenary: Multidisciplinary research - Auditorium					Congenital 2: Management of PA/ToF-VSD with diminished pulmonary flow	Research Plenary: Multidisciplinary research - Auditorium			
15:00-15:30	Coffee - Exhibition Hall									
15:30-17:00	Cardiac general 2	CABG: off pump	BHVS aortic valve session British Heart Valve Society	Perioperative management in thoracic surgery	Other Thoracic Malignancies	Enhancing patient care in CT surgery	Congenital 2: Abstract Session	Moderated posters: Cardiac 1: Aortic Surgery	WiCTS Sub-committee Meeting	PACeS Trial Investigators Meeting (15:30-16:30) / PRIMARY Investigators Meeting (16:30-17:30)
17:00-18:00	Medela Cardiac Symposium medela	Medtronic Cardiac Symposium Medtronic		BMS Thoracic Symposium Bristol Myers Squibb	Medtronic Thoracic Symposium Medtronic		UK Aortic Surgery	BCIS-4 Trial Investigators Meeting (17:00-18:30)		

TUESDAY 19th MARCH

	HALL 1F	HALL 1C	HALL 2D	HALL 3D	HALL 3E	HALL 4	EXECUTIVE BOARDROOM	MEETING ROOM 6
08:30-09:30							Thoracic Surgery Sub-committee Meeting	
09:00-10:30	Mitral valve surgery	Heart Research UK Heart Research UK	Contemporary Lung Cancer management	Collaborative shared learning experiences in CT surgery		Moderated posters: Cardiac 2	Audit Sub-committee Meeting (09:30-10:30)	RESTORE Trial Meeting
10:30-11:00	Coffee - Exhibition Hall							
11:00 - 12:30	Innovations in CT Surgery - Hall 1A/1B							
12:30-13:30	Lunch - Exhibition Hall							
13:30 -15:00	Cardiothoracic Drainology	Training in CT Surgery	Improving Quality in Thoracic Surgery	Improving CT surgical outcomes	Thermic 4 Investigators Trial Meeting	Moderated posters: Thoracics 2	Communications Sub-committee Meeting (13:30-14:30)	National Trials Initiative Steering Group Meeting
15:00-15:30	Coffee - Exhibition Hall							
15:30-17:00	Aortic surgery: Dissection	CABG	Miscellaneous Thoracic Surgery	Creating innovative ways to enhance patient care		Moderated posters: Cardiac 3	Sustainability in CT Surgery Working Group Meeting (14:30-15:30)	

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Legend: Cardiac · Congenital · Industry Sessions · NAHP Wetlab/Session · Plenary · Satellite Meetings · Skills Lab · Student Engagement · Thoracic · Trainee

Multi-faith room: Green Room E • Care giving room: Green Room F

ICC WALES

Dexamethasone modulates Osteopontin activation and microcalcification in venous grafts

Dr Shameem Ladak
University of Leicester, Leicester, UK

The long saphenous vein (LSV) is the most common conduit used in coronary artery bypass grafting (CABG). However, vein graft failure remains the limiting factor for the long-term success of CABG due to the development of intimal hyperplasia (IH). Recent studies have shown that 50% of vein grafts occlude within ten years post-surgery, with an estimated attrition rate of 10–25% within the first year post-surgery.

The development of IH starts during vein harvest, which is known to activate the endothelial cells (ECs). These cells are further stimulated due to the sudden exposure to arterial haemodynamics following implantation of the vein into the arterial circulation, thereby triggering the activation of signalling pathways such as mitogen-activated protein kinase (MAPK) and nuclear factor κB (NF-KB). Vascular calcification (VC) is also implicated in IH, wherein Osteopontin (OPN), a matricellular

Shameem Ladak

protein, has been reported at the injured endothelial sites in a porcine model.

Furthermore, the arterial haemodynamic microenvironment facilitates pro-inflammatory conditions that drive VC, which is also a feather of advanced stages of atherosclerosis in native arteries. However, the role of VC and OPN in vein grafts is not well explored. Our study aimed to assess the role of acute arterial
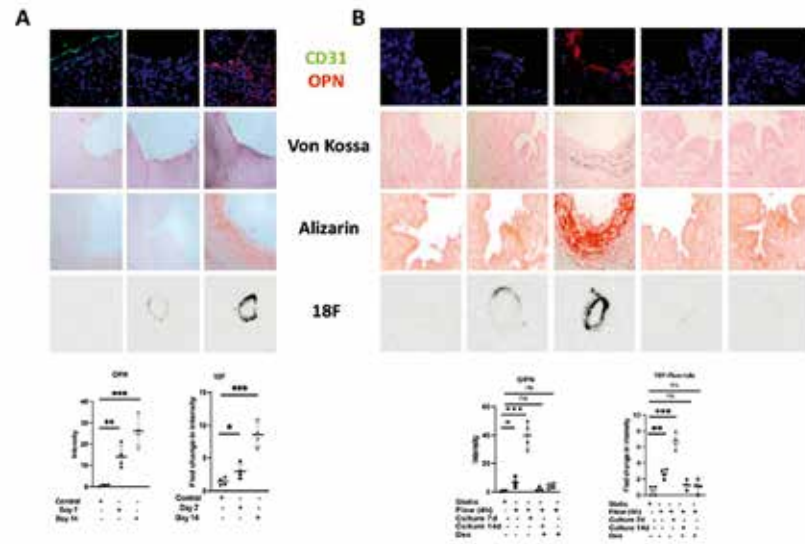
haemodynamics on OPN expression and VC in vein grafts and whether brief pre-treatment with a glucocorticoid, dexamethasone, inhibits OPN production.

To study the effect of acute arterial haemodynamics our initial study employed the use of a porcine vein graft model. The study showed an increased expression of OPN and microcalcification in porcine interposition grafts (A). Next, we exposed the LSV to acute arterial haemodynamics using our ex-vivo setup, which confirmed

the findings from the porcine model study. A brief pre-treatment with dexamethasone before subjecting LSV to acute arterial haemodynamics was able to suppress OPN activation at day 0 and in veins cultured for over 14 days following exposure to acute arterial haemodynamics.

Finally, our findings were validated using 18F-sodium fluoride staining, wherein there was a significant update of 18F-sodium fluoride in porcine interposition grafts and post-flow culture vein segments at 1 week, while a brief pre-treatment of LSV with dexamethasone was able to abolish this uptake (B).

Our study concluded that OPN activation occurs following exposure to acute arterial haemodynamics and that dexamethasone pre-treatment is not only able to suppress OPN activation but also microcalcification development in vein grafts. Furthermore, imaging 18F-sodium fluoride uptake in relation to OPN and microcalcificaton formation may allow predicting the risk of vascular inflammation and IH in vein grafts following surgery.

A screening process to identify prehabilitation needs for patients awaiting in-house urgent (IHU) cardiac surgery

Michael Rice Sheffield Teaching Hospitals, Sheffield (the project was completed at Royal Papworth Hospital, Cambridge, UK)

Research Question
Does a screening process effectively identify patients for physiotherapy input prior to IHU surgery?

Objectives
To optimise the patient journey through cardiac surgery by highlighting those patients who may require enhanced physiotherapy input whilst awaiting IHU surgery.

Methods
Over the period of April to September 2022, 58 patients awaiting IHU cardiac surgery were screened using a newly created tool focusing on musculoskeletal, neurological and respiratory diagnoses. Diagnosis codes were obtained from a database based on the electronic patient record, selected from a full list and separated into the above specialities. IHU patient notes were reviewed as able to provide
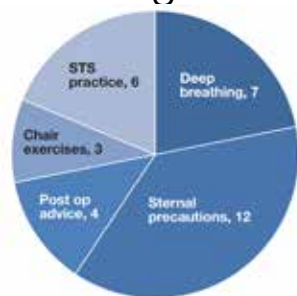

Figure 1. SCTS distribution of patients for each input

prehabilitation or advice to those with comorbidities that may affect their post-operative outcomes.

Results
Fourteen patients were screened in due to having comorbidities and were reviewed for a range of inputs including sternal precaution advice, active cycle of breathing techniques, sit-to-stand (STS) practice and chair exercises, distribution of these is shown in Figure 1.

Most patients had sternal precaution advice (traditional or 'keep your move in the tube/ KYMITT') whereas the screening highlighted those who would benefit from deep

Michael Rice

breathing advice (seven out of 14) and/or chair exercises/STS practice (nine out of 14). Some patients were given multiple interventions. Assessing outcomes for these patients compared to their peers has not yet been reviewed.

Conclusions
It has not yet been established if prehabilitation is of benefit to IHU patients despite being a focus of cardiac surgeons to improve outcomes. This is particularly important in the context of increased surgical wait times, although suitability needs clarification with the cardiology team.

Future research is needed to establish if optimising a patient's physical and mental condition pre-surgery affects their post-operative outcomes. Novel ideas to specify those patients who would get the most benefit from physiotherapy input by using a screening tool would streamline resources.

Further to this, the importance of establishing potential social issues via occupational therapy or shared discharge planning must be considered for a timely post-operative course.

Stand-alone surgical ablation for atrial fibrillation: A UK single-centre experience

Mark Sammut Sheffield Teaching Hospitals, Sheffield, UK

Stand-alone surgical ablation is an effective procedure for symptomatic atrial fibrillation (AF) refractory to recommended first-line therapies such as antiarrhythmic drugs and catheter ablation. However, its wider uptake is limited and only a few centres around the world report on longer-term efficacy. We have been performing stand-alone surgical ablation at Sheffield Teaching Hospitals since 2014 and conducted a retrospectivet observational study to report on its safety and efficacy in our first eight years.

Ninety-three consecutive patients were included (mean age 59 +/- 10 years). The median duration of AF was 4.8 years (interquartile range 2.6-8.2) and persistent in 82% of patients. The mean left atrium volume index (LAVI) was 40 ± 13 ml/m². The majority of patients had moderate or severe symptoms of AF based on the modified European Heart Rhythm Association score. Only 34% of patients had prior catheter ablation, while most of the rest were deemed unsuitable for one due to perceived lack of success, need for anticoagulation

or technical issues related to anatomy.

A thoracoscopic approach was adopted in 94% of patients but 4% necessitated conversion to sternotomy due to bleeding. The left atrial appendage (LAA) was clipped in all patients. The first procedures involved a 'box lesion' (pulmonary vein isolation with superior and inferior connecting lines) and a connecting lesion to the LAA. Right-sided lesions (superior to inferior vena cava line and connecting lines to the right atrial appendage) were introduced later.

The median length of stay was four days (interquartile range 3-6). 30-day complications

included stroke (2%), pacemaker implantation (1%) and re-operation for haemothorax (1%). There were no deaths or cases of pericardial effusion. Freedom from atrial tachyarrhythmias (ATA) was 74% at 1 year, 62% at 3 years and 54% at 5 years. Longer duration of AF, increased LAVI and absence of right-sided lesions were predictors of ATA recurrence. Our data is similar to that reported in other centres performing totally thoracoscopic ablation but centres performing bilateral Cox-Maze IV via sternotomy or right minithoracotomy report long-term efficacy close to 90% or higher.

A subset of patients (n=22) underwent left atrial mapping at subsequent electrophysiological study and this identified successful prior pulmonary vein isolation in 82% and superior/inferior line gaps in 50% which were then addressed. This and the superiority of hybrid over catheter ablation reported in the recent CEASE-AF trial suggests that surgical ablation followed by endocardial 'touch up' may offer the best chance of long-term success.

Surgical involvement in the management of symptomatic AF should therefore be encouraged, with thoracoscopic approaches being safe and reasonably efficacious.

Surgical Repair of aortic root aneurysms in young populations
A contemporary meta-analysis of valve-sparing and composite valve graft root replacements

Hayden Simmons University of Bristol

Thoracic aortic aneurysms primarily affect older populations, with sporadic aneurysms typically affecting patients 65 years and older, so much of the literature examines this demographic. This study aims to provide a comprehensive comparison of outcomes between valve-sparing (David) and composite valve graft (Bentall) root replacement procedures in younger populations, below 50 years of age. The primary

Hayden Simmons

focus is on early mortality, with secondary considerations for cerebrovascular accidents (CVA) and reoperation for bleeding.

This research seeks to uncover the differences in post-operative outcomes between these two main aortic root replacement techniques.

Methods
A systematic literature search was conducted to identify relevant studies within the last 10 years comparing valve-sparing and composite valve graft root replacement procedures. Selection criteria included studies with patients below 50 years of age, excluding duplicates, meta-analyses, systematic reviews,

case reports, and those focusing solely on aortic dissections or populations older than 50 years. A random-effects meta-analysis was performed on three main outcomes: early mortality, CVA, and reoperation for bleeding. Standardised mean differences (SMD) were calculated, and results were analysed for effect size and statistical significance, presented in forest plots.

Results
After screening, three studies met the inclusion criteria, comprising

a total of 742 patients (valve-sparing n=424, composite valve graft n=318). The mean age of patients in both groups was below 50 years. The analysis of early mortality yielded an SMD of -0.20 (CI [-1.80; 1.41]), indicating a small effect size. For CVA, the SMD was -0.88 (CI [-12.96; 11.19]), with a large effect size, while reoperation for bleeding resulted in an SMD of -0.10 (CI [-0.72; 0.52]). As all confidence intervals included 0, none of the analyses showed statistically significant differences.

Conclusions
This meta-analysis suggests that there is no statistically significant difference in early mortality, CVA, or reoperation for bleeding between valve-sparing (David) and composite valve graft (Bentall) root replacement procedures. The recommendation made is to be informed by potential comorbid features, such as a bicuspid aortic valve, and to encourage shared decision-making between surgeons expressing their preferences, and aligning these with patient wishes.

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2024

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19.30 - 1.00

Mark Sammut

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Early detection of Lung Cancer Monday 18 March **11:00-12:30** HALL 2D

Electromagnetic Bronchoscopy Learning Curve, Pneumothorax Rate and Diagnostic Yield

Nicolas Wamaani Mwesigwa
Castle Hill Hospital, UK.

Introduction

Electromagnetic Navigational Bronchoscopy (ENB) stands out as one of the most advanced bronchoscopy techniques available. As delineated by Pickering and colleagues[1] ENB is characterized by a pre-procedural chest CT of the patient that creates a three-dimensional (3D) virtual airway map through which the surgeon navigates to locate tiny lung nodules and biopsy them. It has a notably superior diagnostic yield compared to conventional bronchoscopy; however, the occurrence of pneumothorax remains frequent.[2] Our study explored the diagnostic yield and pneumothorax rate of ENB at Castle Hill Hospital, UK, mainly exploring learning curves and change in statistics over four years. As demonstrated by Lee et al. surgical skills drastically improve with increased frequency of performing a procedure. This article exhibits a clear procedure learning curve that simultaneously improved ENB diagnostic yield and reduced pneumothorax rate at our hospital.

