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Crowne Plaza Hotel
Liège, Belgium

5th International Meeting on Aortic Diseases

New insights into an old problem CHU Liège, APF

www.chuliege-ima.be

Medical errors during
endovascular treatment for
aortic diseases: How can we
avoid them?

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Disclosure of Interest

Speaker name: Colin Bicknell

I have the following potential conflicts of interest to report:

- Medtronic: Proctoring and consultancy, speakers fees, travel and conference fees
- Hansen Medical: Consultancy, speakers fees, travel and conference fees
- Bolton Medical: Consultancy, speakers fees, travel and conference fees
- Gore: Travel and conference fees
- The LEAP study was funded by the Circulation Foundation and NIHR



AGGREGATED MARGINAL GAINS



Studies of the 2000 European Cup demonstrate that the final rankings in tournaments can be predicted by analysing offensive and defensive error during each of the 31 matches.

AGGREGATED MARGINAL GAINS

Should we all be looking to aggregated marginal gains?

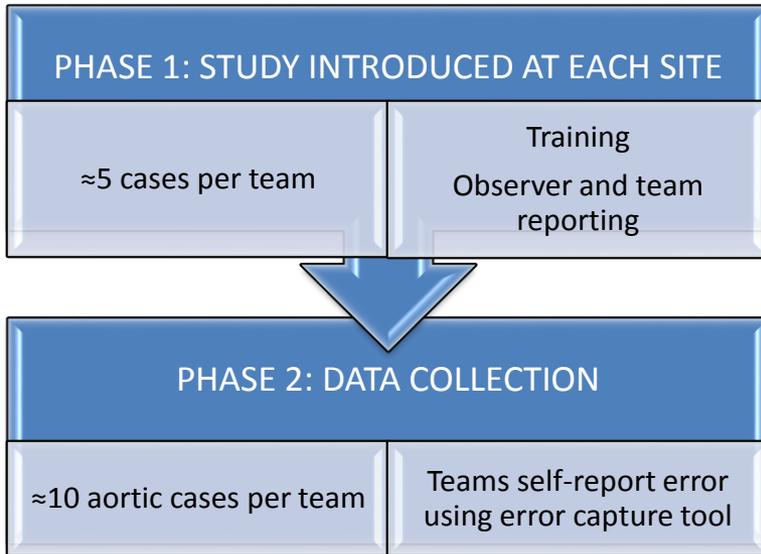


“The principle comes from the idea that if you break down everything you can think of that goes into riding a bike and then improve it by 1% you will get a significant increase when you put them all together”

