Results from ERUS curriculum

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University of Eastern Piedmont, Novara, Italy
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ERUS 2014
The EAU Robotic Urology Section
17-19 September, Amsterdam, The Netherlands
The Halstedian concept
“see one, do one, teach one”
should evolve

The human body is not the ideal
training module
MODERN SURGICAL TRAINING

We need to develop standardized and validated training curricula in minimally invasive surgery.
Fundamental Skills of Robotic Surgery: A Multi-institutional Randomized Controlled Trial for Validation of a Simulation-based Curriculum

Andrew P. Stegemann, Kamran Ahmed, Johar R. Syed, Shabnam Rehman, Khurshid Ghani,

Fundamentals of robotic surgery: a course of basic robotic surgery skills based upon a 14-society consensus template of outcomes measures and curriculum development

Robotic surgery basic skills training: Evaluation of a pilot multidisciplinary simulation-based curriculum

Kirsten Foell, MD; Antonio Finelli, MD, MSc, FRCSC; Kazuhiro Yasufuku, MD; Marcus Q. Bernardini,
PILOT STUDY I
2013

3 months
Jun-Aug 2013

BASELINE SKILLS EVALUATION
(Virtual reality simulation/Dry lab)

E-learning module
Operating room observation
(bedside-console)

SIMULATION-BASED TRAININGS
(one-week intensive course)

Virtual reality simulation
Dry lab
Wet lab

MODULAR CONSOLE TRAINING

TRANSITION TO FULL PROCEDURAL TRAINING
(Video recording of a full case of RARP)

FINAL SKILLS EVALUATION
(Virtual reality simulation/Dry lab)
METHODS

ROBOTIC FELLOWSHIP LEARNING CURVE
12 WEEK TIMELINE

BASELINE ASSESSMENT
- Simulator Test
- Skill Drills Test

ORSI INTENSIVE TRAINING
- Theoretical Exam
- Simulator Skill Drills
- Wet & Dry Lab Cadaver/Training Live-Surgery

FINAL EVALUATION
- Full RARP
- Theoretical and Practical Exam

SKILL DEVELOPMENT
- Simulator & Dry-Lab E-Learning eBRUS

CONSOLE MODULAR TRAINING
- 12 Step Procedure Prostatectomy
- Simulator & Dry-Lab
Participating fellows / institutions

F. Audenet       A. Briganti       M. Brown
V. De Marco      M. Gan           M. Janssen       R. Navarro
M. Oderda        R. Sanchez Salas  E. Wit
<table>
<thead>
<tr>
<th></th>
<th>EXERCISE</th>
<th>PLATFORM</th>
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<tr>
<td>1</td>
<td>Robotic docking</td>
<td>Skills drill</td>
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<td>2</td>
<td><strong>Ring rollercoaster 3</strong> (endowrist use)</td>
<td>Skills drill</td>
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<td><strong>Running suture</strong> (suturing)</td>
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<td><strong>Match board 2</strong> (endowrist use)</td>
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<td><strong>Energy switch 2</strong> (energy/dissection)</td>
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<td><strong>Thread the rings</strong> (needle control)</td>
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<td><strong>Suture sponge 2</strong> (needle driving)</td>
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<td><strong>Dots and needles 1</strong> (needle driving)</td>
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<td>11</td>
<td><strong>Tubes</strong> (needle driving)</td>
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<td>12</td>
<td><strong>Interrupted suturing</strong> (suturing)</td>
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8/10 fellows are deemed able to perform a RARP alone
3/10 fellows are deemed able to perform a complex RARP alone
10/10 fellows submitted an unedited full RARP case.

The videos were divided in 9 segments (surgical steps). Each segment was assessed by 2 independent blind reviewers.

