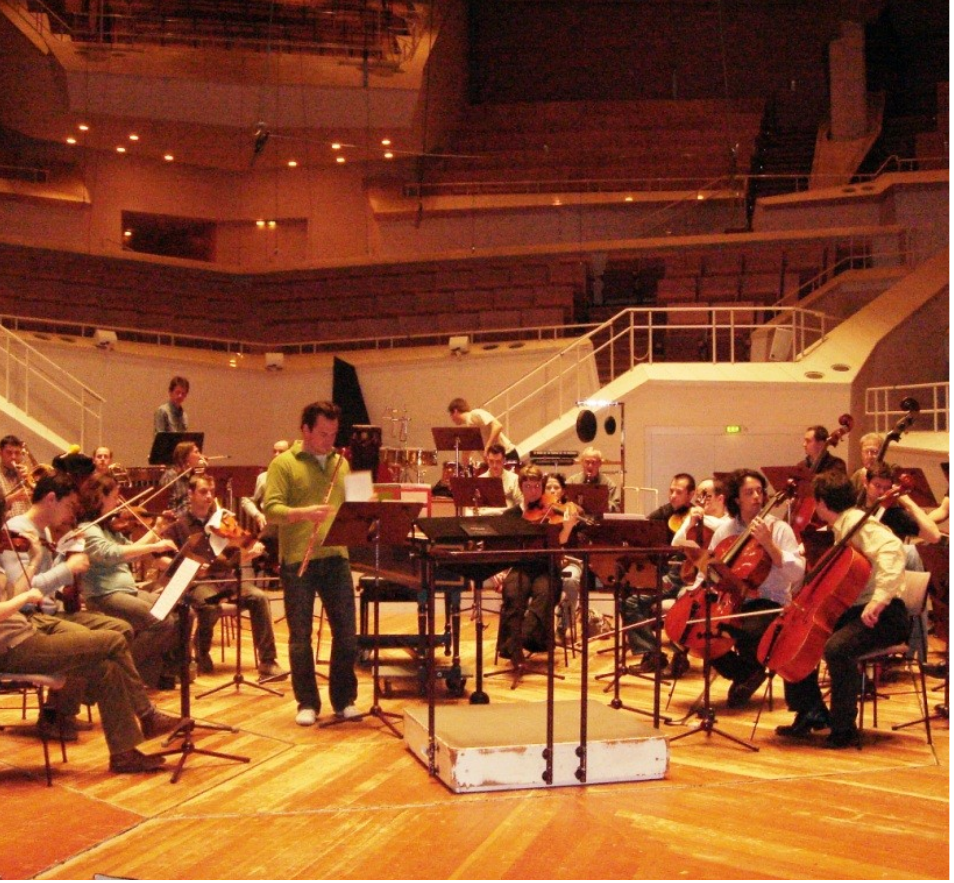



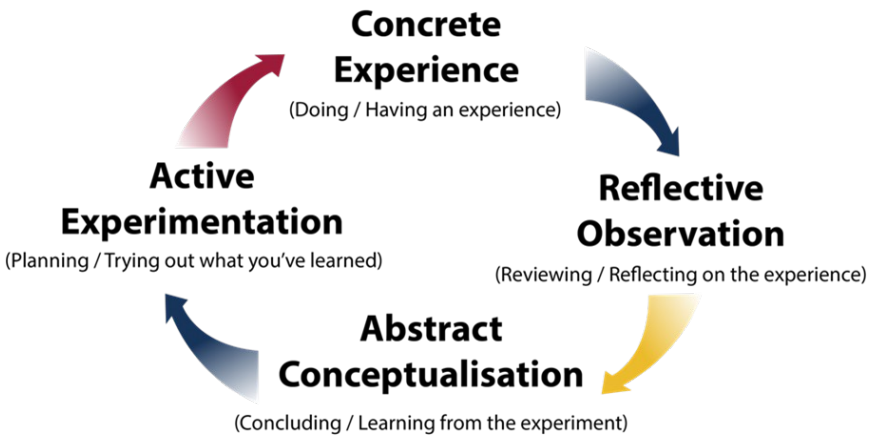
Streamlined training and scrutinised practice. How can a consultant cardiac surgeon provide innovative surgery and effective education.

