Methodist Cardiovascular Fellows' Bootcamp
Jean Bismuth, MD, Methodist Hospital, Houston, TX

Introduction to Academic Vascular Surgery
Murray Shames, MD, University of South Florida Morsani, Tampa, FL

FVS at LSU Course
Malachi G. Sheahan, III, MD, LSU Health Sciences Center School of Medicine, New Orleans, LA

ABSTRACT: Advanced Vascular Surgery Surgical Skills and Simulated Assessment Program for Senior Vascular Surgery Trainees
Mark A. Mattos, MD, Michigan Vascular Center, Flint, MI and O. William Brown, MD, William Beaumont Hospital, Royal Oak, MI

Toronto Simulation Course
Jonathan Cardella, MD, Yale-New Haven Medical Center Program, New Haven, CT

ABSTRACT: REHEARSAL Using Patient Specific Simulation to Improve Endovascular Efficiency
Matthew Wooster, MD, University of South Florida Morsani, Tampa, FL

ABSTRACT: Resident Perspectives on Feedback Before and After the Introduction of a Mobile Assessment Tool
April Rodriguez, MD, Niten Singh, MD, and Elina Quiroga, MD, University of Washington, Seattle, WA

Adam Tanious, MD, Matthew Wooster, MD, Andrew Jung, BA, Peter Nelson, MD, and Murray Shames, MD, University of South Florida Morsani, Tampa, FL

ABSTRACT: Use of Mock Oral Exams in Vascular Surgery Training Programs – A Nationwide Survey
Matthew R. Smeds, Rose An, Katherine Kimbrough, and Mohammed M. Moursi, University of Arkansas for Medical Sciences, Little Rock, AR

Open Vascular Surgery Project
Howard Champion, MD, SimQuest, Boston, MA
The Cardiovascular Fellow’s Bootcamp

Houston Methodist Hospital

Jean Bismuth, MD FACS
Associate Professor
Houston Methodist Hospital
Houston, TX
<table>
<thead>
<tr>
<th>Educational Concept</th>
<th>Description</th>
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<tbody>
<tr>
<td>Teach early</td>
<td>Maximal duration of benefit within the program</td>
</tr>
<tr>
<td>Teach the basics</td>
<td>This is about broadly elevating cardiovascular knowledge</td>
</tr>
<tr>
<td>Teach broadly</td>
<td>Broad and shallow rather than focused and in-depth</td>
</tr>
<tr>
<td>Teach multiple cardiovascular</td>
<td>A great deal of this core curriculum is of broad value to all cardiovascular</td>
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<tr>
<td>disciplines</td>
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We are pleased to invite your fellows to attend the eighth annual Cardiovascular Fellows’ Bootcamp. Bootcamp will provide hands-on training along with two days of succinct lectures, all designed to understand the fundamentals of cardiovascular disease and management. This course consists of two tracks: vascular and cardiology/cardiac. This event is held early in the year so that trainees can obtain a rapid précis of the basic skills that are required to make them competent fellows. Past attendees have found this course valuable and highly beneficial.

events.houstonmethodist.org/2016CVFellowsBootcamp
• Course started in 2009
• Initially didactic, skills lab introduced in 2011
• First year only 50 participants were taken
• This quickly grew to 150 the second year
• Currently run parallel agendas for Cardiology and Cardiac Surgery (some didactics overlap)
Overview
Cardiovascular Fellows’ Bootcamp

- Tracks: Vascular Surgery & Cardiology/Cardiac
- Audience: Residents entering a CV fellowship
- Duration: 2 ½ day crash course
- Agenda: 1 day hands-on training, 1 ½ days didactics
Overview
Cardiovascular Fellows’ Bootcamp

Hands-on training at Methodist Institute for Technology, Innovation & Education (MITIE)

Didactics at boutique hotel - Hotel ZaZa
Vascular Agenda: Day 1
Cardiovascular Fellows’ Bootcamp 2016

REGISTRATION: Thursday, August 18 • 4:30-7:30 p.m. • Hotel ZaZa, Phantom Pre-Function
FRIDAY, AUGUST 19 • Moderator: Alan B. Lumsden, MD