Dave Brailsford, UK cycling performance director



LANDSCAPE OF ERRORS IN AORTIC PROCEDURES

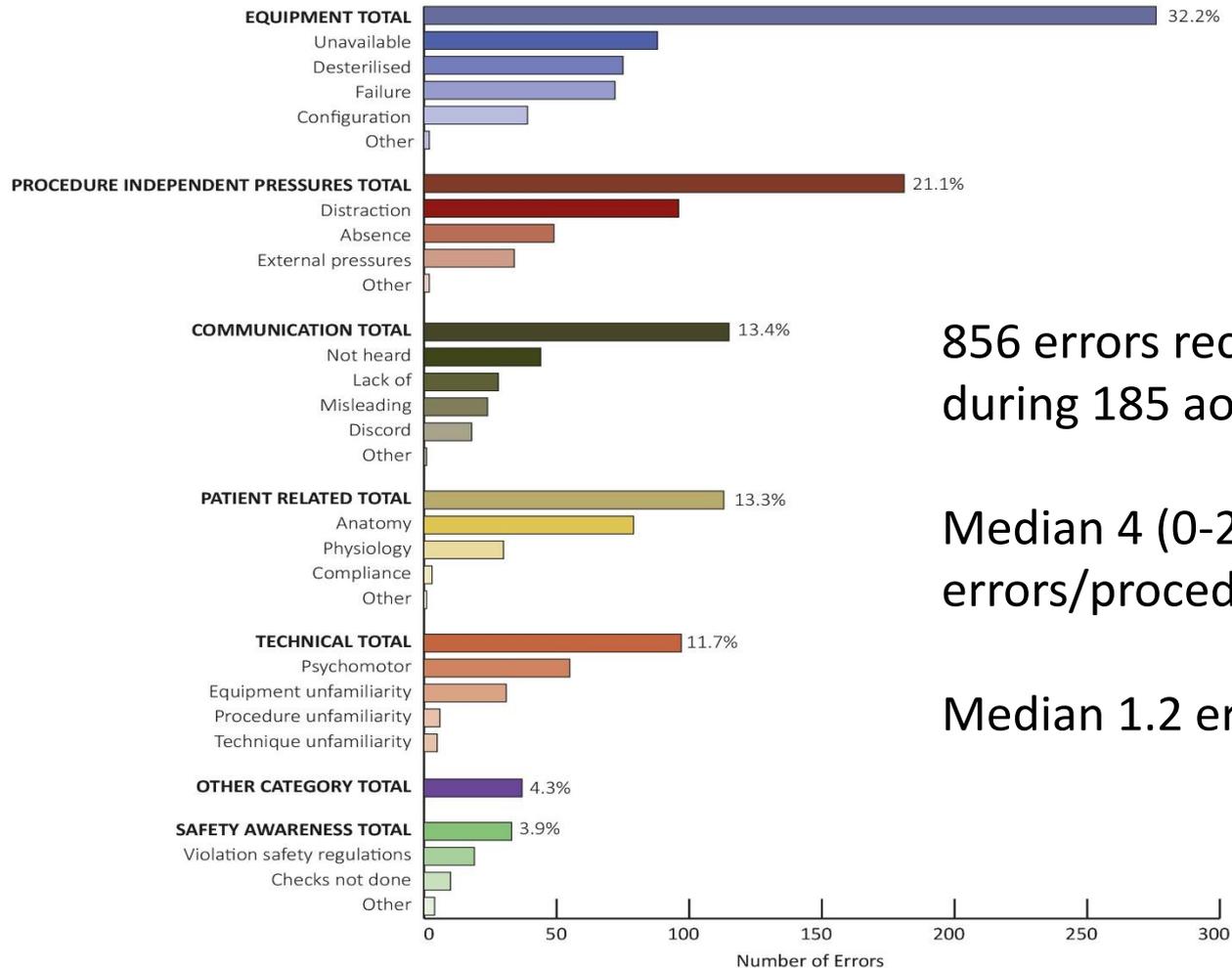


Design and Validation of an Error Capture Tool for Quality Evaluation in the Vascular and Endovascular Surgical Theatre

S.L. Mason ^{a*}, S. Kuruvilla ^b, C.V. Riga ^{a,b}, M.S. Gohel ^{a,b}, M. Hamady ^c, N.J. Cheshire ^{a,b}, C.D. Bicknell ^{a,b}



LEAP STUDY: Errors by primary & subcategories



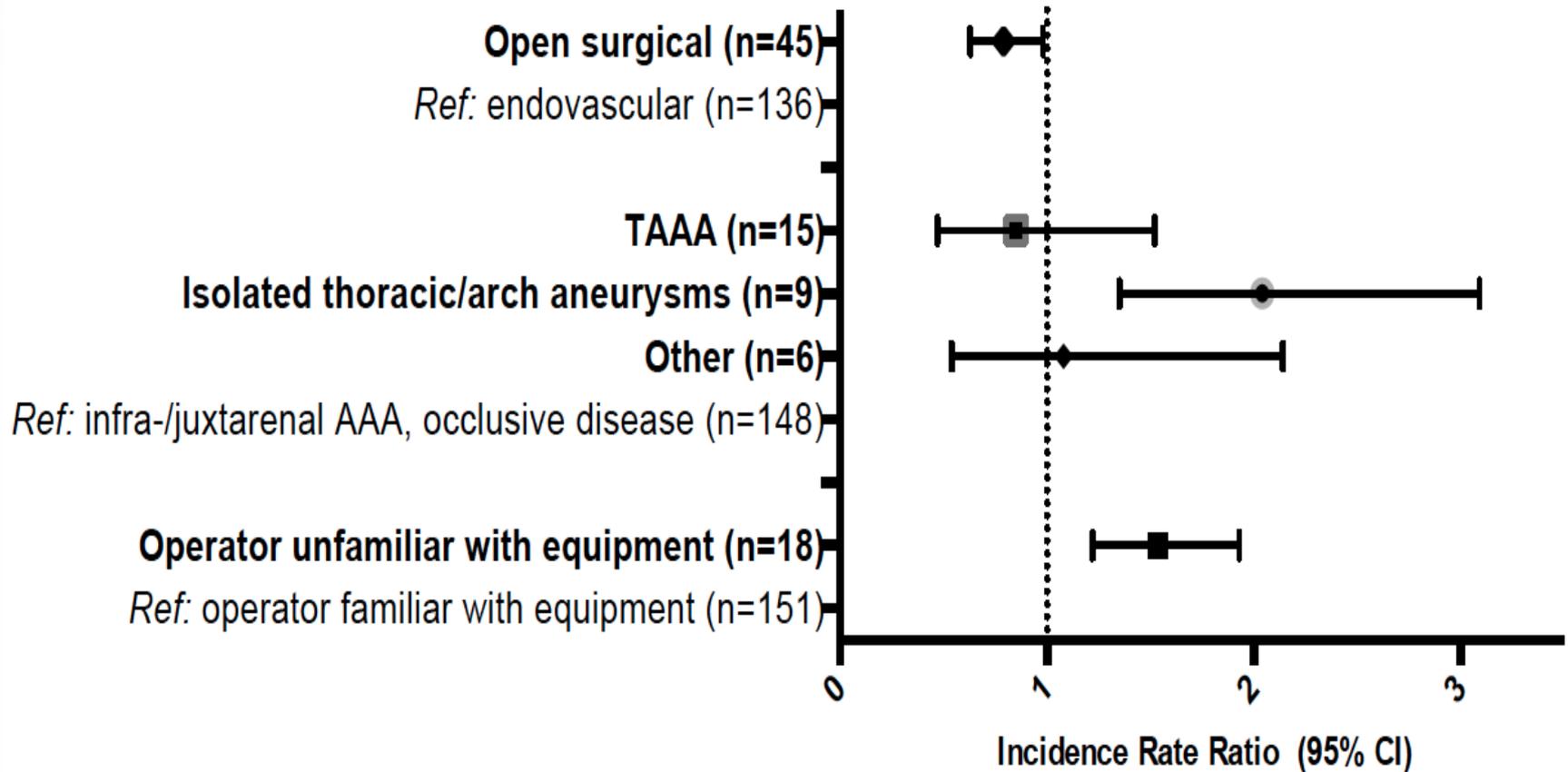
856 errors recorded by teams during 185 aortic procedures