Sotiris Papaspyros

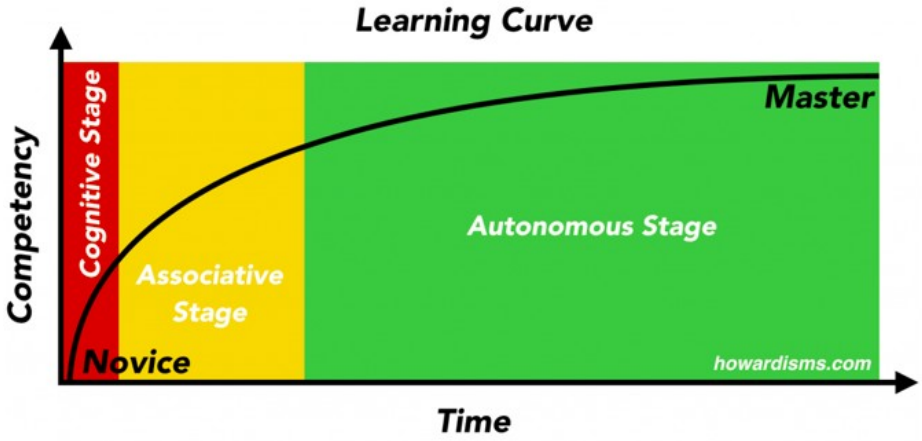


Challenges

- Increasing complexity of cases
- Published surgeon's results
- Operating room efficiency
- Limited financial resources
- European Working Time Directive