6:00 a.m. Skills Lab Registration (Hotel ZaZa: Phantom Pre-Function) • Breakfast (Hotel ZaZa: Hemingway/Deja Vu Rooms)
7:00 Board buses to MITIE facility • Hotel ZaZa • Registration desk
7:30 Arrive at MITIE for Debriefing Sessions with Jean Bismuth, MD • change attire
8:00 VASCULAR SKILLS LAB • Houston Methodist MITIE
5:00 p.m. Board buses to Hotel ZaZa
6:30 Jeopardy-Social • Hotel ZaZa • Phantom Ballroom A
7:30 Evening Reception • Hotel ZaZa • Texas Tycoon Suite/12th Fl. (sponsored by W.L. Gore)
Overview
Cardiovascular Fellows’ Bootcamp

Hands-on training and access to faculty
Overview
Cardiovascular Fellows’ Bootcamp

Hands-on training floor plan

Cadaver Room
A: Abdominal/Visceral; B: Tibial Exposures; C: Carotid/Subclavian; D: Chest Exposures

Open Simulation Room
Trainee Practice Stations
Open Skills (Pulsatile flow models): CEA; Eversion/Patch Angioplasty; Fem-pop bypass; Open AAA repair with Dacron Graft

Endovascular Simulation Room
EVAR: Simbionix Simulators
TEVAR: Pontresina Simulators

EVAR: virtual reality simulators 1 faculty, 2 trainees, 1 tech
TEVAR: pulsatile silicone model; 1 faculty, 2 trainees, 1 tech
SATURDAY, AUGUST 20 | Hotel ZaZa • Phantom Ballroom C
6:30 a.m.  Breakfast
Fountain/Ultimate Ransom

LOWER EXTREMITY ARTERIAL DISEASE  ■  Moderator: Carlos Bechara, MD
7:00 a.m.  Radiation Safety
Carlos Bechara, MD
Michael B. Silva, MD
John M. Buerger, MD
Charudatta Bavare, MD
Erica L. Mitchell, MD
Rahib Chae, MD
Brian DeRubertis, MD
John Eid, MD
Jason Lee, MD
William T. Bohannon, MD
Vijay Nambi, MD
Phantom Pre-Function

8:15 a.m.  Endovascular Interventions
8:30 a.m.  Open Interventions-Grafts and Techniques
8:45 a.m.  Amputations
9:00 a.m.  Compartment Syndromes
9:15 a.m.  Lower Extremity Aneurysms
9:30 a.m.  Medical Management
9:45 a.m.  Break

CEREBROVASCULAR DISEASE  ■  Moderator: John Eidt, MD, MD
10:00 a.m.  Neurovascular Anatomy, Physiology and Carotid Imaging
John Eidt, MD
John Volpi, MD
David Rigberg, MD
Carlos Bechara, MD
Charudatta Bavare, MD

10:15 a.m.  Diagnosis and Medical Management of Stroke
10:30 a.m.  Open Surgical Management of Carotid and Vertebral Stenosis
10:45 a.m.  Endovascular Management of Carotid and Vertebral Stenosis
11:00 a.m.  Carotid Body Tumors

SATURDAY, AUGUST 20 (CONTINUED)
VISCERAL-RENAL ARTERY DISEASE  ■  Moderator: David Rigberg, MD
11:15 a.m.  Anatomy and Physiology
Carlos Bechara, MD
Michael B. Silva, MD
John M. Buerger, MD
Charudatta Bavare, MD
Erica L. Mitchell, MD
Rahib Chae, MD
Brian DeRubertis, MD
John Eidt, MD
Jason Lee, MD
William T. Bohannon, MD
Vijay Nambi, MD
Phantom Pre-Function

11:30 a.m.  Management of FMD
11:45 a.m.  Management of Occlusive Disease of Visceral/Renal Arteries
Noon  Management of Aneurysmal Disease of Visceral/Renal Arteries
12:15 p.m.  Lunch

AORTIC ANEURYSM DISEASE  ■  Moderator: Mitul Patel, MD
1:00 p.m.  Anatomy and Physiology of the Aorta
Rahib Chae, MD
Mitul Patel, MD
Jason Lee, MD
Alan B. Lumsdon, MD
Gregory Pearl, MD

1:15 p.m.  Diagnosis and Imaging of Thoracic and Abdominal Aortic Aneurysms
1:30 p.m.  Medical Management of Abdominal Aortic Aneurysms
1:45 p.m.  Endovascular Management of Abdominal Aortic Aneurysms
2:00 p.m.  Open Surgical Management of Abdominal Aneurysms