Median 4 (0-25) errors/procedure

Median 1.2 errors/hour



DETERMINANTS OF ERROR RATE: multivariate analysis



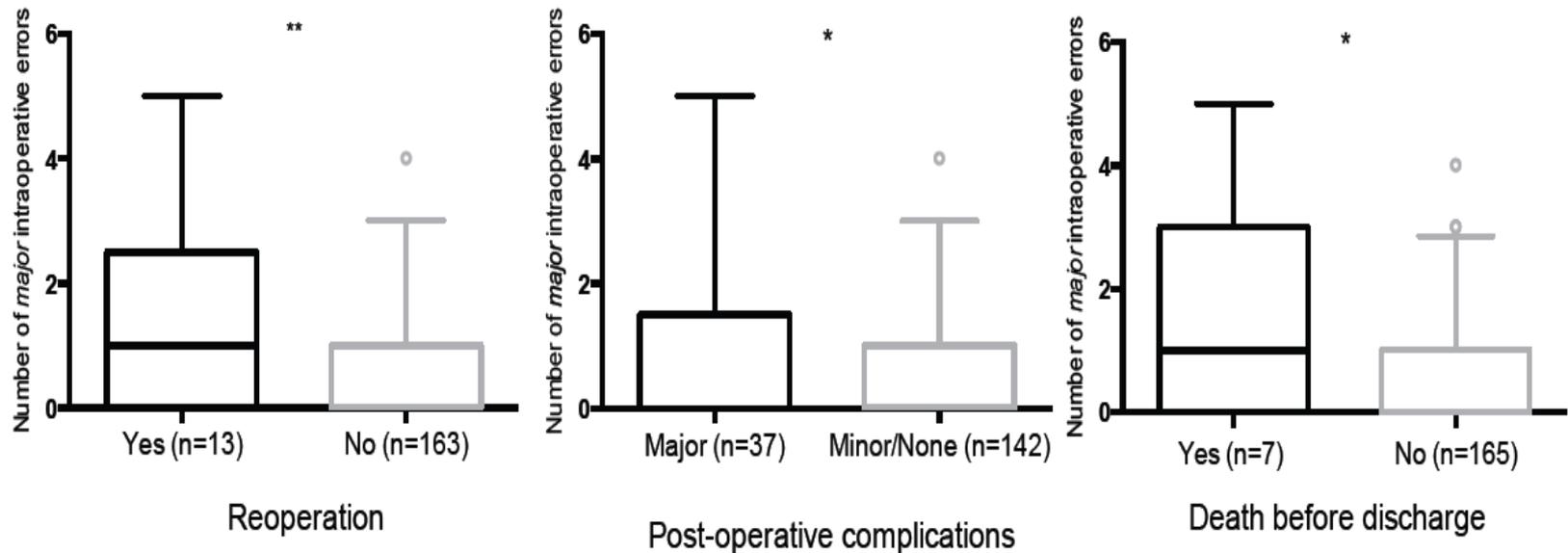


RELATIONSHIP BETWEEN ERROR AND OUTCOME

14 errors directly caused or clearly contributed to harm in 12 patients

6.5% of cohort

7 communication errors, 4 technical errors, 3 unanticipated problems relating to patient's anatomy