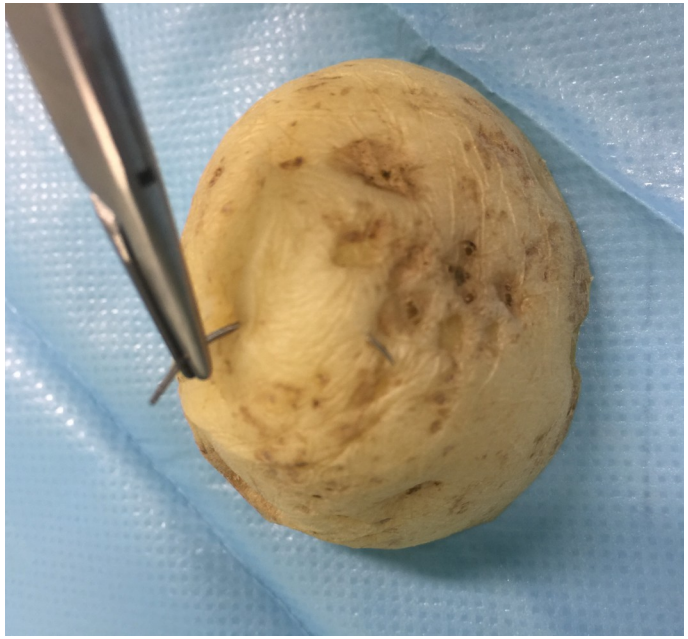
Kolb's learning cycle

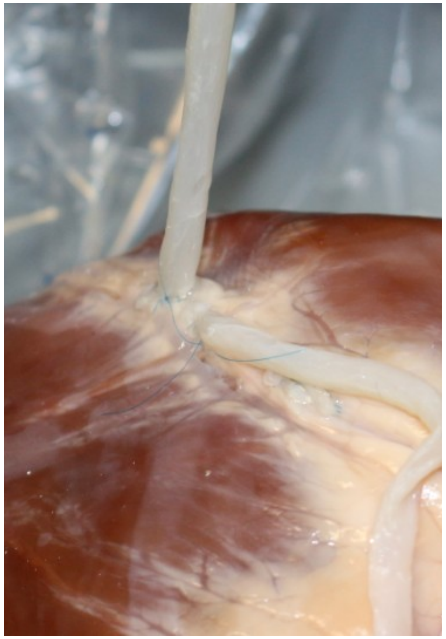


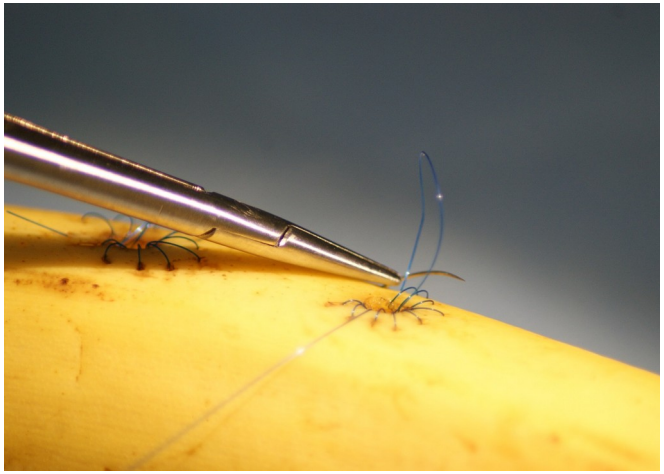
Fitts and Posner motor skills acquisition

How do we learn?

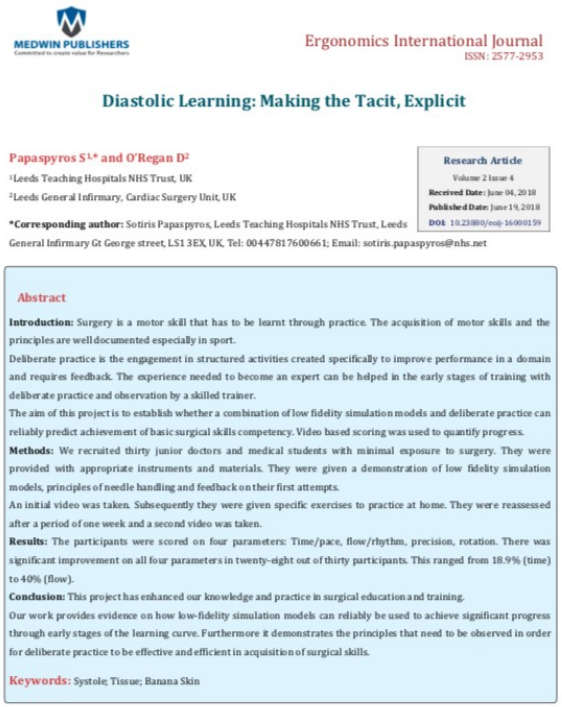








Ergonomics, simulation and deliberate practice



MEDWIN PUBLISHERS

Committed to create value for Researchers

Ergonomics International Journal

ISSN: 2577-2953

Diastolic Learning: Making the Tacit, Explicit

Papaspyros S[1,*] and O'Regan D[2]

[1]Leeds Teaching Hospitals NHS Trust, UK

[2]Leeds General Infirmary, Cardiac Surgery Unit, UK

Research Article

Volume 2 Issue 4

Received Date: June 04, 2018

Published Date: June 19, 2018

DOI: 10.23880/eoij-16000159

***Corresponding author:** Sotiris Papaspyros, Leeds Teaching Hospitals NHS Trust, Leeds General Infirmary Gt George street, LS1 3EX, UK, Tel: 00447817600661; Email: sotiris.papaspyros@nhs.net

Abstract

Introduction: Surgery is a motor skill that has to be learnt through practice. The acquisition of motor skills and the principles are well documented especially in sport.

Deliberate practice is the engagement in structured activities created specifically to improve performance in a domain and requires feedback. The experience needed to become an expert can be helped in the early stages of training with deliberate practice and observation by a skilled trainer.