THORACIC AORTIC ANEURYSM DISEASE  ■  Moderator: Jean Bismuth, MD
2:15 p.m.  Traumatic Aortic Injury
Ali Azizadeh, MD
Brian DeRubertis, MD
2:30 p.m.  Endovascular Management of Thoracic and Thoraco-Abdnominal Aortic Aneurysms
Al A B. Lumsdon, MD
Jean Bismuth, MD

2:45 p.m.  Open Surgical Management of Thoracic and Thoraco-Abdnominal Aortic Aneurysms
3:00 p.m.  Management of Aortic Dissection
3:15 p.m.  Break

LOWER EXTREMITY VENOUS DISEASE  ■  Moderator: Michael B. Silva, MD
3:30 p.m.  Anatomy and Disease
Claudie Sheahan, MD
David Rigberg, MD
Michael B. Silva, MD
Mitul Patel, MD
Ulises Baltazar, MD
Houssem Younes, MD
Alan B. Lumsdon, MD
Black Label Suite (12th Fl.)

3:45 p.m.  Diagnosis DVT and PE
4:00 p.m.  Management of Anticoagulation and Venous Thrombolysis
4:15 p.m.  Diagnosis and Management of Varicose Veins
4:30 p.m.  Diagnosis and Management of Deep Venous Incompetence
4:45 p.m.  Management of PE
5:00 p.m.  Diagnosis and Management of AVFs
Follow Up Content on DICET YouTube
Cardiovascular Fellows’ Bootcamp 2016

https://www.youtube.com/c/DeBakeyInstituteForCardiovascularEducationTraining
Course Pitfalls and Strengths

• Cost
• Needs assessment - know your target audience
• Playing in the sandbox with others is great but...

• Know your faculty, they make the course
• Make it as painless as possible for faculty
• Start small, don’t be too ambitious
• Need other courses to complement (Finishing School and Pre-Intern)
History

Initiated in 2012 to coincide with opening of our simulation center.
Content

- Vascular surgery skills
  - Open
  - Endo
- Fundamentals of research
  - Actual oral presentations
Attendees'

Abstract invitation to all Vascular PD’s
– Medical students
– GS Residents
– VS Residents
– VS Fellows
Meeting Requirements

- All applicants required to submit abstract
- Peer review, 40 applicants selected to attend
- 18 Abstracts selected for presentation competition
  - 6 students
  - 6 GS residents
  - 6 VS residents/fellows
Faculty

- 10-15 faculty
- 4-5 local
- 10 national
  - FVS/FEVS faculty
Funding

- 100% Industry funded through educational grants
- Budget approximately $125K
- All travel/ accommodation/meals coordinated through simulation center
- Industry donation includes: financial support, technical support, simulators, prosthetic grafts, porcine aortic tissue/cadaver veins etc.
Agenda

3 Day meeting

- Day 1: IAVS didactics + Sim session
- Day 2: Sim session + IAVS didactics
- Day 3: Abstract competition
  - Reception and prizes
Didactic Agenda

The ideal research environment
How to get started in research - clinical/translational
How to get started in research - basic science
Finding a mentor
Finding an idea
Funding your research - time and dollars
Research during residency

IRB and human subjects issues
Clinical research - data collection
Basic science - documentation and the lab notebook
Basic statistics
Advanced statistics

So you want to publish a paper
Writing an abstract
Creating a poster
The 10 minute talk
Effective use of PowerPoint
Writing a manuscript
Peer review

What does an academic career mean
Academics and the VA
Constructing and maintaining a proper CV
Multicenter clinical trials
A career as as an educator

My Journey:
IAVS Simulation Agenda

**Group 1 (FVS)**
- Explanation of "Clock Face" Face Skills Trainer
- "Clock Face" skills workshop
- Explanation of the "Patch" Skills Trainer
- Patch skills workshop
- Explanation of "End-to-Side" Skills Trainer
- End-to-side skills workshop

**Group 2**
- EVAR/TEVAR - Symbionix
- Symbionix - FEVS skills assessment
- Open aneurysm repair - Maquet model
- REVAR Simulation – Compass
- Hansen Robot Demo
- Overview of Hybrid Room
Vascular Surgery Skills