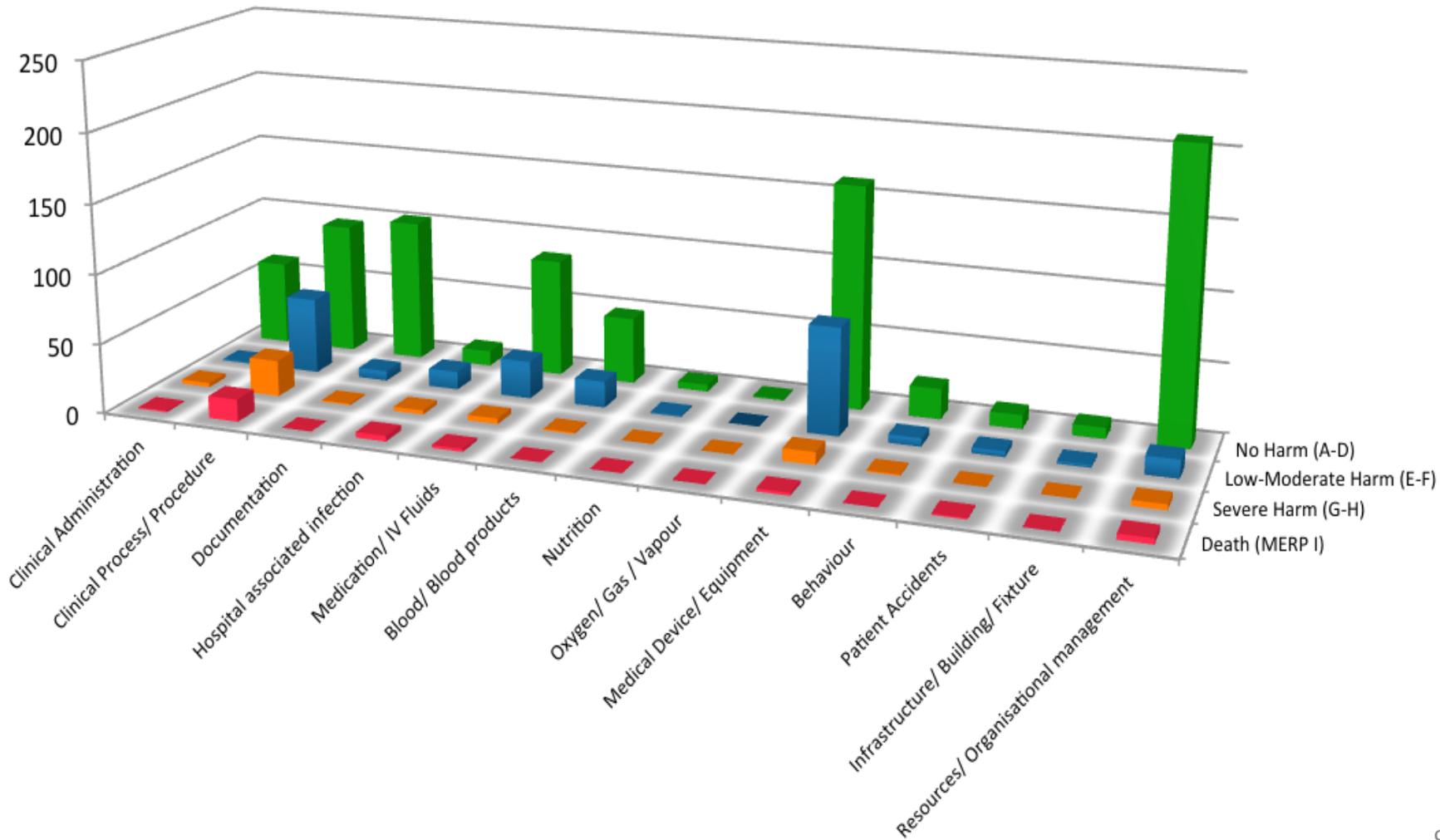
**p<0.01 *p<0.05



NATIONAL REPORTING AND LEARNING SYSTEM

Over 7 million safety events

Thematic analysis identifies 2572 from elective aortic surgery



ERROR PATTERNS

- Error within the vascular (especially endovascular) operating environment is frequent
- Error leads directly to patient harm
- A prominent number of important errors come from:
 - Leadership, communication and team working
 - Specific equipment familiarity
 - Organisational issues



REDUCING HARM IN AORTIC SURGERY

- US Airways Flight 1549
- 155 passengers
- January 15, 2009
- Captain Chesley B. "Sully" Sullenberger and First Officer Jeffrey Skiles, made an unpowered emergency water landing in the Hudson River after multiple bird strikes caused both jet engines to fail.