Our study

We retrospectively analyzed ENB results of 246 patients in whom 358 peripheral lung biopsies were obtained from January 2020 to September 2023. This indicates that several patients had more than one lobe biopsied. Of the 358 biopsies, 108 were obtained from 01/2020 to 12/2021 and 250 from 01/2022 to 09/2023. We then determin v

Nicolas Wamaani Mwesigwa

ed the diagnostic yield of the ENB procedure considering true positive, true negative, false positives and false negative results. This was stratified for the period 2020-2021 and 2022-2023. Post-transbronchial biopsy chest radiographs were conducted for each patient to diagnose pneumothorax. This was stratified for similar periods.

Results

Approximately 32.5% (80/246) of the biopsies were cancerous lesions. This excluded results that depicted atypical cells, most of which proceeded to show cancer following definitive surgery. The overall diagnostic yield was 61.3%. In the 2020-2021 period, the diagnostic yield was 58.2%, which improved to 66.0% in the 2022-2023 period. Pneumothorax rate meanwhile was 9.8% in the 2020-2021 period and drastically reduced to 3.4% in the 2022-2023 period (p = 0.021*), majority following

upper lobe procedures suggesting correspondence with the acute angles that are required to be navigated for these lesions. The high initial pneumothorax rate could indicate initial unfamiliarity with the procedure, a smaller number of patients in this period as compared to the latter half. The mean size of lesion biopsied was 1.13cm which was much smaller as compared to previous studies.

Clinical implications

This study highlights the smooth surgical learning curve involved in conducting ENB procedures. The more procedures the surgeon conducts, the better the outcomes in terms of both diagnostic yield and pneumothorax rates. Our current diagnostic yield of 66.0% and pneumothorax rate of 3.4% were both comparable to those of previous studies.[2,3] While ENB procedure continues to improve at our hospital, over-dependence on the surgical skills of the operator still creates greater operator variability, which is a limitation. This could be solved by introducing robotic technologies with less operator dependence that improve the reproducibility of the procedure across different operators/surgeons.

Table 1. Patient characteristics and lobar distribution of lesions

Variables	Total patients, n	All lobes	UL	LL	RML	p-value
Baseline characteristics						
Age, mean ± SD	246	68.07 ± 9.23	68.07 ± 9.23	67.98 ± 9.32	67.26 ± 9.35	0.458
Size (cm), mean ± SD	246	1.13 ± 1.34	1.13 ± 1.34	1.14 ± 1.35	1.08 ± 0.57	0.219
Cancerous lesions, n (%)	246	80 (32.5)	62 (77.5)	12 (15.0)	6 (7.5)	0.053
Pneumothorax rate	358	24 (6.7)	18 (75.0)	3 (12.5)	3 (12.5)	0.198

Values are presented as mean ± SD or counts, (%) unless otherwise indicated. UL _ Upper lobe; LL _ Lower lobe; RML _ Right middle lobe
*Results depicting atypical cells were excluded from analysis, however, majority of these proved to be cancerous lesions

Figure 1. Pneumothorax rate by period of ENB procedure

Table 4. Pneumothorax rate by period of ENB procedure.

Period	Diagnostic yield	Pneumothorax rate (%)	p-value
2020-2021		9.8	0.021*
2022-2023		3.4	

Table 2. Diagnostic yield stratified by periods of ENB procedure

2020-2021			2022-2023			Overall		
True positive = 55	True negative = 30	True diagnostic (TN+TP) = 85 (TD)	True positive = 25	True negative = 41	True diagnostic (TN+TP) = 66 (TD)	True positive = 80	True negative = 71	True diagnostic (TN+TP) = 151 (TD)
False positive = 1	False negative = 60	Non-diagnostic (FP+FN) = 61 (ND)	False positive = 0	False negative = 34	Non-diagnostic (FP+FN) = 34 (ND)	False positive = 1	False negative = 94	Non-diagnostic (FP+FN) = 95 (ND)
Diagnostic yield (2020-2021) TD/(TD+ND) X100 = 58.2%			Diagnostic yield (2022-2023) TD/(TD+ND) X100 = 66.0%			Overall diagnostic yield TD/(TD+ND) X100 = 61.3%		
Positive predictive value TP/TP+FP = 98.2%			Positive predictive value TP/TP+FP = 100%			Positive predictive value TP/TP+FP = 98.7%		

Key: 1-True positive- Navigational bronchoscopy detected specific tumour (Adeno, SC, Carcinoid, lymphoma…), which was further confirmed on surgical procedure. 2-True negative- Navigational bronchoscopy suggested no malignancy or inflammatory lesion- This was confirmed with CT follow up which showed decrease in size of lesion till discharge or wedge resection which indicated no malignancy.
3-False positive- Navigational Bronchoscopy suggested malignant lesion, which was negative on definitive surgery. 4-False negative- Navigational bronchoscopy suggested no malignancy/inconclusive/inflammatory lesions however, subsequent histology proved malignancy

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Cardiac General 2 Monday 18 March **15:30-17:00** HALL 1A

An evidence-based approach to targeted respiratory prehabilitation addressing frailty, deprivation, and malnutrition to reduce postoperative pulmonary complications (PPC)

Michaela Richards and Tracy Jones Swansea Bay University Health Board, Swansea, UK

Respiratory prehabilitation has emerged as a vital component of quality improvement projects for cardiac patients awaiting surgeries like Coronary Artery Bypass Grafting (CABG) and valvular procedures. Addressing preoperative challenges requires a multifaceted approach encompassing lifestyle modifications, comorbidities management, smoking cessation interventions, and targeted respiratory prehabilitation strategies tailored to the individual needs of cardiac patients[9].

Prolonged periods of inactivity, including frailty, can lead to decreased lung capacity and efficiency, as the lungs may not be fully utilised or exercised to their potential, especially in those aged >60 years.[10] Comorbidities prevalent in cardiac patients, such as obesity, diabetes, and chronic obstructive pulmonary disease (COPD), can further exacerbate respiratory issues by imposing additional strain on the respiratory system[5]. These factors increase the risk of postoperative pulmonary complications (PPC), morbidity and

Michaela Richards and Tracy Jones

mortality[7;15]. Optimising respiratory health significantly reduces the incidence of PPC, including complications like prolonged postoperative ventilation (>48hrs), atelectasis, and infections, ultimately leading to reduced antibiotic usage and shorter hospital stays.[1;7;11;15]

A local clinical audit revealed that over two years, PPC affected 29% of cardiac cases. Frailty emerged as a significant factor associated with its occurrence, particularly evident in 40% of frail patients. Frailty presents a similar risk of PPC as malnutrition, both doubling the risk compared to being a current smoker.[6;14]

IMT Prehab
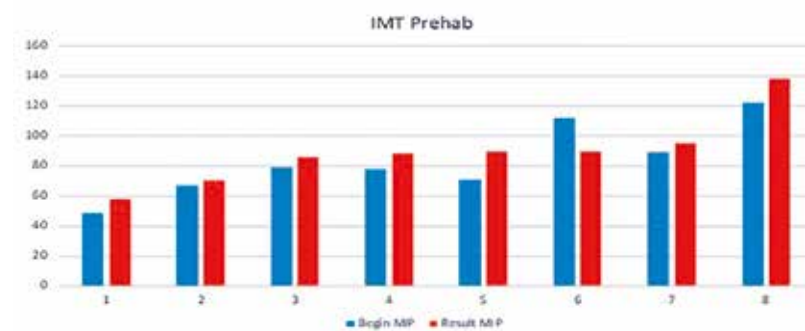
PPC prolongs the need for respiratory support and extends hospital stays, incurring substantial costs. The expenses of critical level 2/3 support per day amount to £1,700, significantly higher than ward care at £500 per day.[4] Consequently, a single PPC can lead to considerable financial burdens per patient, underscoring the imperative need for targeted interventions.

Inspiratory muscle training (IMT) prehabilitation offers a cost-effective solution, strengthening cardiac patients' respiratory muscles and cardiorespiratory fitness.[12] It provides resistance to inhalation, thereby training inspiratory muscles,

reducing PPC rates, accelerating recovery, facilitating shorter hospital stays, and improving patient satisfaction. In the preoperative assessment of cardiac patients, a comprehensive risk assessment that includes frailty evaluation is essential for identifying individuals who would benefit from respiratory prehabilitation[8]. By incorporating such strategies into routine preoperative optimisation, healthcare providers can enhance the quality of care and outcomes for cardiac patients undergoing surgical interventions.

The cost of the IMT device stands at £60 per patient. Most studies have opted

for a threshold IMT device to facilitate effective training.[2;7;15] Although there is no optimal IMT training for cardiac patients, many studies set the Maximal Inspiratory Pressure (MIP) between 15–40% for training.[13;15] Our quality improvement project chose a training regime of 40% of the MIP twice daily. High-intensity training is more effective in increasing MIP (Table 1.) and reducing PPC than endurance training.[3] While direct supervision by healthcare professionals enhances effectiveness, current challenges such as staff shortages and increased workloads necessitate innovative approaches. Our initial IMT session is led by a physiotherapist, who equips patients with necessary guidance and materials, including the patient's leaflet and accessible telephone contact, and then reassesses the day of surgery. Empowering patients to conduct IMT sessions at home marks a shift towards patient-centred care, fostering a sense of action and responsibility in their pre-surgery preparation with indirect supervision from physiotherapists. This approach optimises resource utilisation and emphasises the importance of patient engagement and self-management in achieving better health outcomes.

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Society for Cardiothoracic Surgery
in Great Britain and Ireland

SAVE THE DATE

SCTS ANNUAL MEETING 2025

Sunday 16th – Tuesday 18th March

Edinburgh
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Cardiac General: Outcomes Monday 18 March **11:00-12:30** HALL 1B

Ending the transfusion threshold debate: have we peaked the hierarchy of evidence?

Alexander Reynolds Bristol Heart Institute, University of Bristol, UK; Swansea University Medical School, Wales UK.

Might I start by saying what a great pleasure it will be to attend the SCTS Annual Meeting and, on behalf of my fellow south Walians say, "Croeso i Gymru" to all who attend! I have lived in Wales since beginning my medical training and have found the beautiful land and the people to whom it belongs to be most welcoming and friendly. It will always be the second home where my professional career began.

This year is exciting in that I have the privilege to present a piece of work undertaken with my collaborative research group. We wanted to club together the experiences of multiple trials in the field of cardiothoracic peri- and post-operative care; investigating the restrictive transfusion threshold technique and the resulting effects on mortality, major cardiovascular and cerebrovascular events, and duration of stay in both ITU and hospital overall in the pre-selected group of patients.

Having become proficient in the field of systematic reviews and meta-analyses, we were keen to avoid the pitfalls that such a controversial piece of work may lead to. Of particular concern is the attention given to the clinical context in which the restrictive technique is performed; no team is going to withhold blood transfusion in the context of trauma or acute presentation when it is indicated, and our data does not comment on such a scenario. Rather, we have examined the data of non-emergency cardiac patients in the postoperative

Alexander Reynolds
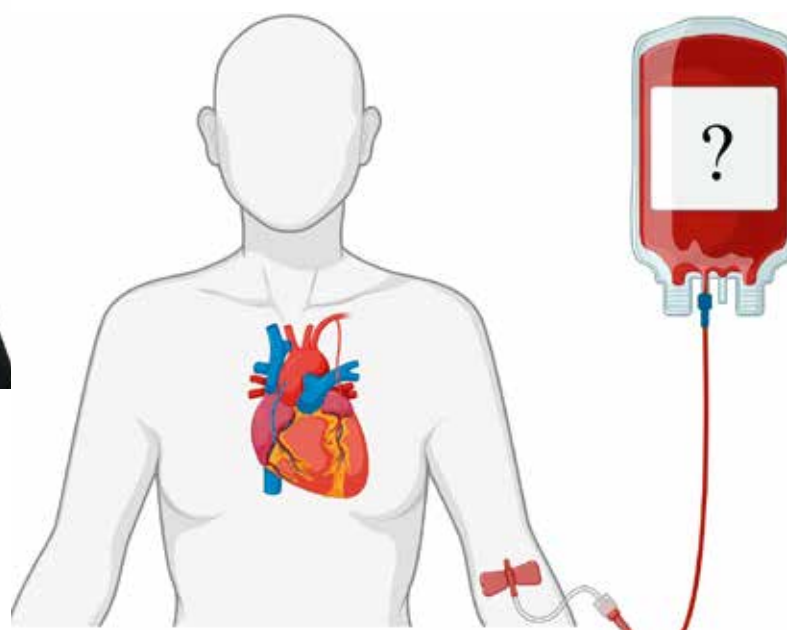
period whose haemoglobin would usually indicate blood transfusion. Enrolled patients were randomised to either receive transfusion or undergo active surveillance- whereby transfusion may only be offered

if their haemoglobin drops to the lower threshold value.

The pooled data confirmed the insignificant differences when comparing patients who received transfusions at a

liberal (normal indication) haemoglobin and a restrictive (lower) haemoglobin. Such results made us consider the known risks associated with blood transfusions and suggest whether the guidelines should now factor in restrictive transfusion thresholds for low-risk non-emergency patients for whom a blood transfusion could pose more risks than the benefit of elevated haemoglobin. Furthermore, the upcoming TRICS-IV RCT may clarify the effect of restrictive transfusion thresholds in high-risk patients- which would develop on our findings considerably.

As an aspiring surgeon, currently undertaking a year of research at an academic cardiac surgery centre, I am most intrigued to see how data influences the opinion of those with real-world experience in making clinical decisions and owning the outcomes. I am particularly keen to hear the views of the audience and the chairs, one of whom was the principal investigator on one of the original prominent RCTs that our dataset includes. Our presentation will take place during the General Cardiac: Outcomes session on Monday 18th March at 11.00 in Hall 1B and we welcome all debate and discussion surrounding this topic.

Collaborative shared learning and experience in CT surgery Co-chair by Cardiac Surgery International Nursing and Allied Professional Research Network (CONNECT) Tuesday 19 March **9:00-10:30** HALL 3D

Surgical site infection after endoscopic and open saphenous vein harvesting for coronary artery bypass grafting

Shincy Joseph, Anilkumar Sankanahalli Annaiah, Chandrashekar Chowdappa, Jeremy Chan, Cha Rajakaruna Bristol Heart Institute, Bristol, UK

Endoscopic vein harvesting (EVH) provides an alternate way to harvest the saphenous vein for CABG to reduce the incidence of surgical site infection. We aim to compare the incidence of surgical site infection (SSI) after EVH and open saphenous vein harvesting (OVH) in the Bristol Heart Institute.

We examined our local cardiac surgery database with all patients requiring a venous conduit from 2021. Currently, EVH is performed by three SCPs while OVH is performed by SCPs as well as the surgical team, in particular out-of-hour cases. We then compared the incidence of in-hospital SSI in patients who underwent EVH and OVH.