Porcine Aorta
– End-end anastomosis
CAMLs - Virtual Patient Care Center
FVS – Skills Assessment
Surgical Skills - FVS
Basic Skills
Endo Skills Training
Open Surgical Models
Open and Endovascular AAA repair
Anatomic Models
Fem-pop bypass
CAMLs - Hybrid Endosuite
RAAA Model - Medtronic
Abstract Competition

- Immediate feedback
- Judged on content, style, slide quality, public speaking.
- Judged in 3 groups and overall
- $ Prizes for winners
Feedback

- Overall very positive
- Enjoyable and valuable experience
- Would like more time with faculty
- More simulation time
- More statistics
- More info on how to set up for research time in residency
- Reorganize lectures to allow time to edit talks for Saturday
Evaluations

Were the Friday lectures helpful specifically for your abstract presentation?

1. Yes: 17 (71%)
2. No: 0 (0%)
3. Non-Applicable: 7 (29%)
Total Responses: 24
Mean: 1.58  Standard Deviation: 0.93

Did you change anything based on the Friday lectures?

1. Yes: 16 (70%)
2. No: 1 (4%)
3. Non-applicable: 6 (26%)
Total Responses: 23
Mean: 1.57  Standard Deviation: 0.90
Evaluations

IAVS 2015 Evaluations Report

Skills Lab and Simulators

1. Poor 0 0%
2. Fair 0 0%
3. Good 1 4%
4. Very Good 2 8%
5. Excellent 21 88%

Total Responses: 24
Mean: 4.83  Standard Deviation: 0.48

Faculty

1. Very Dissatisfied 0 0%
2. Dissatisfied 0 0%
3. Neutral 0 0%
4. Satisfied 8 33%
5. Very Satisfied 16 67%

Total Responses: 24
Mean: 4.67  Standard Deviation: 0.48
Evaluations

Peers

1. Very Dissatisfied: 0 (0%)
2. Dissatisfied: 0 (0%)
3. Neutral: 0 (0%)
4. Satisfied: 3 (12%)
5. Very Satisfied: 21 (88%)
Total Responses: 24
Mean: 4.88  Standard Deviation: 0.34

Exhibitors/Sponsors

1. Very Dissatisfied: 0 (0%)
2. Dissatisfied: 0 (0%)
3. Neutral: 2 (8%)
4. Satisfied: 5 (21%)
5. Very Satisfied: 17 (71%)
Total Responses: 24
Mean: 4.62  Standard Deviation: 0.65
Conclusions

- Valuable learning experience
- Unique opportunity for research/presentation simulation
- Open and endo simulation
- Direct interaction with faculty
Fundamentals of Vascular Surgery at LSU

Malachi Sheahan, MD
Claude C. Craighead Jr., Professor and Chair
Division of Vascular and Endovascular Surgery
Louisiana State University Health Sciences Center
New Orleans, LA
European Vascular Workshop
Pontresina

Basistechniken der Gefäßchirurgie
Handbuch Kurs I
Well attended
Some evidence for technique improvement
Rated highly by attendees

Paved the way for enhanced simulation devices
Pontresina - Cons

- Mostly funded by attendees
- Remote location
- Temporary facility
- Endo simulation primitive
No formal assessment of skill
Formed ad hoc Simulation Committee
2010 – Rolled into Education Committee
The Center for Advanced Practice
- 30,000 square feet
- 4 simulation ORs
- Computer center
- Reception/meeting rooms
- ACS Accredited Education Institute
Fundamentals of Vascular Surgery at LSU
Feb. 14-16, 2013
New Orleans, LA
I AM SUCCESS!!
• 26 Trainees (21 0+5, 5 Fellows)
• Airfare and tuition covered
• Objective scoring given back to respective programs
3 days
Endovascular and open simulation training
Skill testing
New skill incorporation
  • Cardiac cath skills
  • Neuroradiology
  • Embryology
8 Instructors/Examiners
  • Predominantly APDVS members
13 LSU Faculty
Anatomy Lab

- Femoral/Popliteal/Tibial
- Carotid/Subclavian
- Thoracoabdominal exposure
- Thoracic aortic repair
- Aortoiliac exposure
Day 2

- AM - Skill Testing
  - Three models
Fundamentals of Vascular Surgery
The Clock Face Model
PM - Skill Stations

