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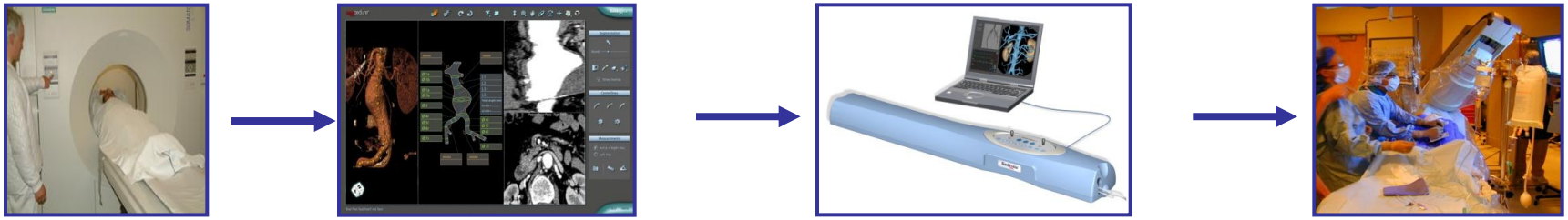
Simulation ***Rehearsal*** before endovascular interventions: Why it ***improves*** our practice.



I. Van Herzeele, L. Desender, W. Willaert on behalf of

*E*uropean *V*irtual Reality *E*ndovascular *RES*earch*T*eam (*EVEREST*)

UniversityHospital Zurich

Imperial College London

UZ Universitair Ziekenhuis Gent

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Disclosures

X I have the following potential conflicts of interest to report:

X Research/educational grants

- W.L. Gore & Associates, Flagstaff , USA
- Simbionix, Cleveland, Ohio, USA

X Consulting Silkroad Road Medical, Sunnyvale, CA, USA

☐ Employment in industry

☐ Stockholder of a healthcare company

☐ Owner of a healthcare company

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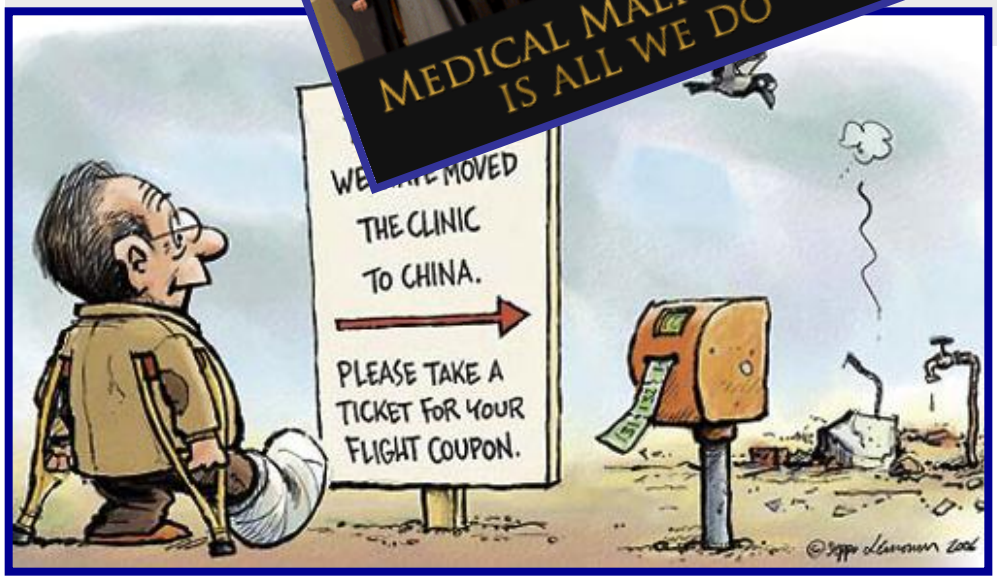
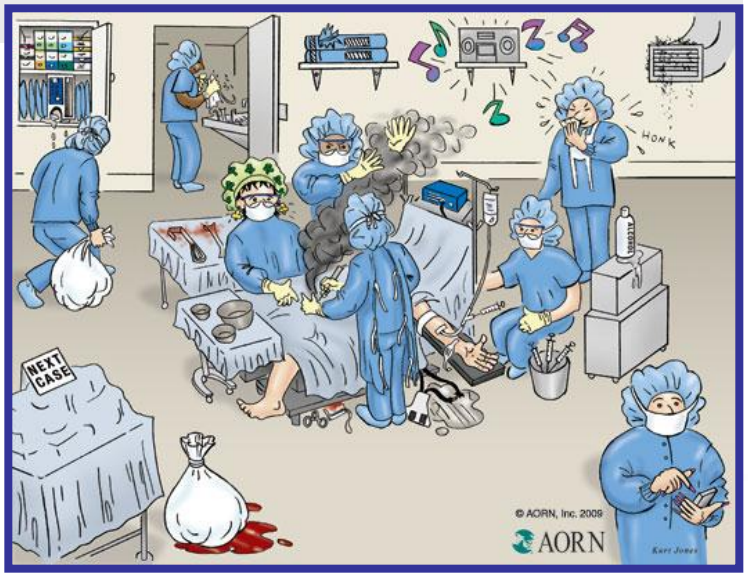
We *don't* need simulation…