A total of 1,042 patients were included, of which 342 (32.8%) of patients underwent EVH. There were no patients who had a confirmed surgical site infection after EVH, while sixteen patients were diagnosed with surgical site infection by the wound care specialist after open vein harvesting. In addition, 20 patients (2.86%) had haematoma after OVH that was managed conservatively.

Our study demonstrated that EVH is associated with a low incidence of post-operative haematoma and surgical site infection. EVH could be considered in patients with a high risk of surgical site infection.

Joseph Shincy

Anilkumar Sankanahalli Annaiah

Chandrashekar Chowdappa

Cha Rajakaruna

CABG Off Pump Monday 18 March **15:30-17:00** HALL 1B

Long-term survival after off-pump coronary artery bypass grafting in a high-volume centre

Jeremy Chan, Daniel P Fudulu, Pradeep Narayan, Tim Dong, Gianni D Angelini Bristol Heart Institute, Bristol, United Kingdom

Previous studies have demonstrated equivalent short/mid-term results between on-pump and off-pump coronary artery bypass grafting in high-volume/experience centres. However, the long-term follow-up results are less known.

A total of 18138 patients who underwent first-time, elective or urgent isolated coronary artery bypass grafting at the Bristol Heart Institute from 1996 to 2023 were included in this study. Of these 8347 (46.02%) underwent off-pump CABG.

We concluded that off-pump when compared with on-pump coronary artery bypass grafting has better short-term clinical outcomes and equivalent long-term survival in high volume centres.

Tim Dong

Training in CT Surgery Tuesday 19 March **13:30-15:00** HALL 1C

Impact of COVID-19 on completion of cardiothoracic training programme in the UK– an evaluation of the Joint Committee on Surgical Training database.

Jeremy Chan, Daniel Fudulu, Tim Dong, Hunaid Vohra, Gianni D Angelini Bristol Heart Institute, Bristol, United Kingdom

Coronavirus 2019 (COVID-19) have overwhelmed healthcare systems internationally. It is widely reported that the volume of cases logged by cardiothoracic trainees significantly reduced during the COVID-19 pandemic. However, less known is the effect on trainees' completion during/post-pandemic.

We use the Joint Committee on Surgical Training (JCST) Surgeons Information Management System (SIMS) database, the Intercollegiate Surgical Curriculum

Programme (ISCP) database, and the Intercollegiate Surgical eLogbook (eLogbook) database to evaluate the Impact of COVID-19 on Cardiothoracic surgical training programme graduates during/post-pandemic.

We demonstrated trainees who undertook part of their training during COVID-19 were more likely to undertake time out of the program and required a longer period to complete the training. There was a significant reduction in cases logged by cardiac-themed trainees. However, an opposite trend was seen in thoracic-themed trainees.

COVID has a significant impact on cardiothoracic surgical training, increasing the duration of the

Gianni D Angelini

training period and the number of trainees taken out of the program for research/clinical training. The impact on surgical volume was greater in cardiac theme trainees.

BHVS Aortic Valve Session Monday 18 March **15:30-17:00** HALL 1C

Trend, early outcome, and long-term survival, in patients between the ages of 50-70 years undergoing aortic valve replacement.

Jeremy Chan, Pradeep Narayan, Daniel P Fudulu, Tim Dong, Gianni D Angelini Bristol Heart Institute, Bristol, United Kingdom

The last two decades have seen an incremental use of biological over mechanical aortic valve prostheses in patients between the ages of 50-70 years, mainly due to advancement in transcatheter aortic valve implantation and avoidance of long-term anticoagulation. While short-term outcomes are largely equivalent, the long-term outcomes remain controversial.

We examined the local cardiac surgery database including all patients between the ages of 50-70 years undergoing elective or urgent isolated aortic valve replacement at our institute

between 1996 to 2023. Trends, early outcomes, long-term survival, valve size, patient prosthesis mismatch (PPM), and repeat valve interventions were investigated in patients receiving biological or mechanical prostheses, first in the whole cohort and then using Propensity Score Matching (PSM).

Our study demonstrated that patients, aged between 50-70 years, who received a mechanical prosthesis had better long-term survival than those with a biological valve prosthesis. The use of a mechanical prosthesis particularly in patients with a small annulus and in the presence of patient prosthesis mismatch was associated with better long-term survival than with the use of biological valve

Jeremy Chan

prostheses. Further studies, including randomised controlled trials, should be conducted before the rapid expansion of the use of biological aortic valve prostheses in this cohort.

Upcoming SCTS Education Courses 2024

Course	Location	Date
ST7.1 Phase 3: Cardiothoracic Pre-Consultant Course Practical	Keele Anatomy & Surgical Training Centre	17th–18th April
ST5.2 Phase 2: Cardiothoracic Intensive Care and Critical Conditions Course	Ashorne Hill	29th–30th April
ST5.1 Phase 2: Cardiothoracic Surgery Sub-Specialty Course	Keele Anatomy & Surgical Training Centre	8th–9th May
ST3.1 Phase 1: Operative Cardiothoracic Surgery Course	Medizin im Grünen, Medical Competence Centre, Berlin	16th–17th May
SCTS Harefield Core Thoracic Organ Transplantation Course	STaR Centre	23rd–24th May
ST4.2 Phase 2: Core Thoracic Surgery Course	Ashorne Hill	10th–12th June
Congenital Heart Disease Course	Ashorne Hill	19th–20th June
ST2.2 Phase 1: Introduction to Specialty Training Course (ST3A)	Ashorne Hill	18th–19th July
Cardiothoracic Surgery Update and Wetlab for Trust-Appointed Doctors	Ashorne Hill	11th–12th September
ST2.1 Phase 1: Essential Skills in Cardiothoracic Surgery Course	Nottingham City Hospital	16th–17th September
CESR Application Course	Ashorne Hill	8th November
ST1: Introduction to Cardiothoracic Surgery Course	Ashorne Hill	15th November
ST4.1 Phase 2: Core Cardiac Surgery Course	Ashorne Hill	18th–20th November
ST7.2 Phase 3: Leadership and Professionalism Course	Ashorne Hill	2nd–3rd December

SCTS EDUCATION

**For more information, please visit:
https://scts.org/events**

Pat Magee Research Session Sunday 17 March **10:50-12:20** HALL 2E

AVSD repair, using a two-patch technique, in a 3D printed model with a novel removable AV valve

Georgios Belitsis   Tony Harshan Linton-Jude

Georgias Belitsis[1], Tony Harshan Linton-Jude[2], Ruby Silvera[2], Cameron Dent[2] and Mehar Bijral[2], Michele Bertolini[3] 1 University College London, 2 University College London Medical School, 3 Politecnico di Milano, Milan, Italy

We attempted to prove the feasibility of using a 3-Dimensional (3D) printed replica to model complex, intracardiac anatomy and repair. This would be shown by replicating and repairing an atrioventricular septal defect (AVSD). Such a model would permit tangible insight into both native and post-surgical anatomy. The educational value of such an endeavour was evident, enhancing the learning of the multidisciplinary team, overcoming current limitations in trainee exposure to complex operative cases and supporting informed patient consent.

A 3D AVSD model, including a first-of-its-kind removable atrioventricular (AV) valve, was designed and printed with compliant resins [Figure 1]. The choice of specific 'inks' being used was based on results of previous research that proved their competency in fine/microsurgical procedures.[1] The removable AV valve allowed for an in-depth appreciation of the complexity of the defect and the common
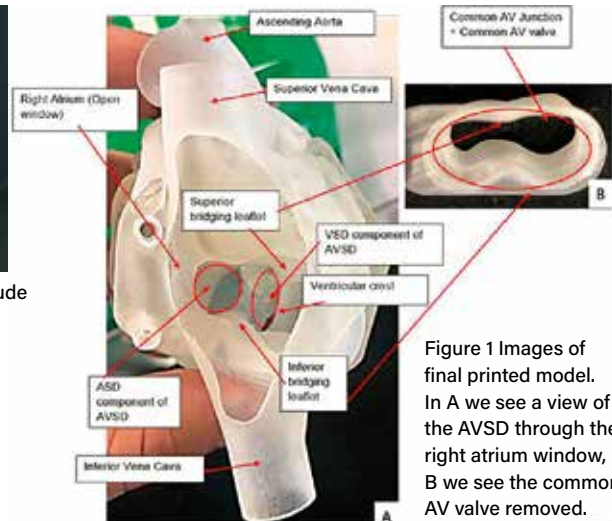
AV junction characterizing the AVSD. The leaflets were carefully designed and sized to allow for adequate coaptation, resembling a competent AV valve prior to any repair.[2] The papillary muscles were added to the already existing 3D mesh, augmenting the already segmented model. Chordae tendinea were added following the print of the model, being sized appropriately. An experienced surgeon, septated the heart and divided the AV valve, utilizing the two-patch technique. [Figures 2,3] An extensive questionnaire was used to document the operator's impression of the texture, elasticity, and appropriateness of the model for simulating surgery, with the latter being sized in a way to resemble infantile AVSD repair.

The pre- and post-operative models were individually appraised by trainees, cardiologists, cardiac surgeons, and scientists, with the use of questionnaires to assess the model's potential for training and consent purposes. We documented strong support
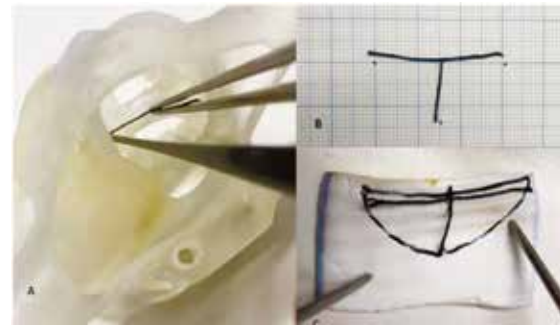

Figure 1 Images of final printed model. In A we see a view of the AVSD through the right atrium window, In B we see the common AV valve removed.

Figure 2 Sizing of ventricular patch
Using a silk tie the ventricular component of the AVSD was sized and then placed on graphing paper to measure the size of the ventricular component and patch (A and B). With the silk tie placed on a Gore-Tex patch it will be cut to size and used as the ventricular patch(C).

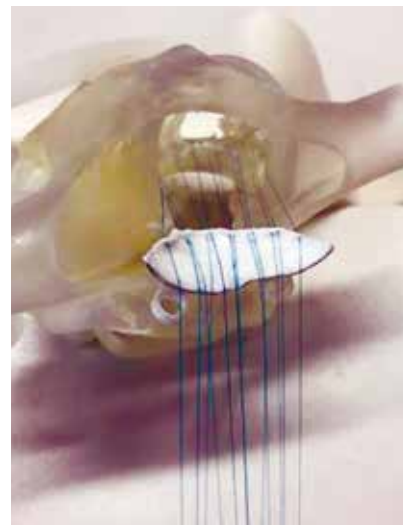
Figure 3 Descent of ventricular patch
Sutures are passed through the curved end of the ventricular patch and then descended to the ventricular component(A). The sutures are then knotted down to the right side of the interventricular septum (B).

regarding the accuracy of the model, with 90.48% (n=19) of pre-operative appraisals identifying fine anatomical features and 100% of post-operative appraisals (n=26) finding the model an accurate representation of two-patch AVSD repair.

In addition, we saw that there is a demand for models like this to be used for the training and education of medical professionals with 100% of respondents finding both the pre-operative (n=21) and post-operative (n=26) models useful for training, with 100% of surgeons (n=6) agreeing such a model should be used in surgical training. In addition, we saw support in using models like this to deliver information for patients with 85.71% (n=18) and 96.15% (n=25) of respondents supporting the model's use for consent, in the pre- and post-operative appraisal groups, respectively.

With our study, we can conclude that there is strong support for the utility of 3D-printed models as a tool to in-depth morphological understanding and surgical training. We look forward in carrying on replicating models for a series of rare and complex cardiac abnormalities,[3] as an adjunct to training, patient education and in vitro trialling of novel surgical techniques.[4,5]

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**Congenital 2 Abstract Session** Monday 18 March **15:30-17:00** HALL 3E

Virtual reality for enhanced preoperative planning and intracardiac baffle design for double outlet right ventricle

Mehar Bijral[1], Georgios Belitsis[2] 1 UCL Medical School, 2 UCL, London, UK

Double outlet right ventricle (DORV) is a form of congenital heart disease in which both great arteries arise from the morphologic right ventricle (RV). DORV is a spectrum, and within it, lies many anatomic variations, including the position of the interventricular communication (IVC) as well as aortic arch phenotypes. Arch malformations are reported in 50% of cases, with 20% of cases requiring neonatal arch augmentation.[1] As surgical repair strategies for DORV vary based on anatomic and haemodynamic subtypes, a detailed assessment of intracardiac anatomy is required preoperatively. Repair typically involves the intricate rerouting of the left ventricle (LV) to either the aorta or pulmonary root, depending on the location of the IVC.

Our study aims to advocate for the utility of virtual reality (VR) in optimising preoperative planning for DORV procedures. We aim to tailor surgical repair and design intracardiac baffles while mitigating reported complications


VR and CT

Baffle
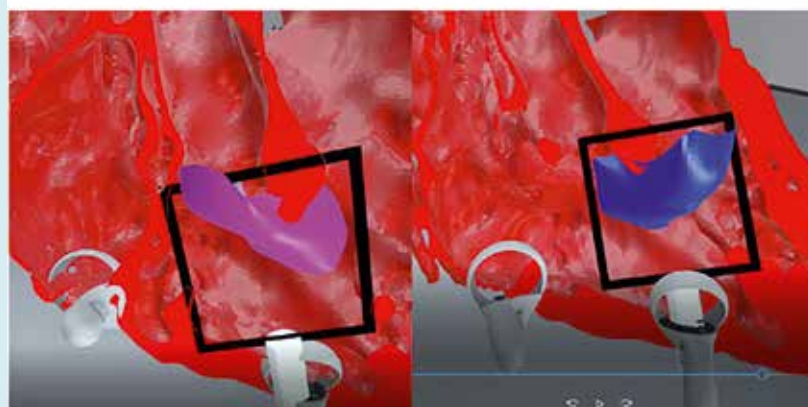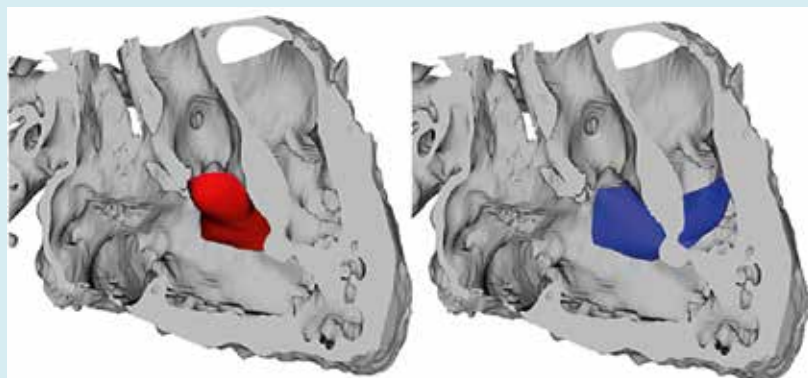
such as heart block, residual small RV, and intracardiac channel narrowing.