The aim of this project is to establish whether a combination of low fidelity simulation models and deliberate practice can reliably predict achievement of basic surgical skills competency. Video based scoring was used to quantify progress.

Methods: We recruited thirty junior doctors and medical students with minimal exposure to surgery. They were provided with appropriate instruments and materials. They were given a demonstration of low fidelity simulation models, principles of needle handling and feedback on their first attempts.

An initial video was taken. Subsequently they were given specific exercises to practice at home. They were reassessed after a period of one week and a second video was taken.

Results: The participants were scored on four parameters: Time/pace, flow/rhythm, precision, rotation. There was significant improvement on all four parameters in twenty-eight out of thirty participants. This ranged from 18.9% (time) to 40% (flow).

Conclusion: This project has enhanced our knowledge and practice in surgical education and training.

Our work provides evidence on how low-fidelity simulation models can reliably be used to achieve significant progress through early stages of the learning curve. Furthermore it demonstrates the principles that need to be observed in order for deliberate practice to be effective and efficient in acquisition of surgical skills.

Keywords: Systole; Tissue; Banana Skin



Contents lists available at ScienceDirect

International Journal of Surgery

journal homepage: www.journal-surgery.net

Original research

Surgical ergonomics. Analysis of technical skills, simulation models and assessment methods

Sotiris C. Papaspyros [a,*], Ashok Kar [b], David O'Regan [c]

[a] Golden Jubilee National Hospital, Cardiothoracic Department, Agamemnon Street, Clydebank, Glasgow G81 4DY, United Kingdom

[b] Royal Infirmary of Edinburgh, Cardiothoracic Department, 51 Little France Crescent, Old Dalkeith Road, Edinburgh EH16 4SA, United Kingdom

[c] Leeds General Infirmary, Cardiothoracic Department, Great George Street, Leeds LS1 3EX, United Kingdom

HIGHLIGHTS

- Competence in surgery is not an achievement but rather a habit of lifelong learning.
- The core elements of a training model build on the basic foundations of gross and fine motor skills.
- Low fidelity models can be used to achieve significant progress through the early stages of the learning curve.
- Deliberate practice is necessary to account for why some people become experts and others fail to do so, but not sufficient.
- Accurate skills assessment at an early stage may be critical in determining an individual's chances of becoming an expert.

ARTICLE INFO

Article history:
Received 8 March 2015
Received in revised form
17 March 2015
Accepted 6 April 2015
Available online 20 April 2015

Keywords:
Surgical ergonomics
Training
Simulation
Assessment
Motor skills
Deliberate practice

ABSTRACT

Introduction: Over the past two centuries the surgical profession has undergone a profound evolution in terms of efficiency and outcomes. Societal concerns in relation to quality assurance, patient safety and cost reduction have highlighted the issue of training expert surgeons. The core elements of a training model build on the basic foundations of gross and fine motor skills. In this paper we provide an analysis of the ergonomic principles involved and propose relevant training techniques. We have endeavored to provide both the trainer and trainee perspectives.

Methods: This paper is structured into four sections: 1) Pre-operative preparation issues, 2) technical skills and instrument handling, 3) low fidelity simulation models and 4) discussion of current concepts in crew resource management, deliberate practice and assessment.

Discussion: Rehearsal, warm-up and motivation-enhancing techniques aid concentration and focus. Appropriate posture, comprehension of ergonomic principles in relation to surgical instruments and utilisation of the non-dominant hand are essential skills to master. Low fidelity models can be used to achieve significant progress through the early stages of the learning curve. Deliberate practice and innate ability are complementary to each other and may be considered useful adjuncts to surgical skills development.

Conclusion: Safe medical care requires that complex patient interventions be performed by highly skilled operators supported by reliable teams. Surgical ergonomics lie at the heart of any training model that aims to produce professionals able to function as leaders of a patient safety oriented culture.