- I am an *experienced* EVAR/CA
- EVAR/CAS cases ar
- *3D imaging*
- Waste
- Too *exp*





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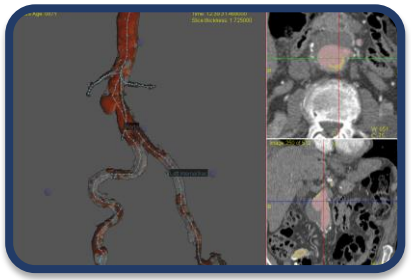
Simulation Rehearsal

AAA > 55 mm
Iliac Aneurysm > 30 mm



3D segmentation

VR

Real case

Technical factors
- C-arm position
- Procedure time
- Fluoroscopy time
- Contrast volume
- # Angiograms

Subjective Questionnaire

	Not at all				Very much	N/A
REALISM						
1. The procedure simulation of EVAR was as realistic as the real case.	1	2	3	4	5	
2. The rehearsal environment was appropriate	1	2	3	4	5	
3. The rehearsal environment contributed to the realism of the simulation	1	2	3	4	5	

Desender L et al. ***Eur J Vasc Endovasc Surg*** *Submitted*

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ALGEMEEN ZIEKENHUIS SINT-MAARTEN

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Plan/Rehearse ALL aspects of the intervention

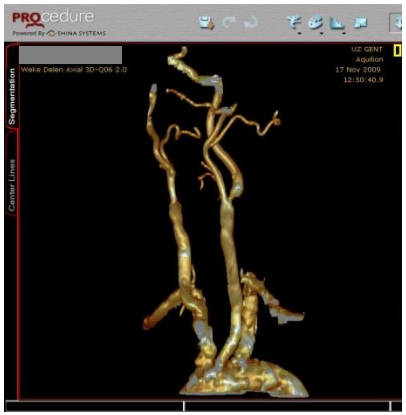
- *Selection*
  - Case
  - Device
  - Endovascular tools
- *Technical* skills for the *team*
  - C-arm angulation
  - Sequence
  - Pitfalls
- *Human* factor skills