A multidisciplinary team of cardiac surgeons, morphologists, and engineers reconstructed precise intracardiac morphology within VR environments, from data sets of routine clinical imaging of DORV hearts.[2]Leveraging our in-house developed VR platform 'VheaRts', we conducted virtual surgical simulations within the VR environment. After decoding complex DORV pathology, we identified

surgical landmarks within carefully defined local coordinates in attitudinally correct fields.[3] We successfully planned and undertook interventions for complex DORV cases, including a case where the IVC, despite being perimembranous[4], was not surgically committable to either outflow tract[5], as well as a case in which raised pulmonary pressures necessitated complex biventricular repair in place of the originally planned Fontan pathway[6]. Additionally, the immersive VR environment has enabled us
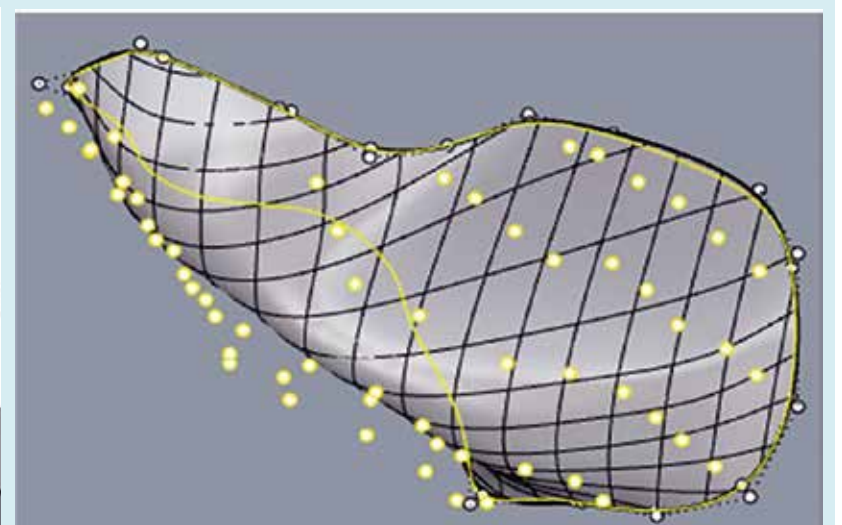
to engineer two precisely designed baffles, facilitating optimally sized outflow tracts between the LV and both the pulmonary root and the aorta. These baffles were carefully computationally sized and positioned through the process of creating an outline, followed by a 'belly', ensuring an unobstructed left ventricular outflow tract, regardless of arterial routing.

Future directions involve transitioning from 3D to 4D reconstructions, and simulating dynamic changes in the LV outflow tract diameter throughout the cardiac cycle. By incorporating MRI studies and simulating the physiological motion of the cardiac fibres, we aim to further refine our baffle designs.

In conclusion, VR has refined preoperative planning for DORV repair by enhancing our understanding of complex intracardiac lesions, customising surgical repair strategies, and facilitating the design of two intracardiac baffles. The potential

applications of VR in this field appear limitless, encompassing areas such as training, precision medicine, surgical practice refinement, global surgical education, and providing crucial support to low-volume centres.

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Long-term diagnostic yield for navigational bronchoscopy: Analysis of over 600 procedures

Arvind Muthirevula, Joshil Lodhia, Elaine Teh, Richard Milton, Alessandro Brunelli, Marco Nardini, Peter Tcherveniakov, Nilanjan Chaudhuri
Leeds Teaching Hospital, Leeds, UK

In lung lesion diagnosis, particularly in cases where routine diagnostic methods prove inadequate or unsuccessful, navigational bronchoscopy emerges as a pivotal tool. Our study delved into its diagnostic efficacy and associated outcomes, aiming to provide comprehensive insights into its utility.

Our methodology encompassed a retrospective analysis from 2018 to 2022, evaluating navigational bronchoscopy procedures conducted by multiple surgeons. The primary measure of interest was diagnostic accuracy, gauged through pathology from per-lesion biopsies. We ensured long-term validation by corroborating findings with follow-up CT scans and treatment records spanning at least one year post-procedure. Additionally, we investigated post-procedural complications such as pneumothorax rates, the need for drain insertion, and the duration of hospital stays.

Throughout the study period, we scrutinized 603 procedures, revealing a commendable 59% diagnostic accuracy per lesion biopsied. Interestingly, when dissected across various surgeons, each with a minimum experience of 30 procedures, diagnostic efficacy ranged from 54% to 67%. Noteworthy findings included a 38% incidence of true positive identifications and a 21% rate of true negatives. Pneumothorax occurred in 7% of cases, necessitating drain insertion in 3% of instances. Impressively, the mean hospital stay post-procedure was a mere 0.51 days, with 399 patients discharged

Arvind Muthirevula

on the day of surgery.

In conclusion, our extensive analysis underscores the substantial diagnostic accuracy afforded by navigational bronchoscopy, particularly in scenarios where conventional methods faltered. Despite the occurrence of pneumothorax, the procedure's efficacy shines through its ability to facilitate brief post-procedural hospital stays. These findings advocate for the widespread adoption of navigational bronchoscopy, offering clinicians a robust diagnostic tool to navigate challenging cases of lung lesions effectively.

Are we utilising the service effectively? Audit on specialized chest drain clinic in Nottingham University Hospital NHS Trust

Nur Binti Yusri, Rashad Abdelrahman, Shlok Pimprikar
Department of Thoracic Surgery Nottingham City Hospital, NUH Trust

In the ever-evolving landscape of healthcare, the pursuit of efficient and cost-effective services is an ongoing challenge. Nottingham City Hospital, under the Nottingham University Hospital NHS Trust, has been at the forefront of development with its Chest Drain Clinic, a service designed to provide post-discharge follow-ups for patients with ambulatory chest drains. This audit critically evaluates the clinic's effectiveness in ensuring safety, regular reviews, and its impact on costs and bed utilization.

The audit, conducted over a one-year period, focused on 97 patients who were discharged home with ambulatory chest drains. The meticulous retrospective analysis tracked patients' progress and identified any complications during their follow-up visits. Additionally, the number of bed days saved and service costs from the day of discharge to chest drain removal were carefully calculated and analysed.

Results from the audit revealed that a staggering 64% of patients required only one clinic visit before their drains were considered safe for removal. This accomplishment translated to a remarkable 60% reduction in inpatient admissions, equating to a total of 1,038 saved bed days. The financial implications were equally impressive, with cost savings reaching approximately £361,200 over the study period (Table 1). These savings not only bolstered the financial health of the institution but also facilitated the care of an additional 173 inpatients, generating an estimated income of £1,038,000 for the trust.

Moreover, the audit highlighted the clinic's role in expediting re-admission procedures for the 7.2% of patients experiencing complications such as pain, infection, or worsening surgical emphysema. By allowing direct re-entry to care from the chest drain clinic, these patients bypassed the emergency department, saving both time and

Nur Binti Yusri

valuable resources.

In conclusion, the Chest Drain Clinic at Nottingham City Hospital has proven its efficacy on multiple fronts. Beyond ensuring patient safety and regular reviews, the clinic has demonstrated substantial cost savings and increased bed availability. The efficiency in re-admission procedures further solidifies its importance in the healthcare landscape. This study underscores the significance of expanding and optimizing such specialized services within healthcare institutions. By doing so, we not only enhance patient outcomes but also empower healthcare providers to navigate the complex landscape of resource management and financial sustainability. Nottingham City Hospital's Chest Drain Clinic sets a benchmark, showcasing how strategic and patient-centric services can positively impact both individuals and the healthcare system at large. It stands as a shining example of effective healthcare delivery and resource utilization.

Cost		Frequency
Number of bed days saved	£400 per day	1038
Number of visits to chest drain clinic	£360 per visit	150
Cost savings		**£ 361,200**

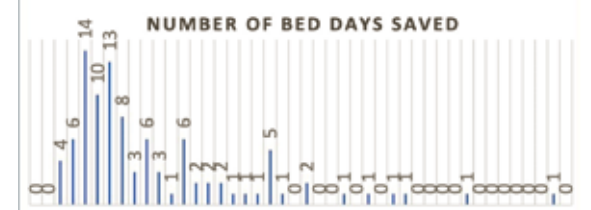**Table 1:** shows cost savings (£400 x number of bed days saved - £360 x number of visits to chest drain clinic)

Figure 2: shows frequency of of bed days saved (Date of drain removal – date of discharge).

Nurse practitioner-led prolonged air leak clinic

Denise Baillie and Nicole Spence
Royal Infirmary of Edinburgh, Edinburgh, UK

The management of a prolonged air leak (PAL) presents a challenge post-thoracic surgery for both the service and the patient. One of the management strategies is the portable ambulatory system (PAS). While the PAS promotes discharge from the hospital, ongoing follow-up is required.

Prior to the nurse-led PAL clinic, follow-up was provided by the thoracic registrar in an outpatient setting. If the drain needed to be removed, the registrar would direct the patient to the thoracic ward for removal by nursing staff. Due to the many demands of both roles, this provision was often susceptible to inconsistencies and delays.

The thoracic nurse practitioner service identified a gap in the provision of services, including continuity of treatment. Subsequently, we embarked on addressing these issues. The ambition of the nurse practitioner-led PAL clinic was to promote early discharge while offering a consistent patient-centred approach.

Our approach to consistency involved the development of a decision-making pathway with safety netting and documentation proforma to provide a standardised approach.

To monitor the efficacy of the nurse-led clinic we establish a baseline for comparison by performing a retrospective data analysis. We measured outcomes of length of stay (LOS) in the hospital, mean days switched to PAS, monitored drain removal, adverse events and readmissions. Following this we commenced a 6-month pilot in the out-patient department where we also provided the service of
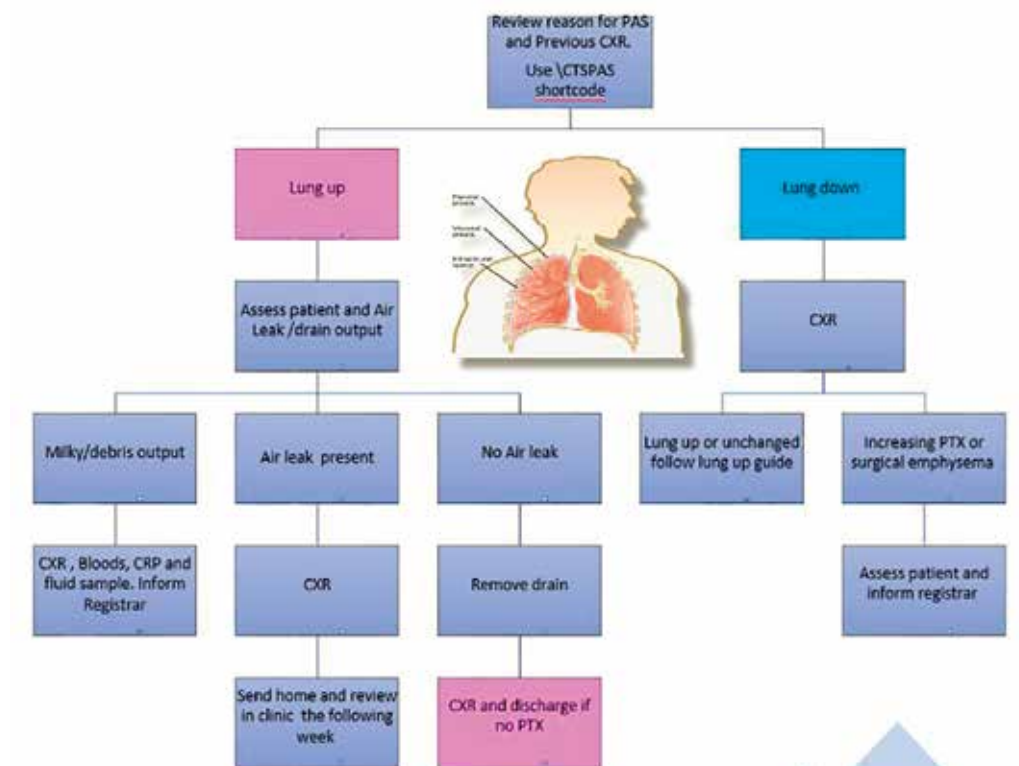
	1st data set	2nd data (May 2023 – Dec 2023)
Length of time collected	1 year	6 months
Number of patients seen	15	14
(Mean) LOS	6.87 days	5.57
(Mean) switch to PAS	5.3 days	4.62
Readmissions	13% (n=2)	7% (n=1)
Drain removed on first visit	74% (n=11)	80% (n=11)
Drain removed on second visit	13% (n=2)	13% (n=2)

Denise Baillie   Nicole Spence

drain removal.

In total, 14 participants were included in our study over the six-month period. The pilot data demonstrated a reduced LOS in the hospital, faster utilisation of PAS postoperatively, and no additional readmissions.

In summary, we set out to provide a more cohesive service that incorporated valuable experience alongside credible delivery to improve the patient pathway. The findings validate the feasibility and benefit of the nurse-led service. The new service is demonstrably safe and effective, highlighting the important role the nurse practitioner plays in both service provision and patient care.

The vision of the service would be to increase to twice-weekly clinics and adopt a patient-led approach to ongoing management by educating patients on recognising when an air leak has resolved, which will enable prompt intervention.

When will the left ventricular mass index be used to optimise the timing of aortic valve replacement for aortic stenosis?

Fatemeh Habibi Nameghi[1], Diego Perez de Arenaza[2], Marcus Flather[1] on behalf of the ASSERT (Aortic Stentless versus Stented valve assessed by Echocardiography Randomised Trial) Investigators 1 Norwich Medical School, University of East Anglia, Norwich, UK; 2 Department of Cardiology, Hospital Italiano, Buenos Aires, Argentina

Fatemeh Habibi

Summary

Aortic stenosis (AS) is a growing problem which is closely associated with population ageing. The timing of aortic valve replacement (AVR), whether performed surgically or via transcatheter approach, appears to be inconsistent across different centres and multidisciplinary teams. This is reflected in differential recommendations in international guidelines e.g. using baseline left ventricular mass index (LVMI), a marker of poorer outcomes post AVR — to time

surgery. Recommendations have either remained the same or retracted statements on using baseline LVMI to time AVR[1,2] despite increasing evidence for it to play a more direct role.