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<th>instrument use</th>
<th>dangerous</th>
<th>in competent</th>
<th>safe</th>
<th>masterful</th>
<th>NA</th>
<th>entering instruments blindly</th>
<th>several attempts</th>
<th>identifying anatomy</th>
<th>no bleeding, instruments in sight</th>
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<td>laborious</td>
<td>safe</td>
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<td>uncontrolled movements</td>
<td>repeated attempts</td>
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<td>errors</td>
<td>bleeding</td>
<td>minor bleeding</td>
<td>minimal bleeding</td>
<td>no bleeding</td>
<td>NA</td>
<td>tissue avulsion, damage organs</td>
<td>occasional bleeding, no damage</td>
<td>minimal damage</td>
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<tr>
<td>end result</td>
<td>damage of organs</td>
<td>inadequately performed</td>
<td>sufficient</td>
<td>Masterful</td>
<td>NA</td>
<td>bladder, prostate, bowel etc.</td>
<td>urologist took over</td>
<td>ready for the next step</td>
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</table>
# FULL RARP CASE ASSESSMENT

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<tr>
<th>Fellow</th>
<th>Bladder detachment</th>
<th>Endopelvic fascia incision</th>
<th>DVC ligation</th>
<th>Bladder neck incision</th>
<th>Dissection seminal vesicles</th>
<th>Dissection prostatic pedicles</th>
<th>Dissection NV bundles</th>
<th>Dissection apex</th>
<th>Urethrovesical anastomosis</th>
<th>Mean</th>
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| Exp 1  | 13                 | 12.5                      | N/A          | 11.5                  | 12                          | 13.5                        | 13                   | 12             | 14.5                      | 12.8 |
| Exp 2  | N/A                | 12                        | 15           | 14                    | 14                          | 13.5                        | 13.5                 | 14             | 15.5                      | 13.9 |
## FULL RARP CASE ASSESSMENT

<table>
<thead>
<tr>
<th>Surgical step</th>
<th>Total Score fellows (mean)</th>
<th>Total score &lt;10 Fellows (No)</th>
<th>Total Score experts (mean)</th>
</tr>
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<tbody>
<tr>
<td>Bladder detachment</td>
<td>11.8 (11-14)</td>
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<td>13.5 (13-14)</td>
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<tr>
<td>Endopelvic fascia incision</td>
<td>11.6 (10-15)</td>
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<td>12.5 (12-13)</td>
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<td>Ligation dorsal vein complex</td>
<td>10.6 (8-12)</td>
<td>1</td>
<td>15 (14-16)</td>
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<td>Bladder neck incision</td>
<td>11 (7-12)</td>
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<td>12.8 (11-16)</td>
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<td>Dissection of seminal vesicles</td>
<td>10.4 (7-13)</td>
<td>3</td>
<td>13 (10-16)</td>
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<td>Dissection of prostatic pedicles</td>
<td>10.5 (7-15)</td>
<td>3</td>
<td>13.5 (11-16)</td>
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<tr>
<td>Dissection of neurovascular bundles</td>
<td>10.9 (5-16)</td>
<td>3</td>
<td>13.3 (11-16)</td>
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<tr>
<td>Dissection of apex/urethra</td>
<td>10 (5-14)</td>
<td>3</td>
<td>13 (8-16)</td>
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<tr>
<td>Urethro-vesical anastomosis</td>
<td>12.4 (9-16)</td>
<td>1</td>
<td>15 (13-16)</td>
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</tbody>
</table>
What is your overall evaluation of this fellowship?

100%

Was this fellowship successful in improving your robotic skills?

30% 70%

Was this fellowship successful in improving your console exposure?

30% 70%

Would you recommend this fellowship to other colleagues?

10% 90%

1: Very poor, not at all  2  3  4  5: Excellent, absolutely yes
PILOT STUDY II (2014)

• Longer training period (6 mos vs. 3 mos)
• Higher number of participants (16 vs. 10 fellows)
• Strict requisites for selection of centres
• Minimal requirements for modular training
• Specific training + initial and final assessment of non-technical skills in a simulated OR environment
ERUS pilot study II
Study flow chart

**A**

**BASELINE SKILLS EVALUATION** (VR) of the participants
- ORSI (Dry lab) / OLV Hospital (OR UV anastomosis) / Non-technical skills

**B**

- E-learning Module
- Operating Room observations at local institutions (bedside / console)

**C**

**SIMULATION-BASED TRAINING** (one-week intensive course)
- ORSI (Wet-lab) (SIMULATED OR – non-technical skills)

Theoretical session – basics of robotic surgery

Video-recording of all simulation training

- **Virtual reality simulator / Dry lab**
  - Virtual reality Dry lab – basic exercises