© 2015 IJS Publishing Group Limited. Published by Elsevier Ltd. All rights reserved.



THE ANNALS OF THORACIC SURGERY

Official Journal of The Society of Thoracic Surgeons and the Southern Thoracic Surgical Association

Digital Media ~ CME ~ Annals in Practice

All Content Search Advanced Search

< Previous Article November 2015 Volume 100, Issue 5, Page 1974 Next Article >

Surgical Training: Learning to Fly at "Top Gun" Level

Sotiris C. Papaspyros, MD

Golden Jubilee National Hospital, Agamemnon St, Clydebank, Dunbartonshire, United Kingdom

David J. O'Regan, MD

Leeds General Infirmary, Great George St, Leeds, United Kingdom

PlumX Metrics

DOI: https://doi.org/10.1016/j.athoracsur.2015.04.147

Abstract Full Text References

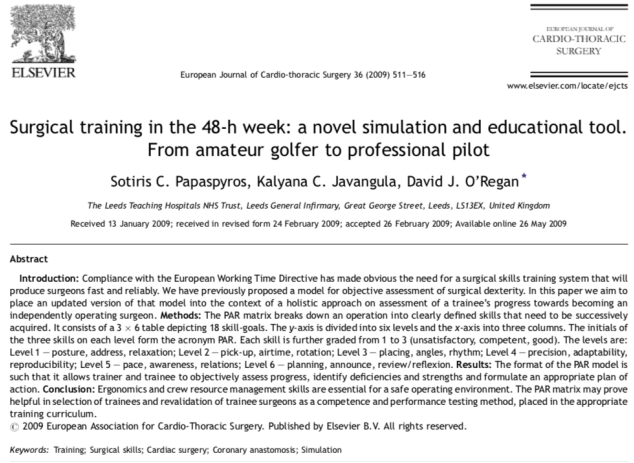
To the Editor:

We read with interest the article written by Enter and associates [1]. The authors pioneer the use of healthy and constructive competition to promote the merits of deliberate practice and simulation for cardiothoracic trainees. Furthermore they use video-based methods to measure technical ability and quantify progress in acquisition of surgical skills in an objective way.

In previous work [2], we created and tested a structured pathway for technical and nontechnical skills training in cardiac surgery as part of a comprehensive approach to professional development. Our 10-year experience with the PAR basic cardiac skills course concurs with the findings of Enter and colleagues that trainees who are at the earlier part of the learning curve have most to gain from low-fidelity simulation models.

There are 3 issues that we would like to point out:

1. Deliberate practice, as defined by Ericsson [3], requires that the trainer give immediate informative feedback. The supervised practice of the participants in this article was 38.5%. This may have mitigated some of the potential benefit.
2. The list of factors that form the assessment part of the exercise are certainly essential, but in our opinion by no means exhaustive. In our model, we also evaluate posture, breathing, and rhythm. We believe these factors contribute to a more realistic insight into the trainee's performance.
3. The anastomosis model was presumably placed on top of a working bench. In real life, operating happens inside the chest. Therefore the angles and posture are different from operating on the surface. Furthermore the materials used for the model are synthetic and do not give feedback equivalent to tissue. We use a poached egg placed in a pudding basin (to represent the chest cavity). If needle rotation is not perfect, the yolk will spill, giving immediate feedback.



ELSEVIER

European Journal of Cardio-thoracic Surgery 36 (2009) 511–516

EUROPEAN JOURNAL OF CARDIO-THORACIC SURGERY

www.elsevier.com/locate/ejcts

Surgical training in the 48-h week: a novel simulation and educational tool. From amateur golfer to professional pilot

Sotiris C. Papaspyros, Kalyana C. Javangula, David J. O'Regan *

The Leeds Teaching Hospitals NHS Trust, Leeds General Infirmary, Great George Street, Leeds, LS13EX, United Kingdom

Received 13 January 2009; received in revised form 24 February 2009; accepted 26 February 2009; Available online 26 May 2009