1. Carotid and Renal Interventions
2. Radiation Safety
3. Coronary Interventions
4. TEVAR/EVAR
5. EVAR Measurement
6. Suturing with the Experts
Day 3

- Lecture series
  - Radiation safety
  - Neurovascular anatomy
  - CT imaging
  - Embryology
- NAIS model with cryo vein
- Feedback session
Benefits to Program Directors

- External feedback on trainee performance
- Opportunity to modify training and correct deficiency
- Help fulfill simulation training requirement
Feedback

- 1. Direct assessment on three models
- 2. Final product assessment on three models
- 3. EVAR measurement
- 4. One on one skill assessment – descriptive
- 5. Resident self assessment
Benefits to attendees

- Skill feedback
- Radiation safety
- Coronary interventions
- CTA interpretation
- Complex open exposures
- Open aortic repair
Pre and post self assessments:

- Significant improvement in:
  - Anatomic knowledge
  - Carotid stent proficiency
  - Renal stent proficiency
  - EVAR measurements
  - EVAR placement
  - Coronary anatomy
  - Neurovascular anatomy
Amazing!
- PGY 3

Best part of the course!
- PGY 6

Need more!
- PGY 2

More, more, more!
- PGY 3
Highest rated

- Suturing with the experts
- EVAR measurement
- NAIS
Coronary interventions

I don’t want to be a cardiologist.
-PGY 1

Why was this necessary?
-PGY 4

What the heck?
-PGY 1
THE FVS EXAM

...no feedback was given...
- PGY 7

...stressful...
- PGY 2

Should have been at the end.
- PGY 3

...didn’t learn anything.
- PGY 2
Was this activity helpful? (1-7)

- 2013 4.2 31
- 2014 6.1 12
- 2015 3.9 29
- 2016 6.4 6
Thank you
Advanced Vascular Surgery Surgical Skills and Simulation Assessment Program

Mark A. Mattos, MD
Michigan Vascular Center-Michigan State University, Flint, Michigan

O.W. Brown, M.D.
William Beaumont Hospital-Oakland University , Royal Oak, Michigan

Presented at the 2016 APDVS Spring Meeting, April 1-2, 2016
Loews Chicago O’Hare Hotel, Guggenheim ½ Room, Rosemont, Illinois
Disclosures

• Nothing to Disclose
Competence in Vascular Surgery

• Cognitive Competence
  – Determined by oral and written examinations administered by the Vascular Surgery Board

• Technical Competence
  – Determined solely by subjective assessment from faculty members of the vascular trainees institution
Begs the Questions….?

Should there be a Technical Skills Component to the Vascular Surgery Board Certification Process?

How Do We Get There?
Educational Goal

Determine feasibility to perform objective evaluation of advanced vascular skills of senior vascular trainees

High-fidelity Simulation Models

Independent Board-certified Faculty Proctors

Multiple Skills Assessment Instruments
Are You Ready to Practice Vascular Surgery?

January 7-9, 2016
Marcia & Eugene Applebaum Surgical Learning Institute
William Beaumont Hospital, Royal Oak, Michigan
Program Content

• 2.5 Day Course

• Open Vascular Skills Performance Sessions

• Endovascular Skills Performance Sessions

• Didactic Lectures

  – Vascular Society-specific, Practice-based
Program Content

• Index vascular surgical procedures
• Industry-based skills and simulation models
• Procedure-specific Assessment Instruments
Trainee Participants

• PGY-7 Vascular Fellows (16)
• PGY-5 Vascular Residents (3)
• Midwest Region (14)
• Invited Regions (5)
  – Southeast
  – Southwest
  – East
Faculty Proctors

• 25 Vascular Surgery Faculty
  – Local, Regional, National
  – Board Certified, Education-Interested

![Image of faculty members]
Program Environment

- 25 skills performance stations
- 12 assessment sessions
- Vascular trainees perform 12 simulated procedures
  - rotate station to station
- 60 minutes per assessment session
10 Industry Simulation Partners

GORE

Medtronic

MAQUET

ENDOLOGIX

Abbott

A Promise for Life

mentice

BARD | PERIPHERAL VASCULAR

SIM • VIVO

CryoLife®

B-LINE MEDICAL
5 Simulated Open Vascular Procedures

- Open Repair AAA
- Carotid Endarterectomy with patch
- Femoral-Popliteal Artery Bypass
- Hemodialysis Access Placement
- Mismatched End-to-Side Anastomosis
Simulated Open Vascular Procedures
7 Simulated Endovascular Procedures