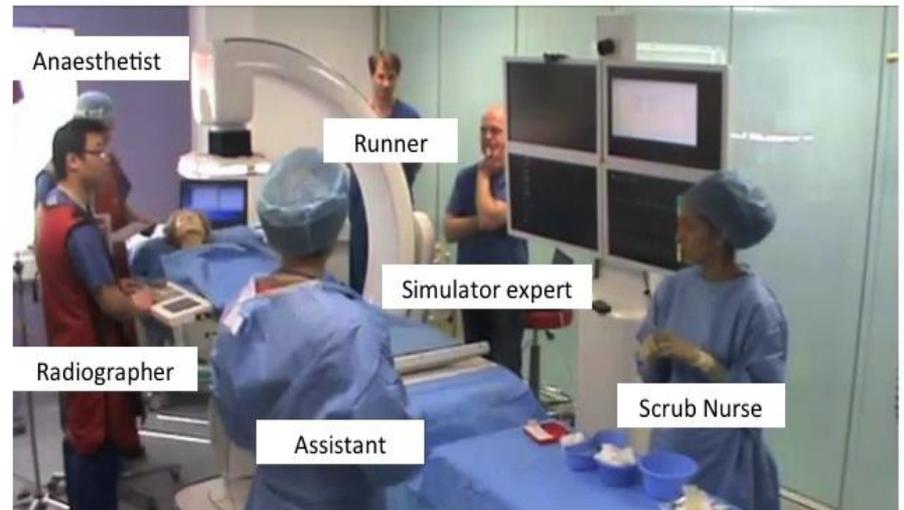




IMMERSIVE SIMULATED ANGIOGRAPHY SUITE



Imperial College
London





IMPERIAL TEAM TRAINING



- Multidisciplinary in teams
- Structured
 - Routine
 - Emergency
 - Reactive
- New pathways of care