Abstract

Introduction: Compliance with the European Working Time Directive has made obvious the need for a surgical skills training system that will produce surgeons fast and reliably. We have previously proposed a model for objective assessment of surgical dexterity. In this paper we aim to place an updated version of that model into the context of a holistic approach on assessment of a trainee's progress towards becoming an independently operating surgeon. **Methods:** The PAR matrix breaks down an operation into clearly defined skills that need to be successively acquired. It consists of a 3 × 6 table depicting 18 skill-goals. The *y*-axis is divided into six levels and the *x*-axis into three columns. The initials of the three skills on each level form the acronym PAR. Each skill is further graded from 1 to 3 (unsatisfactory, competent, good). The levels are: Level 1 — posture, address, relaxation; Level 2 — pick-up, airtime, rotation; Level 3 — placing, angles, rhythm; Level 4 — precision, adaptability, reproducibility; Level 5 — pace, awareness, relations; Level 6 — planning, announce, review/reflexion. **Results:** The format of the PAR model is such that it allows trainer and trainee to objectively assess progress, identify deficiencies and strengths and formulate an appropriate plan of action. **Conclusion:** Ergonomics and crew resource management skills are essential for a safe operating environment. The PAR matrix may prove helpful in selection of trainees and revalidation of trainee surgeons as a competence and performance testing method, placed in the appropriate training curriculum.

© 2009 European Association for Cardio-Thoracic Surgery. Published by Elsevier B.V. All rights reserved.

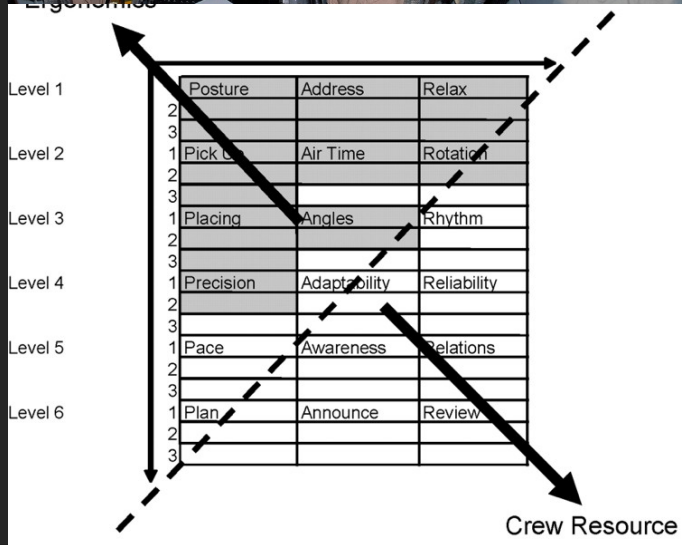
Keywords: Training; Surgical skills; Cardiac surgery; Coronary anastomosis; Simulation

Reflection on my training experience

…from amateur golfer to professional pilot… Briefing/Debriefing

Papaspyros SC et al. Briefing and debriefing in the cardiac operating room. Analysis of impact on theatre team attitude and patient safety. Interact Cardiovasc Thorac Surg. 2010;10(1):43-7.





Proper prior preparation…

- Physical and mental fitness and resilience
- Rehearsal, warm-up, visualization
- Governance and proctoring for innovation









The Surgeon

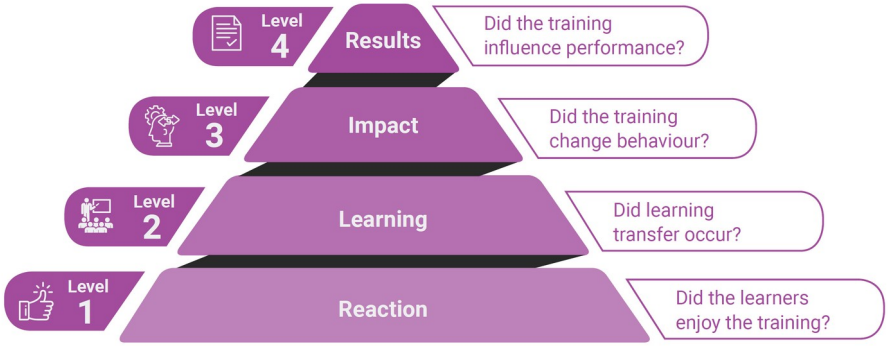
- Manage ambiguous problems
- Balance competing explanations
- Note exceptions to the rules
- Cope with the stress of the operating room