- EVAR
- TEVAR
- Carotid Artery Angioplasty and Stenting
- Renal Artery Angioplasty and Stenting
- Iliac Artery Angioplasty and Stenting
- Superficial Femoral-Popliteal Artery Angioplasty and Stenting
- Percutaneous Closure
Simulated Endovascular Procedures
Simulated Endovascular Procedures
Assessment Methodology

- Single vascular faculty proctor (1:1)
- Faculty are “passive” 1st assistants
- 4 operative assessment instruments
- Immediate feedback to trainee
- Comprehensive summative feedback to program directors
1. Global Rating Scale Score
2. Global Rating Scale Summary
3. Critical Task Completion Performance
4. Critical Task Time Time Measurements
Standards of Proficiency*

1. **Global Rating Scale Score:**
   1. >80% of maximum possible score

2. **Global Rating Summary Score**
   1. Level 4 or Level 5 Performance

3. **Critical Task Completion Performance:**
   1. 100% completion of all critical skill tasks

4. **Critical Task Time Measurements**
   1. 100% completion of all measurable procedural skill tasks under procedure-specific time limit
Proficiency Rating*

- Performance = Proficient vs. or Not Proficient
- 4 Individual Proficiency Assessment Ratings
- 1 Collective Proficiency Assessment Rating

*Faculty-derived performance standards - Not validated
Brief Results

• 202 Procedural Assessments Performed

• Proficiency ratings were variable
  – 83% Global Rating Scale
  – 75% Global Rating Summary
  – 49% Critical Task and Time Performance
  – 47% Collective Proficiency
Brief Results

• Assessment reporting errors or omissions
  – 18%

• Endovascular simulator malfunction
  – 4%

• Open simulator malfunctions
  – Unable to determine
Video Assessment - Metric Validation

- 6 Assessment Stations
- 72 Procedures videotaped
Lessons Learned

- Inconsistency in Faculty Assessments

- Differences in faculty opinions regarding milestone metrics for simulated vascular procedures

- Determining optimal time limits for performance, assessment and feedback of simulated procedures
Lessons Learned

- Small but defined failure rates of simulators
- Logistical Issues regarding performing assessments simultaneously on 2 floors
- Logistical Issues regarding trainees and faculty changing assessment stations at the same time
Plans for 2017 Program

- Add 6 Senior Vascular Trainees (25)
- Add 10 Vascular Faculty Proctors (35)
- Add 5 New Industry Sponsors (15)
- Add 3 New Simulation Stations (25)
- Add 3 New Skills Assessments (15)
- Add Assessment Training Session for faculty
- Formalizing Assessment Instruments
Conclusion

- Feasible to perform objective assessment of senior vascular surgery trainees using various evaluation instruments

- Simulation models exhibited good durability and consistency, and appear useful for assessment for assessment of advanced vascular surgical skills

- Data from this initial feasibility program can be used to determine reproducible objective assessment metrics
Conclusion

These assessment metrics, once validated serve as foundation for a technical competence examination in vascular surgery.
Canadian Endovascular Skills Course

Jonathan A. Cardella, MD, FRCS
Assistant Professor
Section of Vascular Surgery
Yale University
Canadian Endo Skills Course (CESS)

- 27 Residents and Fellows representing all programs in Canada
- Location: Toronto
- Duration: 2 Days
- Cost to Trainee: $0 (Industry)
- Actual Cost: $30k + Faculty
Course Format

• Lectures: VERY SHORT and over a Meal
  – Case Planning
  – Devices and Techniques
  – Radiation Safety
  – Industry Relationships
Practical Sessions

• Simulators
  – 2 Mentice simulators and 1 Simbionix
  – Proctored Iliacs and SFA

• Pig models
  – U/S Guided Access
    • Micropuncture technique
    • Closure Devices
  – Interventions
    • Up and Over, Angioplasty, Renal Stenting, Carotids, Viabahns, Onyx Glue, Coils
Things Done Well

- Cost neutral for programs and residents
- Porcine endo cases are fun!
- Every major company represented
- Use all devices
- Heavy on doing, Light on sitting
Adjustments to make