Lab vs. In-situ Simulation

Willaert W et al. *Br J Surg* 2012; 99(9):1304-13

1.Selection - *Case*

Green



Left ICA score :< 4.9

Amber

Left ICA score: 5.0-5.9

Red

Right ICA score > 7.0

Macdonald S et al. *Stroke* 2009; 40: 1698-703

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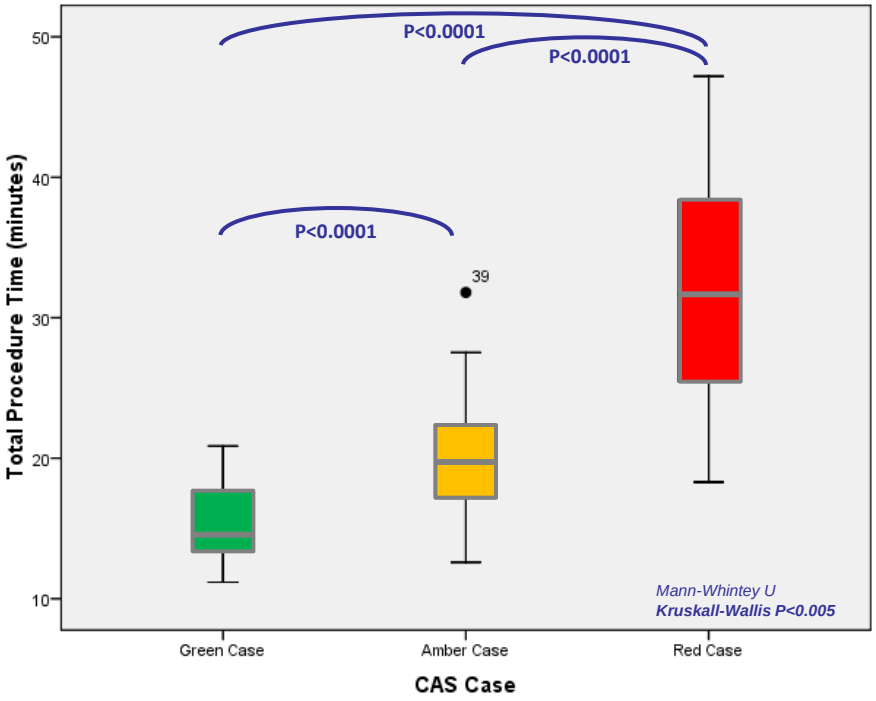
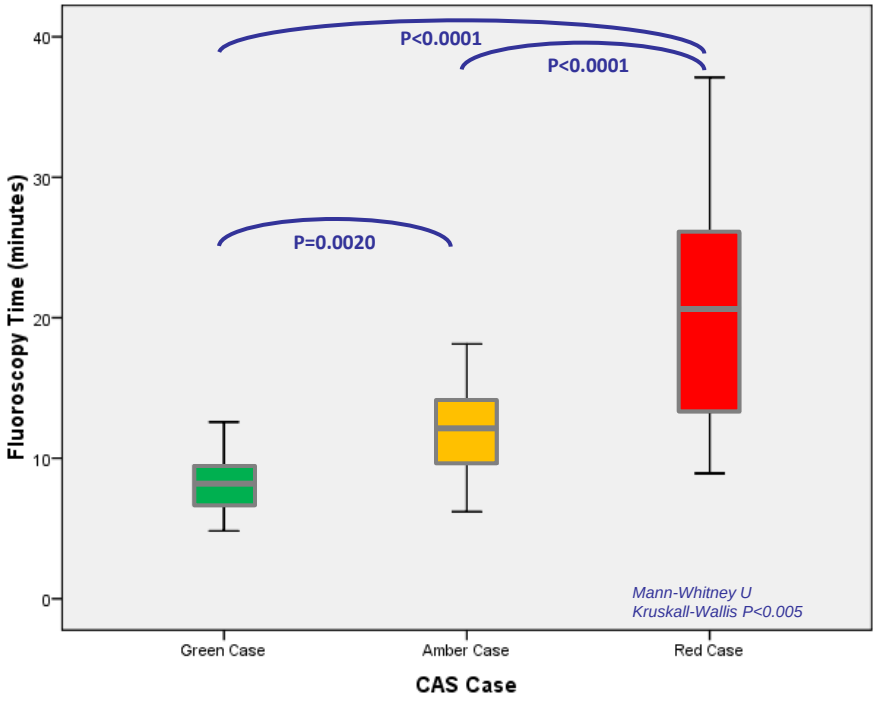
Total Procedure Time (mins)



Fluoroscopy Time (mins)



Red case: **10/20** >15 minutes to cannulate CCA

Amber case: **2/20**

Green case: **0/20**

Willaert W et al. *J Vasc Surg* 2012; 56(6): 1763-70

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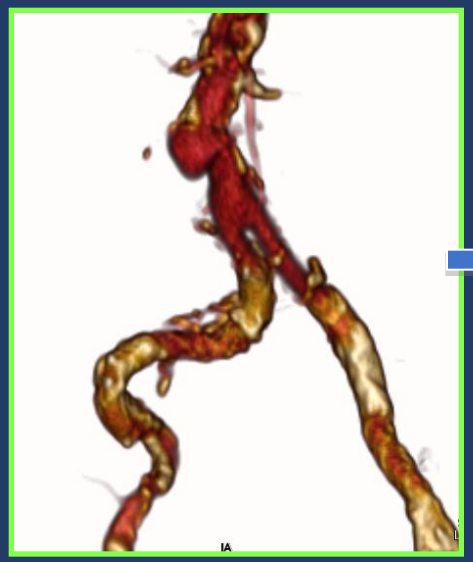
Device choice