- Choose one course of action

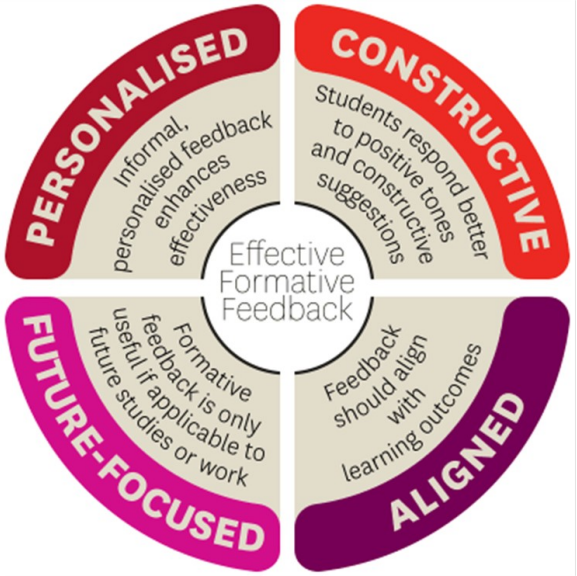
Surgeons should be cool

- Relaxed surgeon pace advancement of procedure
  - Maintains stability of theatre environment
  - Enhances team confidence
  - Improves performance





Kirkpatrick's pyramid



Evaluation and feedback



Next step

Dissertation 2019 -2020:

- Identifying and exploring the most effective way to learn critical cardiac surgery skills.
- A mixed method analysis of how ergonomics, simulation and deliberate practice interact in the process of learning to perform coronary anastomosis and aortotomy repair.
- Learners' and teachers' perspectives.



Should the NHS publish patients' death rates? The experts' view

4 years



Leading hospital under CQC scrutiny over high heart surgery death rate

3 years



That was the NHS: stories of hope, kindness and the human spirit

3 years



England's biggest hospitals veto NHS budget over patient safety fears

4 years



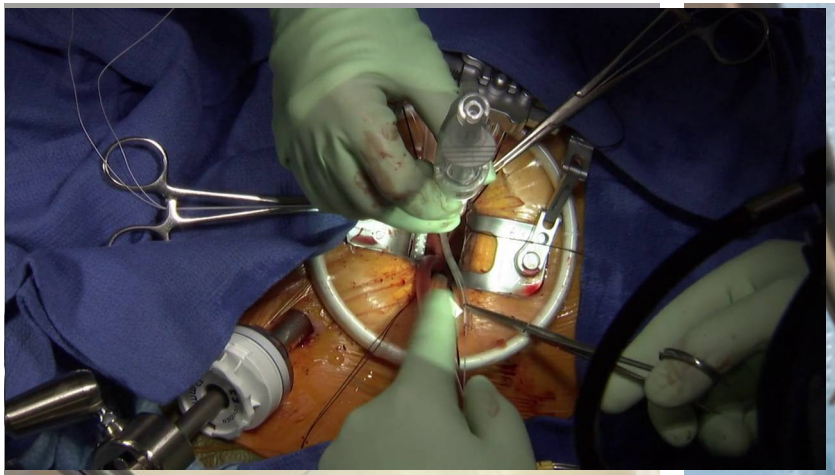
The history of heart surgery failures: tragedies born of arrogance not malpractice