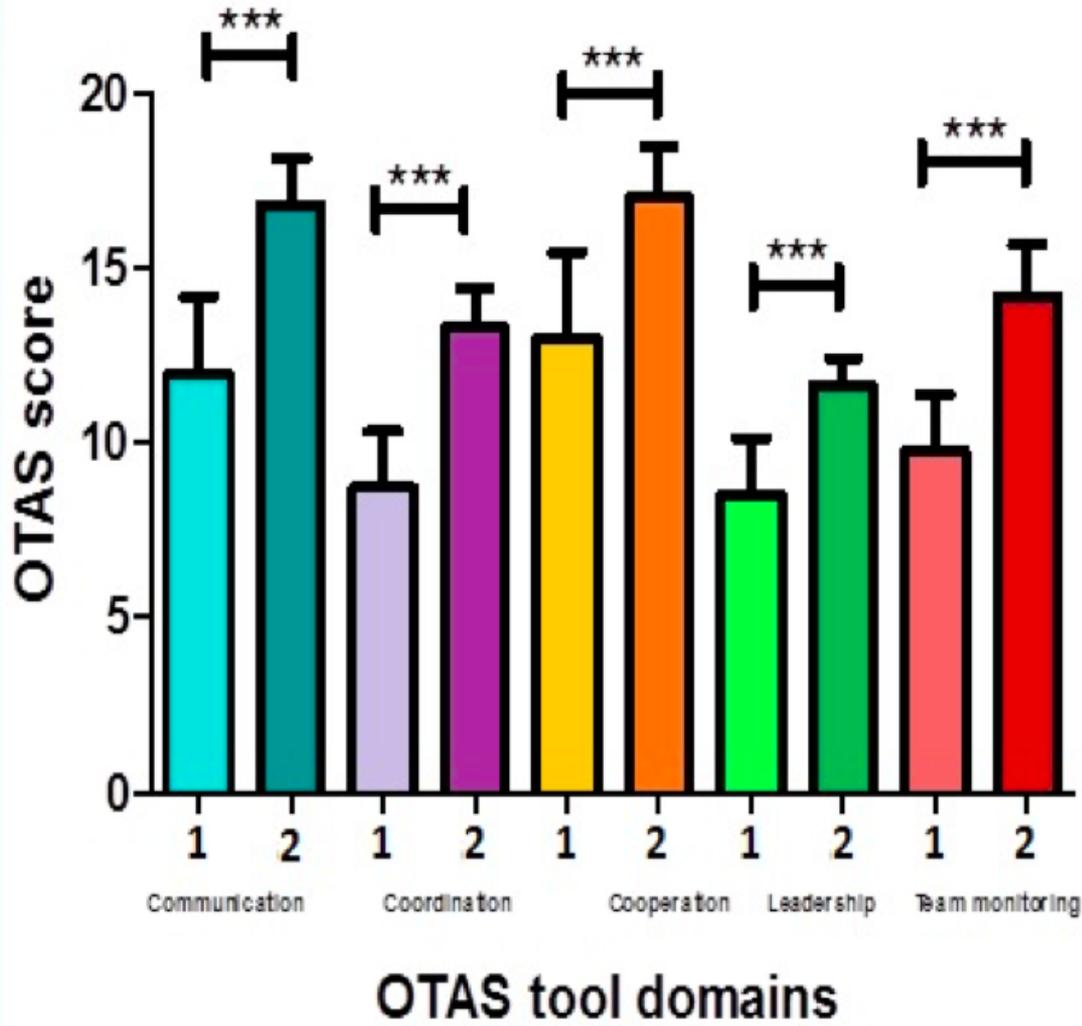
Mentored

Device specific

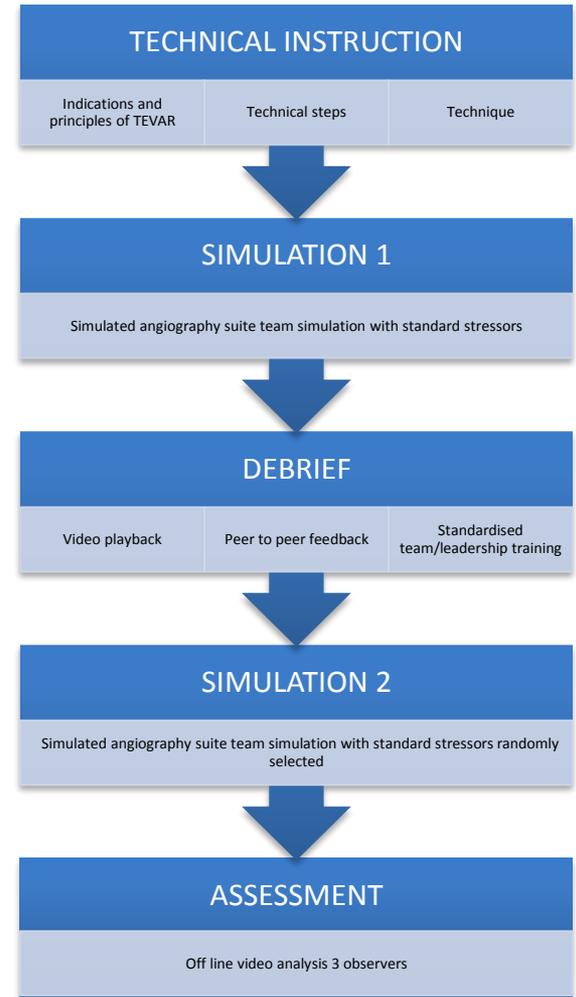




IMPERIAL TEAM TRAINING



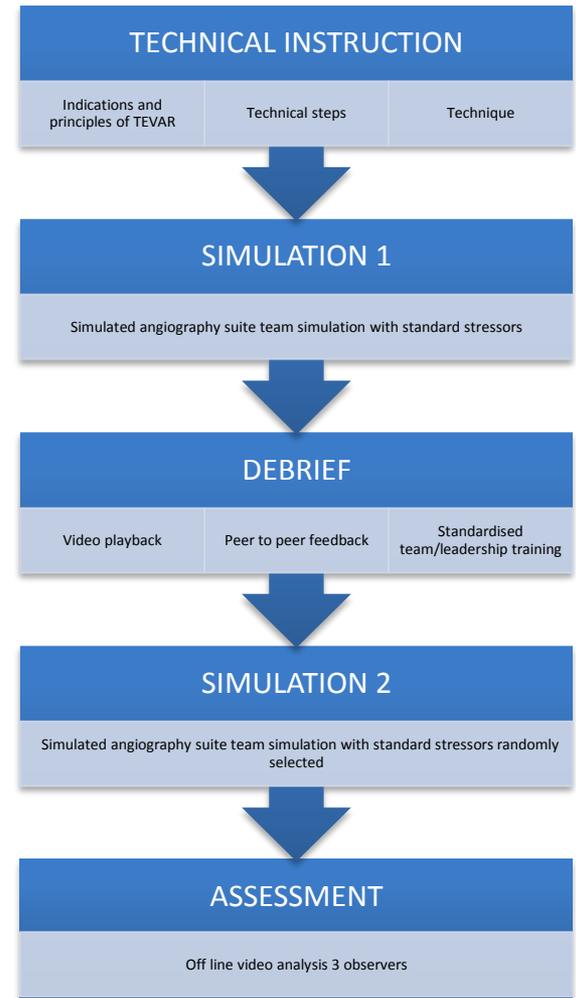
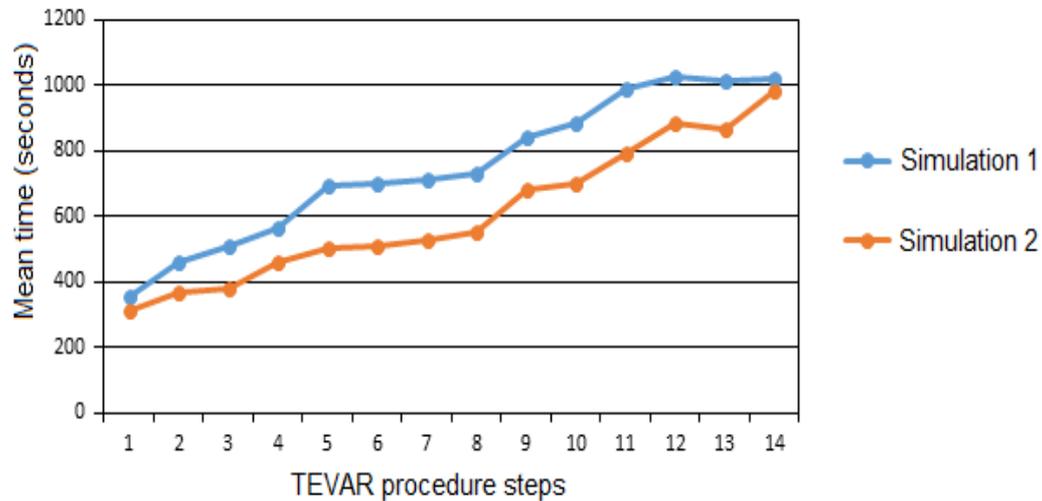
*** = $p < 0.001$





IMPERIAL TEAM TRAINING

Mean time (seconds) taken to achieve each step of the TEVAR procedure before the intervention compared to after the intervention.