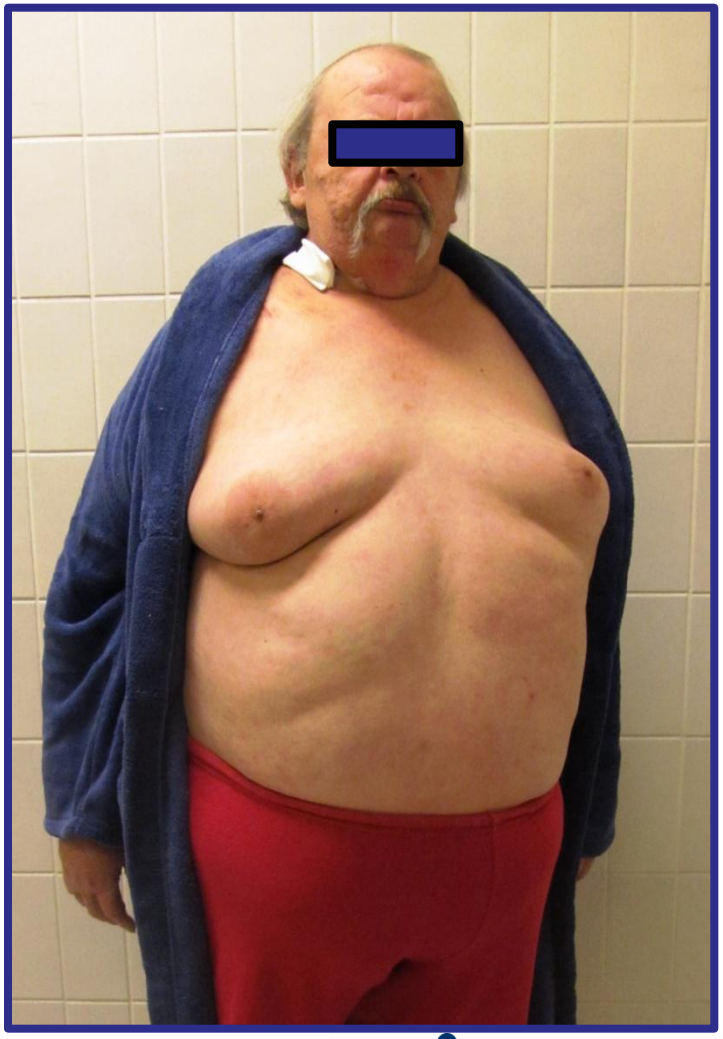
N=10
N=9: infrarenal AAA > 55mm
N=1: iliac aneurysm (50mm)