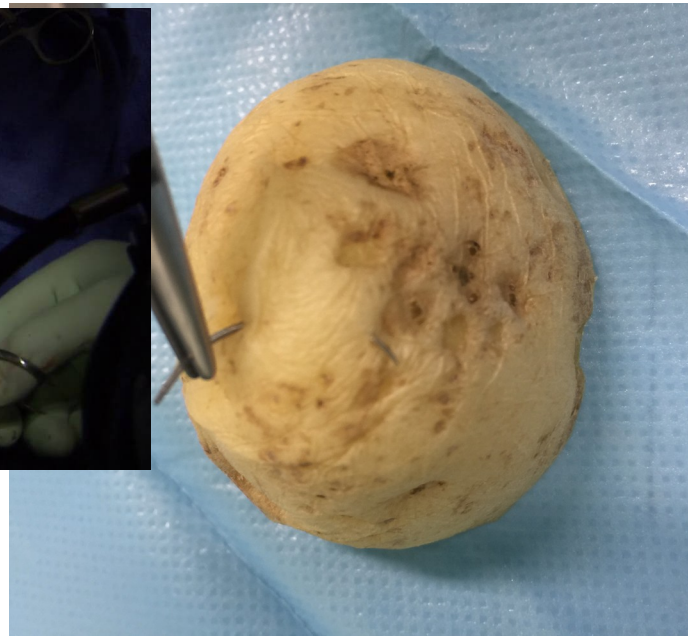
3 years

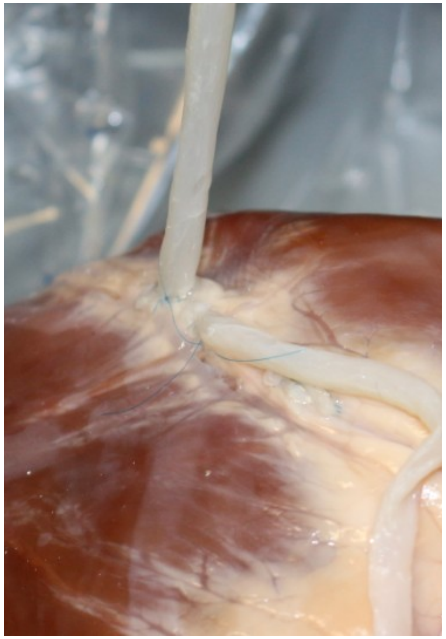
Surgeons' results and risk aversion

Activity 06/17 – 06/19

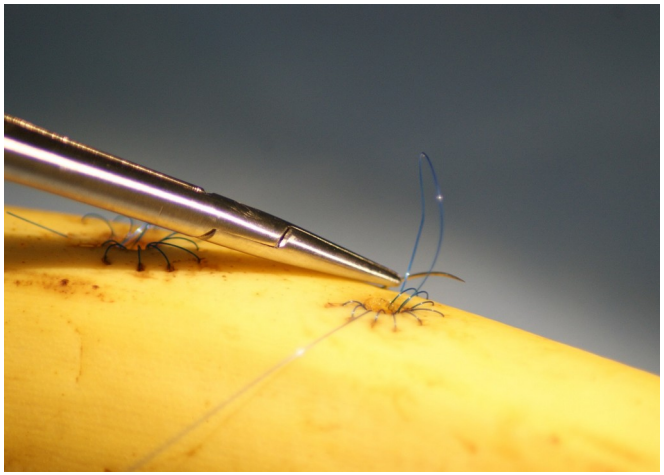
- 250 cases as consultant (592 cases in total)
- Mean Euroscore II: 4.47% (range 0.51 – 43.89)
- 69% Urgent
- 13% Emergency
- 18% Elective
- 5 x Aortic dissections
- 11 x done by trainees
- 2.8% unadjusted mortality
- <1% risk adjstd mortality
- 1.6% re-exploration
- 0.8% stroke
- 0.8% DSWI











Ergonomics, simulation and deliberate practice