IMPERIAL TEAM TRAINING

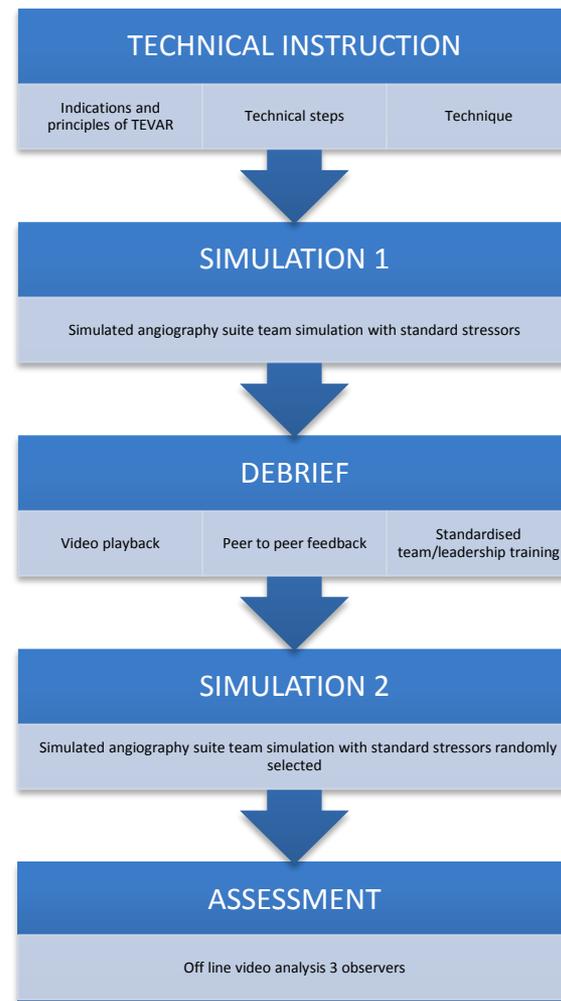
	Before	After	Percentage difference	P value
Fluoroscopy time (mean)	538.08	487.46	-9.4	0.381*
Checked leads number	2	6	+200.0	0.202**
Percentage of runs the team were asked to step back for	3.85	40.38	+948.8	0.002***

Radiation Safety Behaviours

* Mean time of fluoroscopy time was analysed using a paired t test

** The frequency of which the lead surgeon checked the team were wearing leads was compared using Fisher's exact test

*** The percentage of runs for which the lead surgeon asked the team to step back for was analysed using Pearson's Chi squared test.

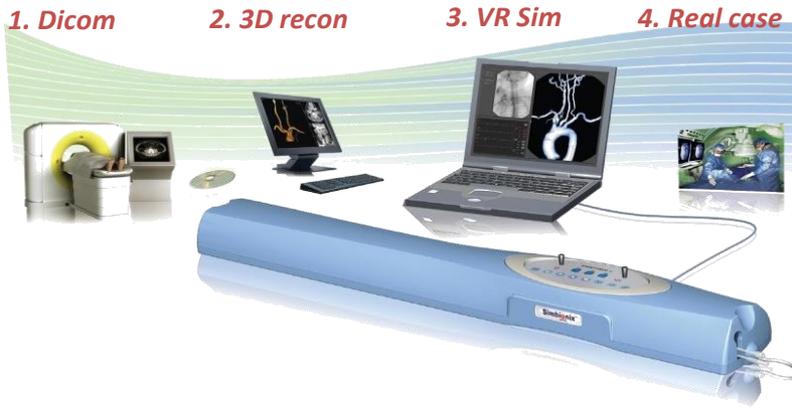


REHEARSAL

ESA-RANDOMIZED CONTROLLED TRIAL

Patient-specific Rehearsal Before EVAR
 Influence on Technical and Nontechnical Operative Performance. A Randomized Controlled Trial

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 Colin D. Birknell, MD,§ Jin M. M. Hevilgers, MD, PhD,¶ Joep A. W. Teijink, MD, PhD,||
 and Frank E. Vermassen, MD, PhD*, on behalf of the PAVLOV Study Group