N=10: Procedure Rehearsal

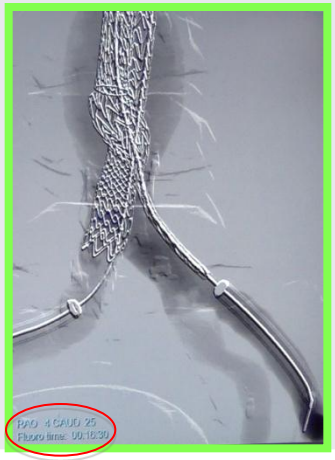
N=9: Real Case



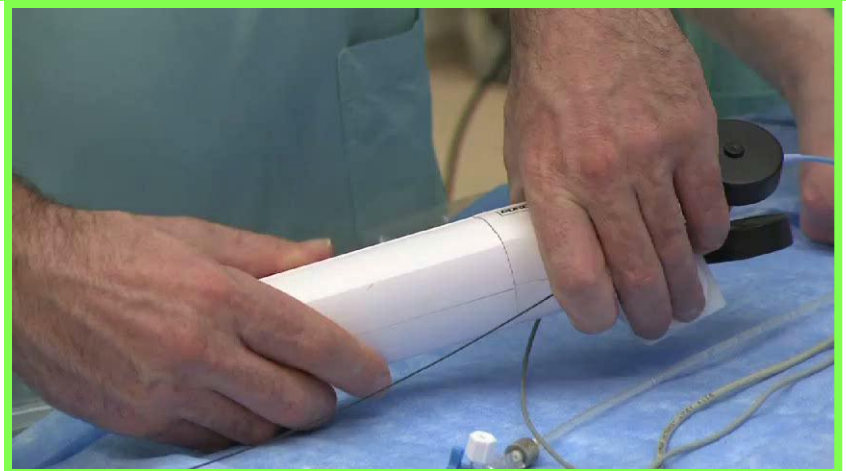
2. Technical factors



C-arm: Elimination of the parallax

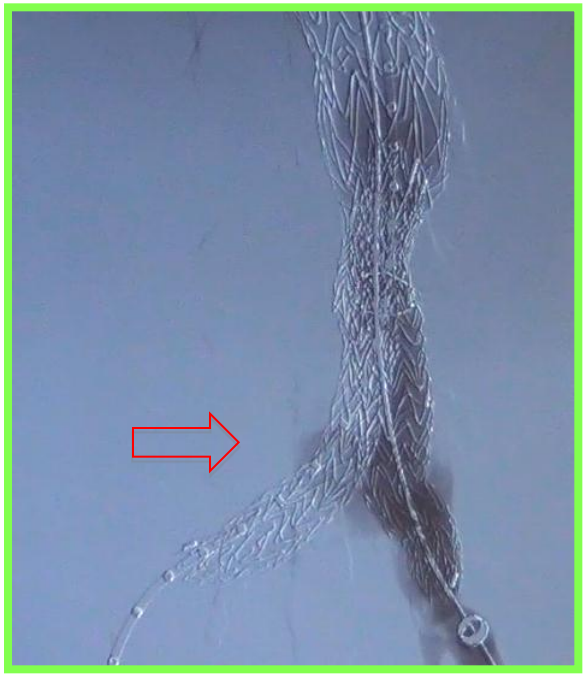
	Simulation	Real Case
<u>Proximal</u> landing zone	**7/9** 	**6/9** (CC & OB) **3/9** (CC **or** OB) 
<u>Distal</u> landing zone	**6/9** 	**4/9** (CC & OB) **2/9** (CC **or** OB) 

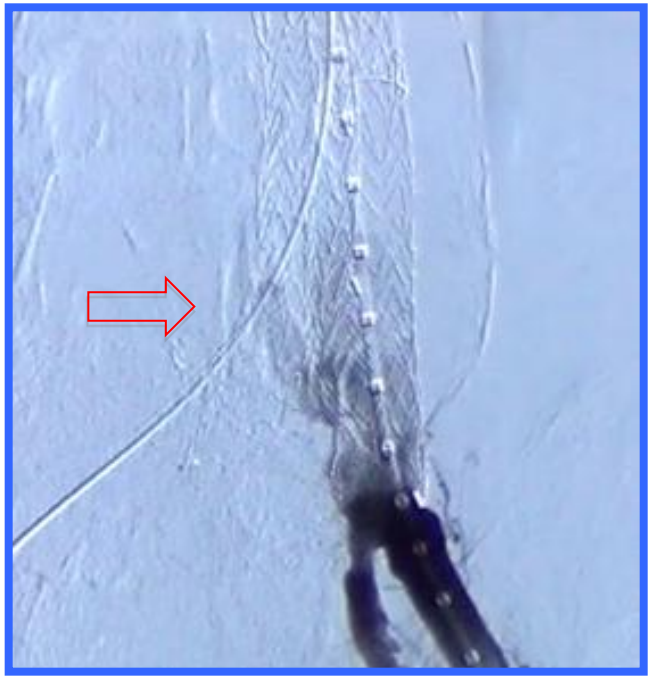
Technical skills



Pitfalls

	Not at all				Very much	N/A
This simulation is useful for me to practice the "real" case prior to performing it on the patient	1	2	3	4	5	
The simulation helped me gather important information for the real case	1	2	3	4	5	
The simulation helped me evaluate potential difficulties with the real case	1	2	3	4	5	