We carried out a secondary analysis of the ASSERT trial[3] which compared the effects of two different AVR types, to evaluate the influence of baseline LVMI on outcomes 12 months after AVR. We found that lower and middle tertiles of pre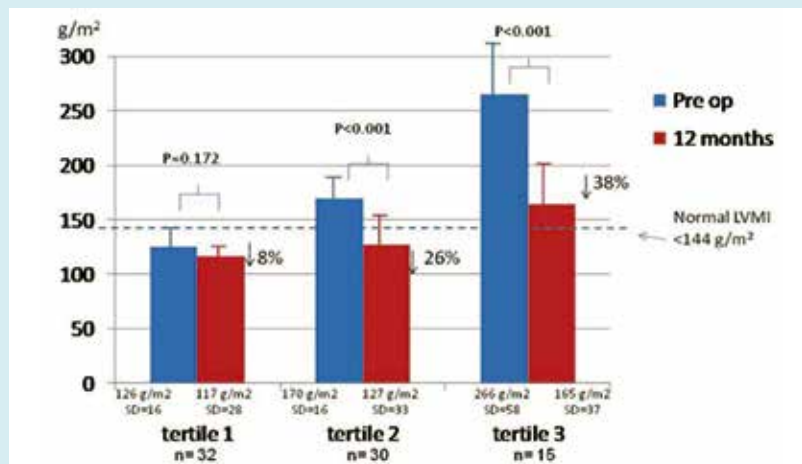-op LVMI had post-operative LVMI regression into the normal range. The highest tertile (mean 266g/m²) had persistently elevated LVMI 12 months

Figure 1: Preoperative and 12-month mean LVMI by tertiles of baseline LVMI for the overall population.

post-AVR (Figure 1), and this group had the worst prognosis in a multivariable analysis.

Recommendations

Based on this data, and data from other studies, we propose that pre-op LVMI becomes an established objective indicator for the timing of AVR. We suggest a threshold of 170g/m² as most of these patients had LVMI regression to the normal range post-AVR.

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Platelet activation and platelet leukocyte aggregates are associated with acute kidney injury after cardiac surgery

Naomi Brown
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Acute kidney injury (AKI) is a common complication of cardiac surgery, independently increasing patient morbidity and mortality. AKI occurs following an acute decrease in glomerular filtration rate (GFR), determined by changes in serum creatinine (SCr) concentration and urine output. Overall, the pathogenesis of AKI is poorly understood, and no individual biomarker has been established as the gold standard

for diagnosing or assessing the risk of AKI following cardiac surgery. Our current research focuses on exploring the pro-inflammatory mechanisms associated with platelet activation, such as extracellular vesicle (EV) concentrations and micro-RNA (miRNA) expression, and their utility as predictive and diagnostic markers for post-cardiac surgery AKI. We conducted a longitudinal analysis of inflammatory response, cellular activation, and levels of circulating EVs and miRNA using plasma and citrated blood samples from 95 adult cardiac surgery patients recruited to the

MaRACAS trial (NCT02315183).

Fifty-four patients (57%) developed post-cardiac surgery AKI, diagnosed in accordance with the KDIGO guidelines. Flow cytometry analysis showed a significant increase in platelet activation, determined by an increase in platelets positive for activated glycoprotein IIb/IIIa 6-12 hours after surgery, and platelet-granulocyte aggregates before, 6-12 and 24 hours after surgery in AKI patients. Analysis of soluble inflammatory biomarkers detected higher levels of soluble ICAM1 before and 48 hours after surgery; however, there was no difference in levels of interleukin-6, -8 and -10. AKI patients also exhibited elevated platelet-derived EVs 24 hours after surgery. To explore AKI-related miRNAs, we isolated RNA from circulating plasma EVs and performed a pooled analysis for 754 human miRNA species using qRT-PCR arrays.

Our analysis identified downregulation of miR-668 and upregulation of miR-1262, -133b, -518a-3p, -920 and -92a-1 immediately after surgery in AKI patients. We verified the expression of these miRNAs, confirming miR-1262 upregulation immediately after surgery. Contradictory to our pooled analysis, qRT-PCR verification showed significantly lower miR-133b expression before surgery. Sample pooling may explain the discrepancies between discovery and validation, which we recognise as a limitation of our study.

To better understand the role of platelets in relation to the administered antiplatelet drugs, we used Multiplate assays that test the platelets' response to agonists. The platelets were significantly less responsive to the activation of the P2Y12 receptor by ADP 6-12 hours after surgery. We did not observe any differences in platelet

activation by thrombin (TRAP test) or arachidonic acid (ASPI test) between AKI and non-AKI groups. The desensitisation of platelets to ADP was not a consequence of patients taking P2Y12 inhibitors.

We speculate this may be due to the release of ADP *in vivo* from activated platelets or damaged red blood cells. Sensitivity analysis further confirmed that the administration of aspirin did not affect the observed changes in platelet function in AKI patients.

Since the levels of platelet-granulocyte aggregates and soluble ICAM1 significantly correlated before surgery, we suspect that a pro-inflammatory state before surgery determines patient susceptibility to renal injury. The diagnostic potential of platelet activation markers should be investigated further, together with the renoprotective ability of antiplatelet agents, particularly those blocking P-selectin.
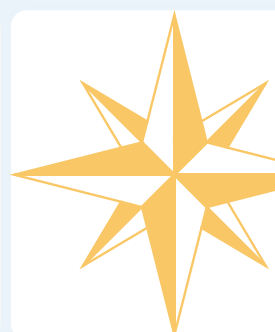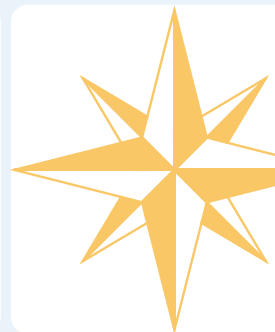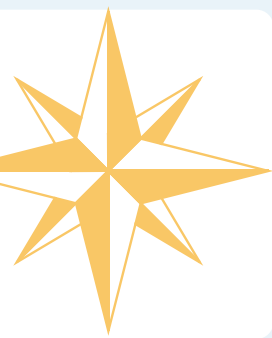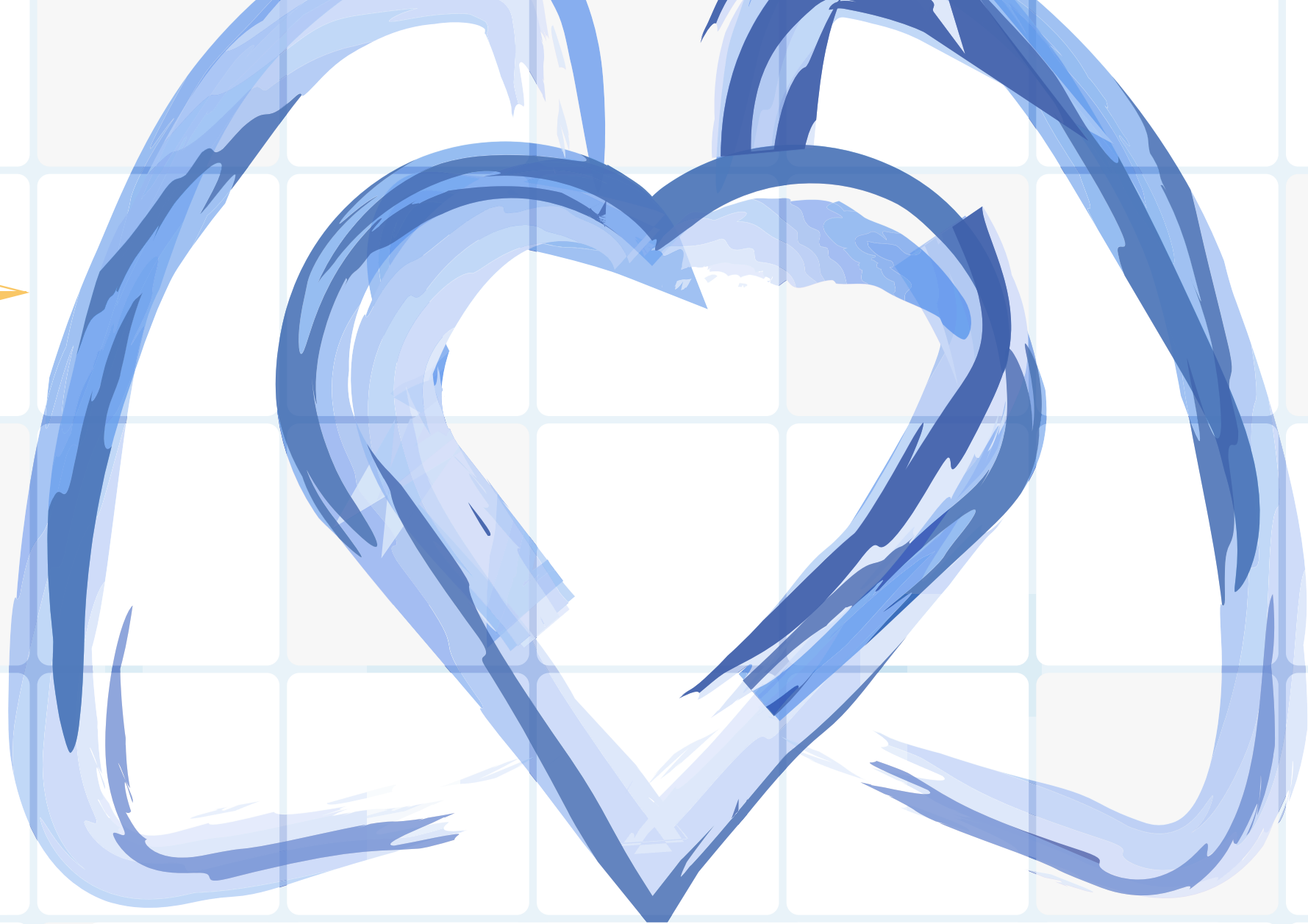
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Altmetric vs bibliometric trends in the top 100 cited Thoracic Surgery articles

The efficacy of web-based platforms and social media in advancing the propagation of scientific literature

Alana Atkinson[1], William Cartlidge[1], Rickesh Karsan[2], Gwyn Beattie[2] 1 Queen's University Belfast, Belfast, United Kingdom; 2 Department of Cardiothoracic Surgery, Royal Victoria Hospital, Belfast, United Kingdom

The specialty of thoracic surgery's research base is growing and evolving. Bibliometric citation analysis has long been utilised to infer an article's potential degree of influence. Altmetrics are an alternative measure of a paper's research impact, which considers the engagement that literature receives online and in the media. In an age where online platforms have such a strong influence on the direction of academic research, it is pertinent to be cognisant of the potential that altmetrics have to advance important studies within their field. The purpose of this study was to analyse the altmetric and citation data of thoracic surgery articles, to discern if there was a correlation between perceived research impact and distribution through web-based platforms.

To discern if there was a correlation between altmetric and bibliometric data, we analysed the top 100 cited English language articles; by searching 'thoracic AND surg*' in the Clarivate Web of Science platform. Thereafter, statistical analysis was performed and forecast models were generated.

The search returned 179,930 results. The greatest number of citations an article accrued was 2,775, whilst the highest altmetric score was 796. A significant association was established between citation and altmetric scores (p=<0.001), and rates (p=<0.001) respectively. A significant relationship was evident between the citation score and journal five-year impact factor upon regression analysis (p=0.019). Forecast models have determined that altmetric hits are predicted to accumulate at a greater rate than traditional citations, over the next five-year period.

These results demonstrate that the dissemination of medical research has fundamentally been altered, with the greater influence and use, of social media and web-based platforms. It is important to consider not only how altmetric means may be utilised to improve the distribution of medical research, but also how it may complement bibliometric analyses to appraise the significance of a study's findings, more responsively. Therefore, based on our findings, altmetric data has been shown to possess value in predicting the prospective impact of research within the discipline of thoracic surgery.

Alana Atkinson Rickesh Karsan William Cartlidge

A small number of JCOGs in a big segmentectomy wheel

How real-life historical practice compares to the JCOG0802/WJOG4607L trial

George Hudson Bristol Royal Infirmary, Bristol, UK

Historically, exact surgical treatment for low-grade non-small cell lung cancers (NSCLCs) has been controversial. Indeed, initial trial data from the Lung Cancer Study Group showed higher recurrence rates in sub-lobar resections compared to lobectomy. Meanwhile, recent trials such as JCOG0802/WJOG4607L have shown non-inferiority, with 5-year relapse-free survival as high as 88%. As such, it is relatively unclear how translatable these newer findings are to historical practice.

In our current work, we retrospectively reviewed a 10-year data series of segmentectomy operations at the Bristol Royal Infirmary. This yielded a total of 255 segmentectomies of which 163 performed for NSCLC were subsequently compared to the inclusion/exclusion criteria in the JCOG trial.

This analysis revealed that 43 NSCLC segmentectomies were performed in 2022, dwarfing the 19-yearly average for 2017-2021 and five-yearly average for 2012-2016. Moreover, 20/43 (47%) of these were complex segmentectomies – a significantly higher proportion than the 10 years prior (28%, p=0.036). The vast majority were VATS operations (95%) with a predisposition towards the left side (66%) compared to the right (34%).

Across all years, only 20 (12%) patients would have fulfilled JCOG criteria, the majority failing due to slim resection margins <20 mm without a confirmatory frozen section taken intraoperatively, or due to patient factors such as the presence of a simultaneous or metachronous cancer. Both JCOG-adherent and non-adherent groups were comparable in age, sex, and smoking status. However, the JCOG group was enriched with COPD patients (45%) relative to the non-JCOG group (35%). Contrastingly, the non-JCOG group had lower proportions of ischemic heart disease (9% vs 0%).

Segmentectomies not adhering to JCOG criteria showed no significant difference in pre-op WHO performance [median= 1vs 1, p=0.437], Clavien-Dindo scores [median=1 vs 0, p=0.222], length of stay [median=4 vs 5-days, p=0.371], or 30-day mortality [median=1 vs 1 deaths, p=0.581] compared to JCOG-adherent segmentectomies. Importantly, though overall mean margin was 22.3 mm for JCOG-adherent patients but only 13.4 mm for non-JCOG adherent patients [p=0.004], with four incomplete resections (R1) in the non-JCOG adherent group. Moreover, whilst the dataset was too small for survival analysis, there was a crude recurrence rate of 0.05 per year of follow-up for the non-JCOG adherent group compared to 0.03 in the JCOG adherent group.

Taken together, this work suggests that segmentectomies are becoming more common and complex, particularly after the publication of the JCOG trial. This makes it more important than ever for thoracic surgeons to follow evidence-based practice. Although our JCOG group was too small for survival analysis, we identified a higher proportion of incomplete resections and recurrences in historical segmentectomies not adhering to JCOG criteria; a finding which may make it difficult to achieve comparably good outcomes. We, therefore, suggest lobectomies should still be offered for larger tumours and when resection margins cannot be confirmed.