- **OR (Non-technical skills training / UV asastomosis model)**
  - UV asastomosis Briefing and debriefing

- **Wet lab**
  - Trocar placement
  - Dissection
  - RALP
  - RAPN / RARP
  - RARC
MODULAR TRAINING (Full log of training steps) – Assessment of each step / procedure by the mentor (To construct learning curve)

Transition from Modular Training to FULL PROCEDURAL TRAINING - Assessment of each step / procedure by the mentor (To construct learning curve)

FINAL SKILLS EVALUATION (VR) of the participants ORSI (Dry lab) / OLV Hospital (OR UV anastomosis) / Non-technical skills

6 months
Requested modular training

- Bladder detachment: 20 cases
- Endopelvic fascia incision (if performed): 20 cases
- Bladder neck incision: 15 cases
- Section of vasa and preparation of SVs: 15 cases
- Dissection of the posterior plane: 10 cases
- Dissection of the prostatic pedicles: 10 cases
- Dissection of neurovascular bundles: 5 cases
- Ligation of Santorini plexus (if performed): 10 cases
- Apical dissection: 10 cases
- Urethro-vesical anastomosis: 15 cases
Adopted outcome parameters

- Da vinci skills simulator (Matchboard 2, Energy switch 2, Ring walk 3, Suture sponge 2, Tubes)
- Global Evaluative Assessment of Robotic Surgery (GEARS)
- Non-Technical Skills for Surgeons (NOTSS) System
- Revised Non-technical skills (NOTECHS) scale
- Anastomosis score
- RARP checklist
- RARP procedure-specific scoring scale for video assessment

Participating institutions
Participating institutions
Academic position

Staff member: 47%
Fellow: 35%
Resident: 18%
Prior involvement with robotic surgery

- Median involvement 12 mo (IQR 2 – 33)
- Median involvement in table assistance 10 mo (IQR 2 – 33)
- Median involvement in table assistance 50 case (IQR 12 – 200)
- No involvement at console for 10 guys
- Minimal involvement at console for the other 7 (median 6 mo and 10 cases, mainly bladder detachment, endopelvic fascia incision, bladder incision)
Fellows activities during Pilot study II

>1000 sessions recorded
GEARS domains median scores

All p values < 0.05
NOTSS median scores

- Situation awareness: Baseline 2, Final 3
- Decision making: Baseline 3, Final 3
- Communication and teamwork: Baseline 2, Final 3
- Leadership: Baseline 2, Final 3

* p value 0.05
Other p values < 0.05
NOTECHS median scores

- Communication and interaction: Baseline 12.75, Final 17
- Situation awareness: Baseline 5.5, Final 9
- Team skills: Baseline 12, Final 21
- Leadership and management skills: Baseline 13, Final 19
- Decision making: Baseline 15, Final 20

*p value <0.05
dVSS median overall scores

- Matchboard 2: Baseline 70, Final 91
- Energy switch 2: Baseline 85, Final 93
- Ring walk 3: Baseline 58, Final 82
- Suture sponge 2: Baseline 86, Final 95 (p value 0.05)
- Tubes: Baseline 54, Final 91

* p value 0.05
Other p values < 0.05
dVSS median time to complete

All p values < 0.05
### Scores RARP full case

<table>
<thead>
<tr>
<th>Fellows</th>
<th>Bladder detachment</th>
<th>Endopelvic fascia</th>
<th>DVC</th>
<th>Bladder Neck</th>
<th>Vasa and SV</th>
<th>Pedicles</th>
<th>NVBs</th>
<th>Apex</th>
<th>Anastomosis</th>
<th>Mean score</th>
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Range 4-16; ≥10 was considered safe
Conclusions

• The curriculum was effective in improving technical and non-technical skills of the fellows as assessed by most of the validated questionnaires adopted
• Major improvements in dVSS parameters were demonstrated
• Review of the RARP full case demonstrated that RARP was performed in a safe way by most of the fellows (87%)
• The 2 only “insufficient” fellows were young residents
• Further predictive analysis to come (unlikely to identify predictors due to the small sample size)
Acknowledgements
Fantastic friends involved
Video reviewers

Giacomo,
I'm doing it. It takes ages!
Will get it done by Sunday.