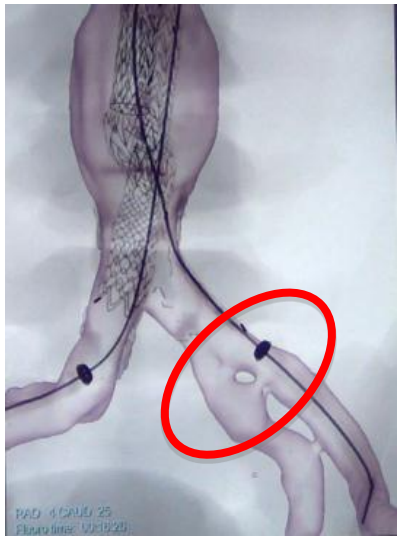


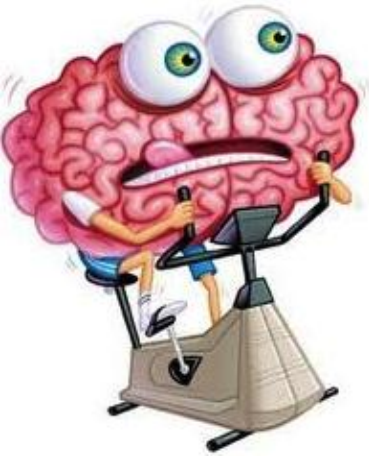
3. Human Factor Skills

	Not at all				Very much	N/A
TEAMWORK AND COMMUNICATION ISSUES						
The simulation aided the coordination between team-members in the real case	1	2	3	4	5	
The simulation aided the communication between team-members in the real case	1	2	3	4	5	
The simulation enhanced my confidence for the real intervention	1	2	3	4	5	

Limitations

- Biomechanical properties
- Device with infrarenal fixation
- Time consuming
- Cost





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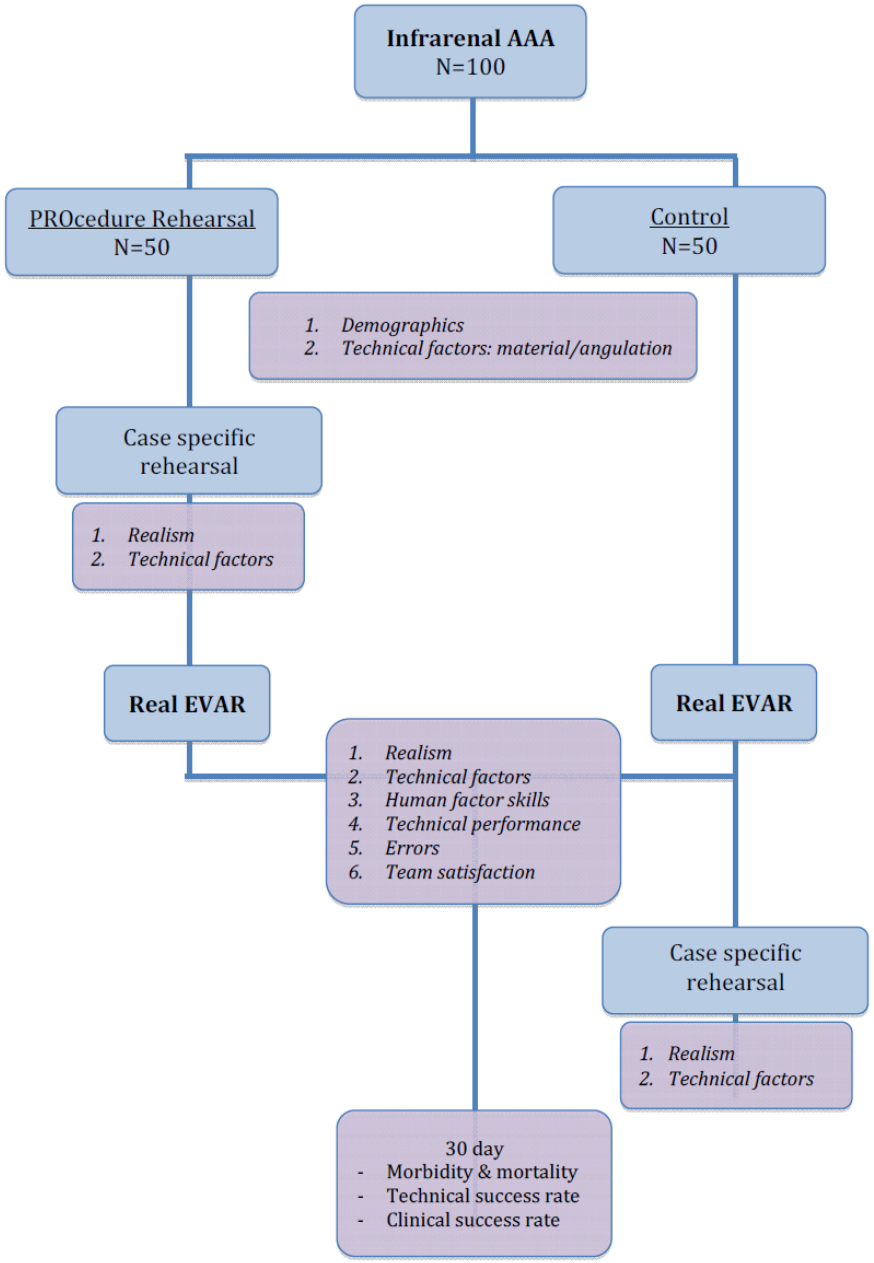
Case - Specific Rehearsal