Addition of intra-operative variables augments the predictive power of EuroSCORE II

Khurum Mazhar Royal Stoke University Hospital, Stoke on Trent, UK

In cardiac surgery, traditional risk stratification models have focused on the nature of pre-operative patient and procedural factors to provide useful tools for surgeons, institutions and patients. Surgeons have sought benefit from having a quantitative form of mortality/ morbidity risk to the patient which has also allowed us to have meaningful comparative results between institutions to serve as quality markers and guide management of complex cases. Models such as EuroSCORE II (ES2) and the STS risk calculator are widely used validated examples of such stratification tools. Conversely, as cardiac surgeons, we are taught about the fundamental importance of cardiopulmonary bypass (CPB) and aortic cross-clamp (AXC) times and the minimization of this to improve patient outcomes. That is to say; there is a (proven) direct link between lengthening CPB / AXC times and patient mortality and morbidity. Hence in this study, we sought to investigate the effect of an additional three intra-operative variables; 1. CPB time, 2. AXC time and Duration of operation (DO) on the predictive capabilities of ES2 for mortality and several morbidity outcomes (30-day mortality, CVA/TIA, new haemofiltration and re-operation for tamponade/ bleeding) based on our local dataset. 8,008 patients' data was used to construct two new predictive models (quadratic and linear) and compare to ES2 alone. Area Under Receiver Operating Curves (AUROC) were calculated for each new model and significance tested.

We found both the new quadratic and linear models outperformed ES2 to predict 30-day mortality (AUROC 0.85 Vs 0.83 Vs 0.79 respectively- see Figure 1). Re-sternotomy for bleeding/tamponade was also more predictable with our new models c.f. ES2 (AUROC 0.67 Vs 0.65 Vs 0.63 respectively). No significant difference was found between the models in predicting new CVA/TIA or renal failure requiring haemofiltration.

As surgeons we may question the practical applicability of a model that relies on data after the patient is anaesthetised or not knowing the CPB or AXC times integral to the model; after all, why bet on a horse after the race is over? Well firstly, the current study does not dispute the validity or applicability of ES2 (or another pre-operative-based model). On the contrary, we believe adding more data to the model can only strengthen its predictive capabilities and quantify a phenomenon that is already widely accepted. Secondly, such an enhanced model would be useful in re-evaluating a patient's expected post-operative course to either anticipated or unanticipated factors which lengthen the procedure, for example when the surgeon encounters technical difficulties.

With the exponential increase of AI technologies in healthcare and the recognition and adaptation of a more diverse range of patient factors in predictive modelling (frailty, muscle mass, nutritional markers) predictive risk modelling will likely continue to evolve and refine with increasing accuracy. Our study shows that routinely collected intra-operative data also influences patient outcomes and has potential practical applications.
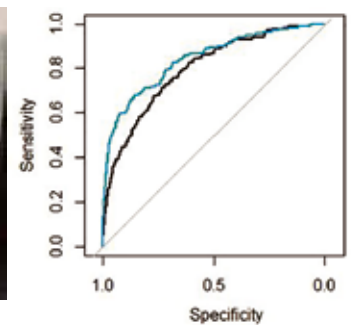

Figure 1: Receiver operating curves showing the sensitivity and specificity of the prediction models for the Morality based on EuroSCORE 2 alone (black) and the best quadratic model (blue)

Real-life experience of neoadjuvant chemotherapy and immunotherapy in Non-Small Cell Lung Cancer

Fady Bassily Liverpool Heart and Chest Hospital

Lung cancer remains a significant global health challenge, prompting continuous advancements in treatment strategies. Among the recent breakthroughs, the Checkmate-816 trial has gained attention for exploring the potential benefits of neoadjuvant therapy in resectable non-small cell lung cancer (NSCLC).

The Checkmate-816 trial was a landmark study to evaluate the effectiveness of neoadjuvant immunotherapy in lung cancer. Neoadjuvant nivolumab, plus chemotherapy in patients with resectable NSCLC, showed evidence of improved event-free survival and an increase in the percentage of complete pathological response (cPR) compared to chemotherapy alone. The addition of Nivolumab to neoadjuvant treatment didn't increase the incidence of adverse events or impede the feasibility of surgery.

Owing to the successful study outcomes, the NICE guidelines recommended the use of neoadjuvant Nivolumab and chemotherapy in patients with NSCLC, for tumours greater than 4 cm, or node positive, since the start of April 2023.

In our presentation, our real-life experience in Liverpool of delivering neoadjuvant chemo-immunotherapy is reflected. 40 patients received Immunotherapy neoadjuvant treatment before surgery between 1st of April and 30th of September. All patients in our centre who received neoadjuvant treatment went on to receive surgery. The percentage of cPR was similar to that of the Ckeckmate-816 trial.

There were quite a few challenges that we faced in delivering neoadjuvant treatment. One of which was the time lag between each stage of treatment including; the wait for the outpatient clinic, the wait for ALK and EGFR mutation status, the wait for oncology assessment and finally the wait for surgery. That led us to try to develop ways to overcome these obstacles by developing our local clinical pathway and employing a neoadjuvant cancer patient tracker. We will show in our presentation, that for all patients eligible for neoadjuvant patients, we have managed to decrease delays and avoid losing track of what stage patients are at in the pathway.

However, not all patients who were referred for neoadjuvant treatment received it due to several reasons including patients declining it and medical co-morbidities. In addition, some of the eligible patients were not referred because of a lack of access to neoadjuvant treatment in part of the region we cover (till the 1st of August), and uncertainty about the stage.

In summary, our results suggest that in real life, similar results can be achieved to the Checkmate 816 study in terms of achieving cPR. Complications appear similar compared to patients who do not undergo neoadjuvant treatment.

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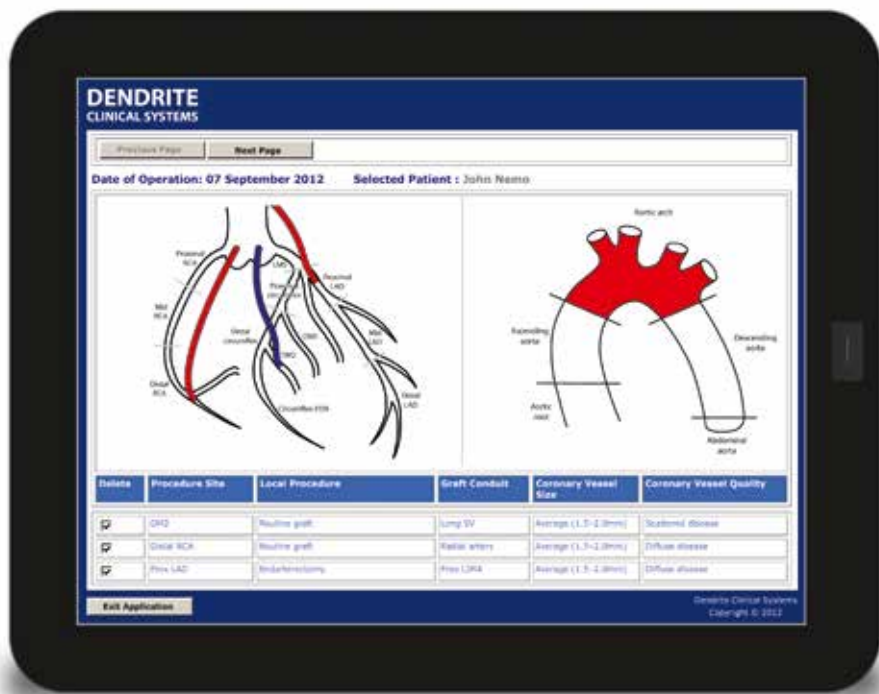
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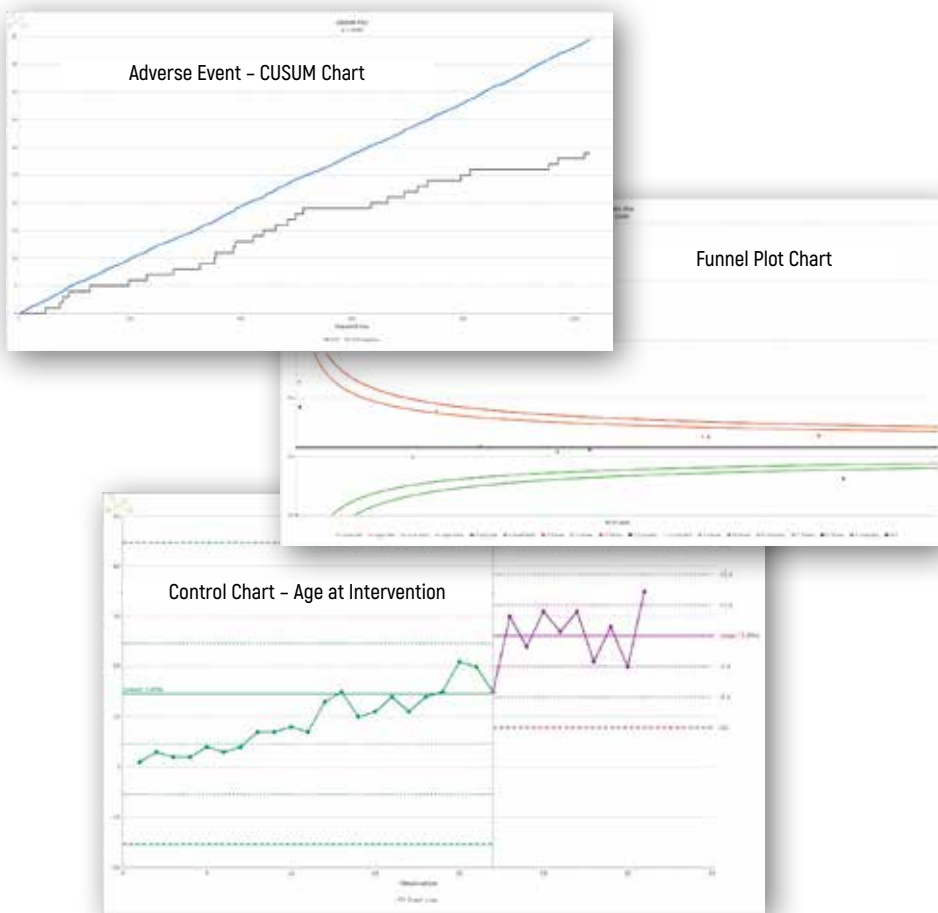
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Cardiac General: Outcomes   Monday 18 March **11:00-12:30** HALL 1B

Peri-operative cannabinoids significantly reduce postoperative opioid requirement in cardiac surgery patients

Ujjawal Kumar   University of Cambridge, UK

Postoperative pain after cardiac surgery is a significant issue for patients and often necessitates large amounts of analgesia to achieve adequate pain control. Opioid-based analgesics are the mainstay of pain management following cardiac surgery. However, opioids have adverse effects that prolong recovery, including respiratory depression, extended mechanical ventilation, and increased duration of intensive care unit (ICU) and hospital admissions. In the longer term, patients may also experience tolerance and/or addiction, with potentially catastrophic outcomes. Therefore, alternative approaches that will reduce

postoperative pain for patients undergoing cardiac surgery are an area of interest. Current strategies include the use of other analgesics such as NSAIDs, as well as techniques such as parasternal nerve blocks and intercostal nerve cryoablation.

Cannabinoids are a class of molecules of emerging interest – they interact with the body's endocannabinoid system to modulate pain perception and inflammation, acting synergistically with opioids. Therefore, cannabinoids have potential as an adjunct to opioid-based analgesia. Our study investigated the potential role of cannabinoids in reducing opioid requirements to achieve post-operative pain control.

A prospective study examining the impact of dronabinol, a synthetic cannabinoid, on opioid requirements after coronary artery bypass grafting (CABG) surgery was undertaken. Patients were randomised to receive either standard opioid-based post-operative analgesia (control group, n = 37), or to the dronabinol

group, who received dronabinol + standard opioid-based analgesia (dronabinol group, n = 31). Three doses of dronabinol were administered: at anaesthetic induction, in the ICU prior to extubation, and on the first postoperative day following extubation. There were no significant differences between the two groups in terms of patient demographics and comorbidities.

Compared to the control group, the dronabinol group showed a significant reduction in post-operative opioid requirements (39.62 vs 23.68 morphine milligram equivalents, p = 0.0037), representing a 40% reduction in post-operative opioid requirements. There were no adverse effects of dronabinol treatment. Additionally, a trend towards shorter durations of mechanical ventilation,

inotropic support, and ICU admission was noted in the dronabinol group, though these differences did not reach statistical significance. Interestingly, a significantly greater improvement in left ventricular ejection fraction (echocardiography undertaken preoperatively and at discharge) was also noted in the dronabinol group, suggesting potential suppression of cardiac function by opioids.

These findings offer preliminary support for the adjunctive use of cannabinoids alongside opioids in post-cardiac surgery analgesia. More research will be crucial to determine the long-term effects of cannabinoid use, and further elucidate cannabinoids' role in optimising pain control and post-operative outcomes for cardiac surgical patients.

Mitral Valve Surgery   Tuesday 19 March **9:00-10:30** HALL 1F

Patient selection for robotic mitral valve repair – experience of a conservative screening algorithm

Ujjawal Kumar   University of Cambridge, UK

Mitral valve repair is the procedure of choice for patients with mitral regurgitation due to degenerative mitral valve disease. A robotic approach has the added advantages of smaller incisions, reduced postoperative pain, shorter hospital admission, faster recovery, and improved cosmetic appearance with less scarring. However, selecting the right patients for robotic mitral valve surgery can be challenging. Optimal patient selection is crucial to ensure a successful surgical outcome.

During my elective in summer 2023, supported by an SCTS/Heart-Research UK Medical Student Fellowship, I spent a month with the mitral valve team at the Cleveland Clinic. The institutional patient selection algorithm qualifies 60.5% of patients presenting with degenerative mitral valve regurgitation for robotic mitral valve repair, with excellent outcomes.

This intentionally conservative screening algorithm aims to identify suitable patients for successful robotic mitral valve repair. This imaging-based algorithm was developed based on institutional early experiences with robotic mitral valve surgery. It utilises pre-operative transthoracic echocardiography alongside computed tomography scanning to assess patient suitability.

A total of 1,000 consecutive patients with isolated degenerative mitral regurgitation were evaluated using this algorithm (Figure 1). Of these, the algorithm successfully identified 60.5%

of patients as suitable candidates for robotic mitral valve repair (n = 605). By virtue of the algorithm's exclusion criteria for robotic surgery, patients selected tended to be younger, with a greater ejection fraction, and fewer non-cardiac comorbidities such as smoking, hypertension, hyperlipidaemia, diabetes, and COPD.

Successful robotic-assisted mitral valve repair was achieved in 100% of patients selected using the algorithm. Encouragingly, the robotic surgery group also experienced better clinical outcomes (reduced rates of postoperative atrial fibrillation, red blood cell transfusions, ICU admission length, and overall hospital stay) compared to the group undergoing mitral valve surgery via sternotomy. All-cause 30-day mortality in both groups was zero, and rates of post-operative stroke and re-operation for valve dysfunction or bleeding were similar between groups.