Simulated Case in SOS

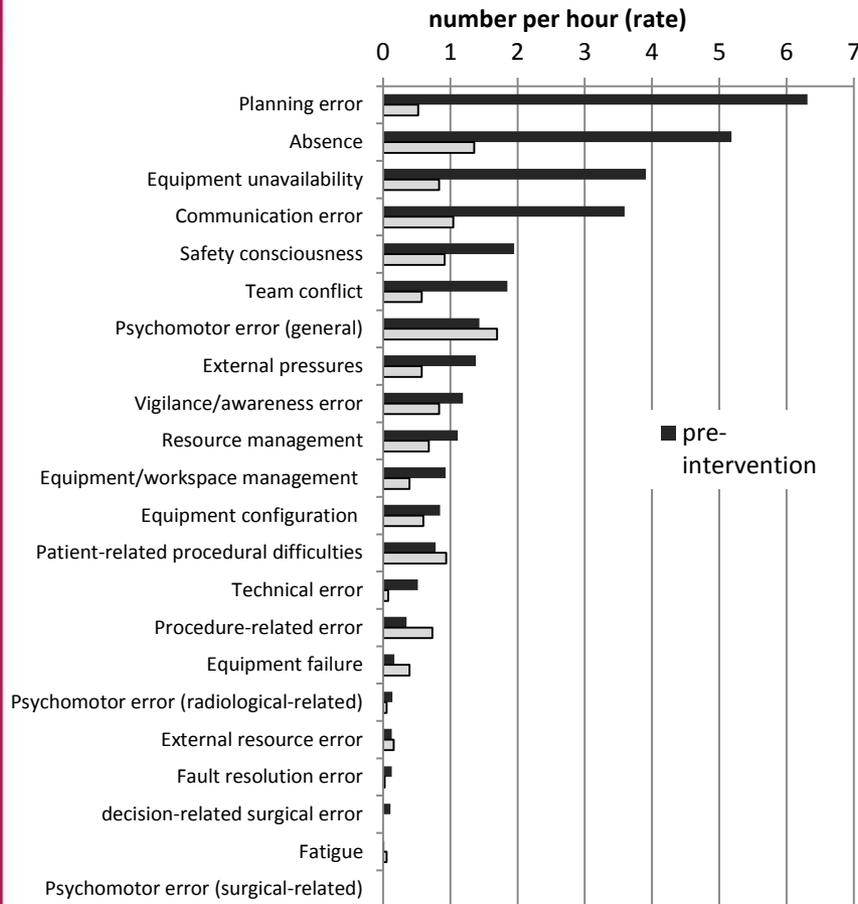
Real Case in Angiosuite



Variable	Errors Intervention group (95% CI)	Errors Control group (95% CI)	Difference intervention vs. control group	95% confidence interval	p-value*	p-value multivariate analysis‡
Major errors Complete procedure	0.08 (0.03 to 0.21)	0.34 (0.21 to 0.55)	-76.5%	-92.1 to -30.1%	0.009	0.009
Minor errors Complete procedure	3.14 (2.67 to 3.67)	4.24 (3.71 to 4.85)	-25.9%	-39.8 to -9.0%	0.004	0.002



REHEARSAL



Improving Patient Safety In Combined Open/ Endovascular Arterial Surgery

Previous work by Imperial College London and the European Virtual-Reality Endovascular Research Team (EVEREST), has suggested a higher incidence of operative procedures involving endovascular techniques. The implementation of a structured mental rehearsal at the commencement of this high risk endovascular period has been shown to reduce intra-operative error rates and improve patient safety.^[1, 2]

The Pre-Procedural Structured Mental Rehearsal

- To be led by the endovascular specialist.
- To be performed at the start of the endovascular phase of combined procedures.
- All members from the endovascular MDT to be present.
- Endovascular specialist to summarise main steps of procedure and outline the specific equipment needs.
- Nurse to verbally confirm that each piece of equipment is present and if not, to be responsible for retrieving equipment from the stockroom.
- Endovascular specialist to confirm that all team members understand the phase and are happy to proceed.

[1] Patel SR, Gohel MS, Hamady M, Albayati MA, Riga CV, Cheshire NJW, Bicknell CD. Reducing Errors in Combined Open/Endovascular Arterial Procedures: Influence of a Structured Mental Rehearsal Before the Endovascular Phase. J EVT 2012 [In Press]

[2] Morbi A, Hamady M, Riga C, Kashef E, Peach B, Vincent C, Moorthy K, Vats A, Cheshire N, Bicknell C. Reducing Error and Improving Efficiency in Vascular Interventional Radiology: Implementation of a Pre-Procedure Team Rehearsal. Radiology 2012 [In Press]



KEY THEMES

- Error within the vascular operating suite is frequent ...and leads directly to patient harm
- Leadership, communication and team working/training are key.
- Specific equipment familiarity vitally important
- Immersive, contextual training may help to avoid error related to the environment and equipment
- *...I propose given this evidence that rehearsal and team training should be a mandatory part of training, and of effective institutional governance.*