- Cognitive rehearsal = Planning ✔
- Psychomotor rehearsal = Hands-on ✔
- Crew Resource Management = Team ✔



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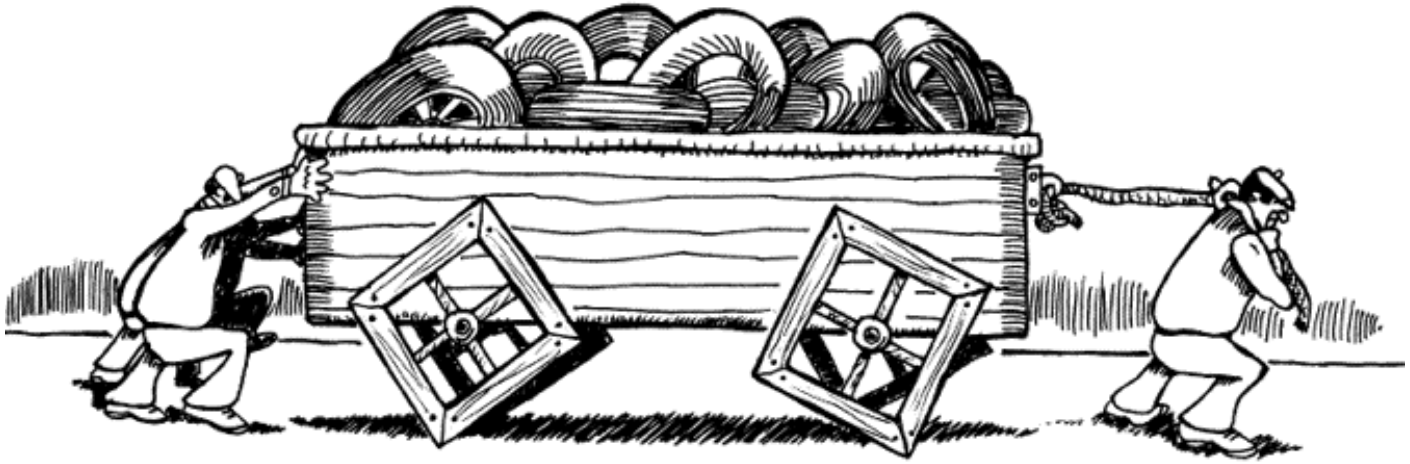
RCT EC/2012/412

- *Primary* objectives
  - Technical parameters
  - Number of errors (ICECAP)
- *Secondary* objectives
  - Realism
  - Team satisfaction
  - Technical and clinical success rate



Why use **Square Wheels**?
Round Wheels already exist!

"…medicine is a ***team*** sport, with two exceptions: people's lives depend on it and there are no coaches."

In sports, when the team loses, the whole team loses, but in medicine, ***only*** the patient loses.

Atul Gawande