These results suggest that this

algorithm is a promising tool for selecting patients for robotic mitral valve repair. Subsequent expansion of patient eligibility has occurred with increasing institutional experience. While not intended to be prescriptive for other institutions, this algorithm is a useful conservative strategy to utilise with the potential to improve patient outcomes while ensuring appropriate patient selection for this advanced surgical technique.

Key findings

- An algorithm was developed to select patients for robotic mitral valve repair.
- The algorithm identified 60.5% of patients as suitable candidates.
- Mitral valve repair was successful in all patients selected by the algorithm.
- Patients in the robotic surgery group experienced better clinical outcomes.
- This approach has the potential to improve patient selection and clinical outcomes for robotic mitral valve repair.
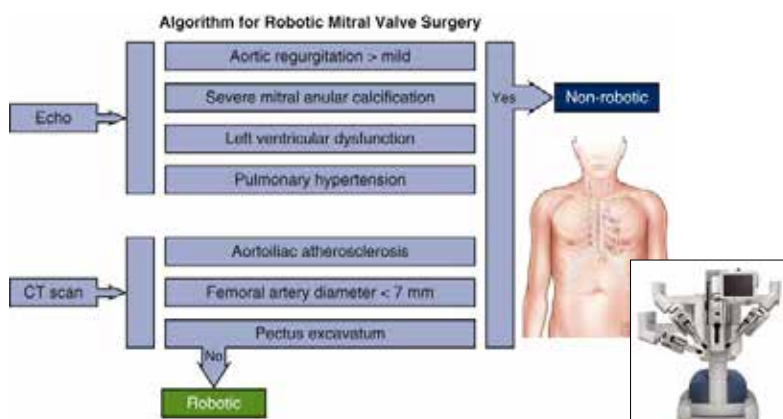

Figure 1 – Patient selection algorithm for robotic assisted mitral valve repair

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Training in CT Surgery   Tuesday 19 March **13:30-15:00** HALL 1C

Revolutionising surgical education: Can artificial intelligence (AI) outperform human experts in Cardiothoracic Surgery Board Exams?

Ujjawal Kumar

University of Cambridge, UK

Surgical education and training are complex and demanding, requiring a vast amount of knowledge and skill. In recent years, the advent of artificial intelligence (AI) in medicine has heralded a new era of innovation and efficiency with a growing interest in the potential role that AI may have in supporting surgical education. Large language models (LLMs, such as ChatGPT) are a type of AI that has shown promise in a variety of tasks, including accessing and interpreting information, answering questions, and generating text. Their integration into postgraduate medical education therefore represents a ground-breaking shift towards a more interactive, responsive, and personalised learning experience. AI not only serves as a means of accessing a large repository of knowledge, but also as a dynamic tool for creating, utilising, and disseminating educational content.

Our study evaluates the potential of LLMs to

enhance the educational framework of surgical training and education. We used the American Board of Thoracic Surgery's question bank to test the capabilities of various AI models to understand and respond to complex medical queries, by comparing the performances of GPT-3.5, GPT-4, Google's MedPaLM2, and Anthropic's Claude2 across 400 ABTS questions. We evaluated these models on questions testing knowledge of adult cardiac surgery, general thoracic surgery, congenital cardiac surgery, and cardiothoracic critical care, with deliberate exclusion of questions necessitating visual interpretations such as radiology.

The results of this comparative analysis are remarkable. GPT-4 emerges as the frontrunner, boasting an impressive 87.0% accuracy rate – a significant leap over its predecessor, GPT-3.5, and the other evaluated models. This is a testament to the evolution of LLMs in a short amount of time and their great potential in interpreting and understanding the intricacies of surgical educational content.

Across all subspecialties, GPT-4's performance was consistently excellent, with accuracy rates ranging from 70.0% to 90.0%, highlighting its robust ability across diverse surgical domains.

The results of this study underscore the potential of Large Language Models like GPT-4 in surgical education and training. Demonstrating an impressive ability to accurately engage with complex surgical content, we show how LLMs can improve between iterations, with massive potential for further development. Beyond just accessing information, LLMs are poised to revolutionise the creation of educational content, crafting questions reflective of those found in surgical exams such as SESATS. These AI-driven tools can adapt to include the latest research, offering comprehensive curriculum coverage while catering to the specific learning needs of trainees. This not only enriches the educational journey but also optimally prepares future surgeons for board exams and beyond, using AI to the surgeon's advantage to enhance learning and future clinical practice.

Creating Innovative ways to enhance patient care   Tuesday 19 March **15:30-17:00** HALL 3D

Protocol for pre-operative ultrasound conduit assessment in patients undergoing coronary artery bypass grafting – A QI project

Ellyn Small   Royal Infirmary of Edinburgh, Edinburgh, UK

Harvest of the Great Saphenous Vein (GSV) as a conduit for Coronary Artery Bypass Graft surgery (CABG) is a common procedure performed by the Surgical Care Practitioners (SCPs). Pre-operative ultrasound venous assessment has been identified as an accurate method for ascertaining the suitability of the GSV for use as a conduit and is considered an important element of pre-operative planning. As with any procedure carried out in a healthcare setting, a protocol is of vital importance to

ensure safe and effective care is delivered. As demonstrated by the literature, the use of pre-operative ultrasound venous assessment is hugely beneficial towards preventing unnecessary surgical exploration and protocols can promote continuity of care. This Quality Improvement project aimed to develop, implement and evaluate a protocol for pre-operative ultrasound conduit assessment to improve the quality of pre-assessment and reduce unnecessary incisions.

Alongside input from the multidisciplinary team, a protocol conducive to the department was developed and implemented for every patient undergoing

CABG from January to March 2023. This protocol included information on the principles of ultrasound assessment, indications, contraindications, equipment, communication with patients, preparation and positioning of patients, the examination protocol itself, minimum image requirements, reporting results and examination time recommendation.

Data was collected to examine the traditional visual assessment of the legs (Clinical examination and history taking) versus ultrasound assessment (identifying the calibre of the GSV, 0.2cm – 0.4cm being preferable, the compressibility and its anatomical variations). Over two months the devised protocol

was implemented and related data was collected. The Sample size of the project was n= 39. The results demonstrated that in 41% of patients (n=16) the plan for conduit harvest changed following ultrasound assessment. In 5% of patients (n=2) the GSV was identified as unusable following ultrasound assessment due to poor calibre/quality or unknown vein stripping.

Additionally, a survey was provided to the SCP team to rate their satisfaction with the protocol. Results from the survey were positive with 100% of respondents agreeing that the protocol was clear, covered all important areas, was essential to continuity of care,

made them feel more comfortable with the ultrasound technique and that they would choose to continue using it.

The QI project aimed to introduce an evidence-based protocol to support the identification of the most suitable conduit for CABG. The use of this protocol showed improvement in the quality of pre-operative assessment and prevented unnecessary surgical incisions through continuity of care. In summary, the trial introduction of the protocol within our centre showed significant improvements in the pre-operative assessment of conduits, resulting in better patient outcomes and staff satisfaction.

Understanding patient's experiences and their involvement in treatment decision-making for early-stage non-small cell lung cancer

Hemangi Chavan
University of Manchester and
Royal Brompton Hospital, UK

Hemangi Chavan

Surgical treatment remains the gold standard in early-stage non-small cell lung cancer (NSCLC). It offers overall survival benefits, either on its own or as a part of multimodality treatment. Stereotactic ablative radiotherapy is an alternative option for those patients deemed unfit for or declined surgery. Managing early-stage non-small cell lung cancer requires increasingly complex decision-making by healthcare professionals. In this setting, it is important to have shared decision-making with the patient to ensure they understand the risks, side effects and treatment options. However, there are limited studies addressing healthcare professionals' perspectives on treatment decision-making and patients' experiences within this treatment decision-making process for early-stage non-small cell lung cancer. This study aimed to explore patients' experiences and involvement in treatment decision-making for early-stage non-small cell lung cancer using a qualitative pragmatic approach.

The patients and their healthcare professionals were recruited and a total of 47 transcripts were included in the analysis. The multi-source data collection started with patients' first consultation with surgeons or oncologists to discuss treatment options for early-stage non-small cell lung cancer and three months after treatment. Participants were recruited from two centres- surgery and oncology. Data collection included audio recordings of the first consultation and in-depth semi-structured interviews with patients and their healthcare professionals. Reflexive thematic analysis methods were used to analyse the data.

The synthesis of the key findings (Figure 1) is discussed in three overarching themes. These are 'Dilemmas in treatment options and treatment decision-making process', 'Information sources and systemic barriers to treatment decision-making', and 'Deliberation and strategies to improve treatment decision-making'.

The study shows the complexity of treatment decision-making in early-stage non-small cell lung cancer. Currently, shared decision-making is not often used in practice. Instead, consultations focused on informing MDT recommendations, gathering information, and consenting to the procedure. Patients' preferences, values, alternative options, and long-term treatment outcomes were not explicitly discussed. Patients preferred professionals to facilitate treatment decisions by presenting the information clearly and comprehensively. Findings highlight the need to adopt a patient-centred approach, provide emotional support throughout the treatment process, and acknowledge their values in treatment decision-making.

Figure 1: Synthesis of the findings

Study highlights	Recommendations
Non-adherence to the shared decision making guidelines, consent process and quality standard guidelines for assessing patients with borderline fitness	MDT discussion includes specific information on the patient's preferences for treatment outcomes and values alongside the patient's medical history
Disparity in the treatment of early-stage NSCLC particularly in older patients, comorbidities (e.g. COPD) and poor performance status	Complex, high-risk patients (e.g. COPD and emphysema) discussed in the specialist MDT meeting with thoracic surgeon input
Disparity in the level of involvement of lung clinical nurse specialists during the first consultation and follow-ups	Advanced communication training specific to lung cancer care, treatment and consultation
Patients satisfied with the treatment option but dissatisfied with the professionals' failure to meet the expectations of the professionals' role and provide patient-centred care.	Active involvement of lung clinical nurse specialist in early-stage NSCLC
	Develop clinical decision aids specifically for early-stage NSCLC

Is Virtual Reality Mindfulness effective in improving peri-operative well-being and pain in patients admitted for elective thoracic surgery? – A feasibility study

Natawadee Chantima Glenfield Hospital, University Hospitals of Leicester NHS Trust, Leicester, UK

Procedure-induced anxiety and stress negatively affect patient recovery and worsen the perception of pain, which may lead to increased opioid use and extended hospital stays. Mindfulness-based interventions have been promoted to benefit physical and psychological well-being. This study investigates the effectiveness of virtual reality (VR) mindfulness in improving anxiety and well-being in patients undergoing elective thoracic surgery with the aim of improving pain and enhancing recovery.

Natawadee Chantima

Patients scheduled for elective thoracic surgery (benign and malignant) were recruited to undergo one immersive seven-minute mindfulness session using the Rescape VR Headset. Wellbeing, stress, anxiety, and pain levels were assessed using pre- and post-experience questionnaires. Physiological observations were recorded before and after each session.

We recruited 15 thoracic surgery patients (seven pre-operative and eight post-operative). A significant 80% of patients felt the session was enjoyable and reported increased relaxation. 73% of patients felt less stressed and 67% felt noticeable calmness after the experience.

Three out of eight post-operative patients
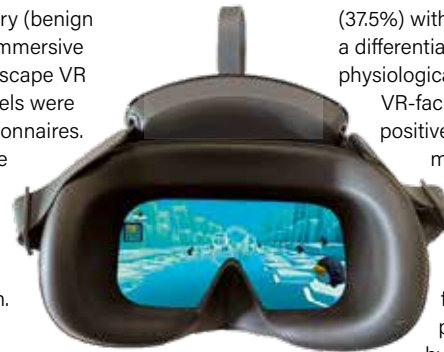
Figure 1: Rescape VR headset

(37.5%) with pre-existing pain had reported relief, suggesting a differentiated response in pain management. No significant physiological changes post-experience were observed.

VR-facilitated mindfulness sessions were associated with positive psychological outcomes and stress reduction by most participants. This is a potentially promising adjunct as a non-pharmacological intervention to enhance peri-operative thoracic surgery experience and patient recovery.

This pilot study's findings advocate for further research into VR mindfulness efficacy on postoperative pain and patients' recovery, possibly by regular, multi-session VR mindfulness exercises throughout the duration of hospitalisation.

Chest Wall Disease and Trauma Monday 18 March **11:00-12:30** HALL 2E

Thoracoscopic first rib resection for thoracic outlet syndrome: A single centre retrospective cohort study assessing safety and efficacy relative to conservative management and open surgery

Jean-Luc Duval, Fernanda Binati, Tenisha Joseph, Dominic PJ Howard, Francesco Di Chiara Oxford University Hospitals, UK

Background

Thoracic outlet syndrome (TOS) is a rare and complex syndrome which has a potential significant functional impact on young, otherwise healthy, individuals. Its management requires multidisciplinary expertise, but can broadly be divided into conservative and operative approaches. Operative management traditionally relied on open resection of the first rib, however thoracoscopic first rib resection (FRR) is an emerging minimally invasive option; particularly advantageous in venous TOS, as an inferior approach to the rib is thought to allow preservation of collateralised veins. Currently, very few UK centres offer this procedure, and we were pleased to present our

experience with this novel technique at last year's meeting. Following on from this, we have now sought to investigate the safety and efficacy of thoracoscopic FRR relative to existing treatment modalities, as this has not previously been reported in the literature. We carried out a retrospective analysis of all patients with confirmed TOS at our centre over a six-and-a-half-year period, comparing conservative, open and thoracoscopic management in terms of inpatient course, complications and symptom resolution.

Our Findings

A total of 74 patients (male = 36, median age = 36.5) were diagnosed with confirmed TOS during the period of study. Twenty-six (26) were managed conservatively, 26 underwent open FRR and 22 underwent thoracoscopic FRR. Demographics were comparable between cohorts and the majority presentation

was venous TOS (73%). We found no significant difference in length of stay (2.2 vs 3.2 days, p = 0.75), postoperative analgesic requirements or incidence of major post-operative complications between open and thoracoscopic FRR. We quantified residual symptom burden via telephone interview using the validated QuickDASH Questionnaire which generates a score between 0, representing no symptoms, and 100, representing complete disability. There was over 75% response rate to QuickDASH Questionnaires across all cohorts. The average QuickDASH was 16.94 (+/- 19.24) in the conservative cohort, 11.98 (+/- 11.1) in the open and 13.07 (+/- 11.03) in the thoracoscopic, with no significant difference in QuickDASH detected between open and thoracoscopic (p = 0.75) or conservative and operative (p = 0.25). Sub-analysis of the conservative cohort revealed

five patients who were offered surgery which was declined. These patients reported an average QuickDASH of 43.66 (+/- 13.39) which represented a significantly worse symptom resolution than the operative cohort (p < 0.0001), suggesting that where indicated, operative management seems to yield significantly better symptom outcomes than

Dominic Howard   Francesco Di Chiara   Jean-Luc Duval

conservative management.

Take Home Points

There are cohorts of TOS patients in which surgical intervention is key in limiting the functional impact of their condition. We have found thoracoscopic FRR to be a safe and efficacious option in the operative management of TOS, with inpatient course and symptom resolution

outcomes that are non-inferior to traditional open surgery. Given the predominance of venous TOS presentation and the theorised advantages of thoracoscopic FRR in such cases, this cohort of patients may stand to benefit from a wider availability of this technique, and we hope that our findings may encourage other centres to explore this.

Chest Wall Disease and Trauma Monday 18 March **11:00-12:30** HALL 2E

Surgical management of costal margin rupture associated with intercostal hernia: Evolution of techniques

John Edwards and Pradeep Wijerathne Northern General Hospital Sheffield, Sheffield, UK

Costal margin rupture (CMR) injuries in association with intercostal hernia (IH) are believed to be rare. However, we have been able to generate a large series through prospective data collection, since we first recorded a case at Northern General Hospital, Sheffield, in 2008. In 2019, Michael Gooseman published the "Sheffield Classification", based on a radiological analysis in 19 patients. In an expanded series in 2023, Johnny Byers published clinical characteristics of 54 patients, such as the bimodal distribution of the level of CMR, according to the aetiology.

In this study, Pradeep Wijerathne presents the evolution of surgical techniques, based on iterative learning from successes and failures in 71 cases with CMR-related injuries. Those with a related IH pose a significant surgical challenge, due to the forces associated with the common clinical feature of morbid obesity. Failure rates of up to 66% are reported after surgery.

We have characterised the injuries seen

and recorded patient management and follow-up. Surgical techniques evolved with experience of complications and patient outcomes, from suture repair without and then with extrathoracic mesh, to three iterations of double layer mesh repair (DLMR). The Mk1 repair used polypropylene mesh and intercostal sutures supported with polytetrafluorethane felt buttons. The "intercostal nerve-sparing" Mk2 repair used biologic mesh secured with sutures passed through holes drilled in the ribs caudal to the IH. The Mk3 DLMR added titanium buttress plates applied to the ribs adjacent to the IH, with sutures passed through the spare screw holes in the buttress plates. Associated surgical stabilisation of acute rib fractures (SSRF), or surgical stabilisation of non-united rib fractures (SSNURF), was performed when required. If costal margin cartilage could be reduced closely and if it was of sufficient quality to accept a plate, then external cortical plates and screw fixation were carried out.

Of 25 patients with CMR+IH and 11 with TDIH, 25 patients underwent surgery, with six reoperations in five patients. There were eight suture repairs (SR), three extrathoracic mesh repairs (EMR). DLMR was performed

Edwards Repair: Mark 3:
Double Layer Mesh Repair with Biologic Mesh, and Titanium Buttress Plates to Ribs

Origins of Serratus Anterior / External Oblique muscles

External Intercostal Muscles

Intracostal/pericostal sutures, passed through drilled plate screw holes of the rib caudal to the Intercostal Hernia

Horizontal mattress sutures to secure mesh, passed through drilled plate screw holes of the rib caudal to the Intercostal Hernia

Double layer of biologic mesh. Intrathoracic mesh is rectangular. Extrathoracic mesh is cut into an H shape to maintain Serratus Anterior and External Oblique origins

Ribs caudal to intercostal hernia are drilled for pairs of intercostal bundle-sparing "intracostal" sutures

Titanium External Cortical Rib Plates with variable angle locking screws

Intercostal Hernia

Costal Margin Rupture

in 14 patients (3 Mk 1, 5 Mk 2 and 6 Mk 3). Surgical failures (either patients reporting significant pain, or recurrent IH) occurred early, in the first few months after surgery. We encountered failures in patients undergoing SR or EMR. Patients suffering neuropathic pain promoted the change from the DLMR Mk1 to Mk2. Sutures pulling through ribs, causing multiple fractures, in

a patient with a Mk2 DLMR led to the Mk3 repair, with the titanium buttress plates. Costal margin stabilisation with titanium plates was successful twice at the level of the seventh but failed twice out of three times at the ninth costal cartilage. The Mk3 repair has, to date, been reproducible and durable, with no failures or significant post-operative pain.

As a Chest Wall Injury Society (CWIS) Collaborative Centre, we have visited other centres to help perform the Mk 3 DLMR, with reproducible results. CWIS is commissioning a multi-centre registry, CWIS-CoMar, in order to record outcomes from different surgical outcomes and to determine the optimum surgical management of these challenging injuries.

Transplant and MCS Monday 18 March **11:00-12:30** HALL 1C
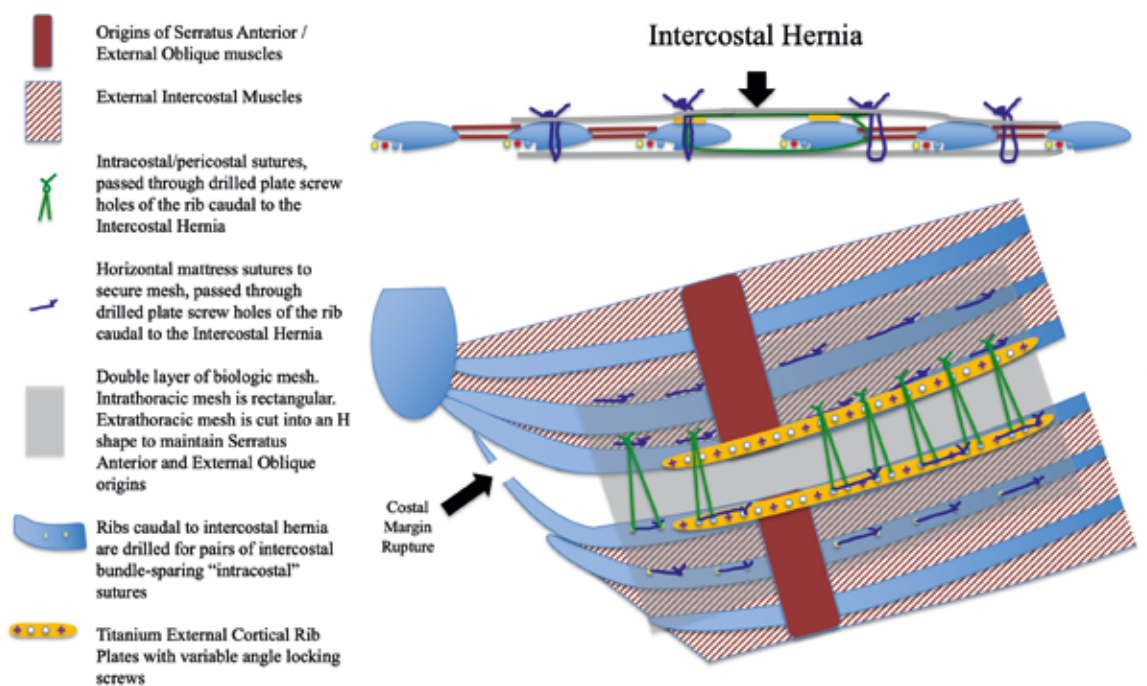
An insight into theatre perioperative practitioners' learning experience and concerns when assisting heart and lung organ procurement and transplantation – a mixed methods study for local service improvement

Yi Wang Royal Brompton and Harefield Hospitals, UK

The study aims and purposes

1. Explore theatre perioperative practitioners' (TPP) learning experience during organ retrieval, procurement and transplantation procedures.
2. Understand the concerns and issues TPPs face when assisting and their coping strategies.
3. To understand TPP's well-being status and the support they obtained.
4. Make recommendations for changes.

Research methods

A mixed methodology approach was

applied using quantitative and qualitative questions and group discussions. First, quantitative data were collected through a survey. Then, a qualitative method was conducted through focused group discussions using open questions, and themes were developed. Finally, integrating quantitative and qualitative data was fulfilled with a joint display presentation.

Study results and discussion

The study was conducted in late 2023. A total of 19 TPPs took part, and 16% of TPP believed that they lacked training and had been struggling since the start of their independent practice. 21% rated education and training in transplantation and retrieval

as inadequate, with 57% of the participants not knowing what education program is available and suggesting a need to set one. However, they have gained the skills and experience during the years of practising. Hence, 58% of the TPPs rated their practice as skilful.

The 31% of TPPs felt psychologically unsupported by the department. However, 95% believed that they were best supported by their fellow TPP colleagues when they encountered stress and are happy to offer support in increasing public awareness of heart and lung organ donation by involving different educational events and activities. All the participants were generally satisfied with the teamwork and communication among

team members. Just under half the TPPs expressed stress levels reaching 7-10/10. More than half of the TPPs expressed the most difficulties and issues are long travelling and long working hours and nearly 95% of staff addressed long waiting times and delays in donor hospitals. More than 55% of TPPs have stated that poor sleep during organ retrieval and transplant process has affected their job performance, quality of work and life, and physical and mental well-being.

The qualitative data from the focus discussion groups have been developed into five themes: 1) communication and Teamwork; 2) Training and Education; 3) Issues and Solutions; and 4) Well-being and support. The most shared concerns during
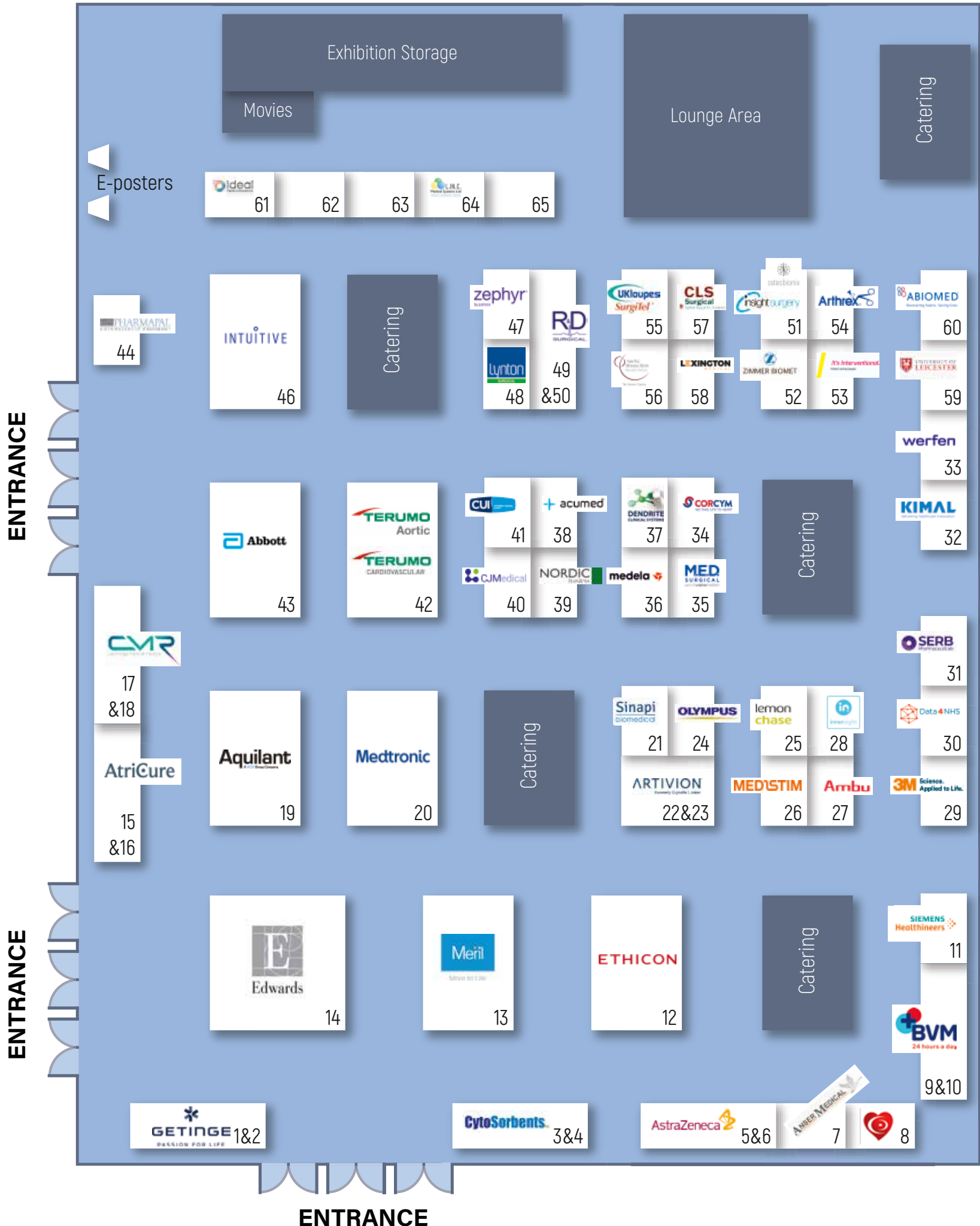
the focus group discussion included being overworked, lack of sleep, poorly protected rest periods, and emotional upset during some DCD organ procurement. These were mainly due to interpersonal conflict during procedures, but occasionally, ethical dilemmas such as personal beliefs and cultural backgrounds have played a part.

Conclusions

There is a need for formal educational programmes and better psychological support from departments and hospitals. However, this study has demonstrated good team spirit and peer support amongst the TPPs. We recommend developing relevant educational and psychological support.

Floorplan

Company	Stand Number
3M	29
Abbott	43
ABIOMED	60
ACTSCP (Association of Cardiothoracic Surgical Care Practitioners)	8
Acumed	38
Ambu	27
Anser Medical	7
Aortic Dissection Awareness	56
Aquilant	19
Arthrex	54
Artivion	22 & 23
AstraZeneca	5 & 6
AtriCure	15 & 16
BVM Medical	9 & 10
CJ Medical	40
CLS Surgical	57
CMR Surgical	17 & 18
Corcym	34

Company	Stand Number
Cui International	41
CytoSorbents Medical UK Ltd	3 & 4
Data4NHS	30
Dendrite Clinical Systems	37
Edwards	14
Ethicon	12
Getinge	1 & 2
Ideal Medical Solutions	61
Innersight Labs Ltd	28
Insight Surgery	51
Intuitive	46
It's Interventional	53
KIMAL	32
Lemonchase	25
Lexington Medical UK Ltd	58
LINC Medical Systems Ltd	64
Lynton Surgical	48
M.E.D Surgical	35

Company	Stand Number
Medela	36
Medistim	26
Medtronic	20
Meril UK Ltd	13
National Cardiac Surgery Trials Initiative	59
Nordic Pharma	39
Olympus	24
Osteobionix	51
Pharmapal	44
Pulmonx	47
R&D Surgical	49 & 50
SERB Pharmaceuticals	31
Siemens Healthineers	11
Sinapi biomedical (Pty) Ltd	21
Terumo Cardiovascular & Terumo Aortic	42
Ukloupes	55
Werfen	33
Zimmer Biomet UK Ltd	52

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