• Bigger pig is a better pig!
  – 50 kg or greater
• Probably less wet lab and more porcine
• Fewer trainees and more instructors
• Timing of Course
• Should have studied as intervention

• Use of animals for open!
REHEARSAL Using Patient Specific Simulation to Improve Endovascular Efficiency

Mathew Wooster, Adam Doyle, Sean Hislop, Roan Glocker, Paul Armstrong, David Gillespie, Michael Singh, Karl Illig

APDVS Spring Meeting
Chicago, IL
April 2016
REHEARSAL:
CONFLICTS OF INTEREST

• None
REHEARSAL:
Background

• “Surgical skills simulation”
REHEARSAL:
Background

Warm-up in a Virtual Reality Environment Improves Performance in the Operating Room

Dan Calatayud, MD,* Sonal Arora, MBBS,† Rajesh Aggarwal, PhD,† Irina Kruglikova, MD,‡ Svend Schulze, DSc,* Peter Funch-Jensen, DSc,‡ and Teodor Grantcharov, PhD§

An Approach to EVAR Simulation Using Patient Specific Modeling

Gavin R. Davis, Karl A. Illig, George Yang, Thu-Hoai Nguyen, and Murray L. Shames, Tampa, Florida
REHEARSAL:
Objective

• To determine if the use of procedural rehearsal by the endovascular surgeon using patient specific simulation prior to performance of the actual procedure improves procedural efficiency and outcomes.
REHEARSAL: Methods

- All patients scheduled for carotid artery stenting who had an adequate CTA were considered for enrollment
- Randomized 1:1 by random number generation
- Control: routine stenting procedure without rehearsal
- REHEARSAL: Patient CTA loaded into Simbionix endovascular simulator and the surgeon simulated the case within 24 hours of the scheduled procedure
- Contrast usage, fluoroscopy time, and timing of procedural steps were recorded by a blinded observer
**Case Data Collection**

<table>
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<tr>
<th>Intervention</th>
<th>Date: / / MHz:</th>
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<tr>
<th>Action</th>
<th>Time to completion (sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arch angi</td>
<td>CCA angi</td>
</tr>
<tr>
<td>Placement of stent sheath</td>
<td>Deployment</td>
</tr>
</tbody>
</table>

Data Recorder: ____________________________

Contrast volume: ____________________________

Fluoroscopy time: ____________________________

EBL: ____________________________

Length of stent: ____________________________

Residual stenosis: ____________________________

Other stent/plasty details: ____________________________

Adverse events: (Yes/No)- explain if yes:

Procedure steps (catheter and wire exchanges):

1. ____________________________
2. ____________________________
3. ____________________________
4. ____________________________
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26. ____________________________
27. ____________________________
28. ____________________________
29. ____________________________
30. ____________________________

Flow of operation: ____/10  Case: ____/10  Proficiency: ____/10

Rehearsal: (Yes/No) Why or why not?

Events related to rehearsal? (Yes/No) What?

Division of Vascular and Cardiothoracic Surgery
## REHEARSAL: Results

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>REHEARSAL</th>
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<tbody>
<tr>
<td>N</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Contrast volume (mL)</td>
<td>76.9 (38-120)</td>
<td>59.2 (29-108)</td>
</tr>
<tr>
<td>Fluoroscopy time (min)</td>
<td>19.4 (9.8-38)</td>
<td>11.4 (5.4-19.8)</td>
</tr>
<tr>
<td>Operative time (min)</td>
<td>42.5 (30.9-69)</td>
<td>31.9 (14.2-54)</td>
</tr>
<tr>
<td>Time to carotid cannulation (min)</td>
<td>23.3 (13.4-30.5)</td>
<td>17 (7.2-30.1)</td>
</tr>
<tr>
<td>Carotid sheath duration (min)</td>
<td>19.2 (11.8-26.5)</td>
<td>14.9 (6.1-23.9)</td>
</tr>
</tbody>
</table>

**All P values > 0.05**
REHEARSAL: Discussion

• Results are limited by small N value
  – Suspect type II error

• The simulator is currently unavailable, hindering further evaluation

• Blind observers *subjectively* identified REHEARSAL cases to have better procedural flow
REHEARSAL: Conclusion

- No statistically significant differences identified

- REHEARSAL group *trended* towards reduced contrast volume and radiation time

- REHEARSAL group *trended* towards reduction in time for ALL operative steps
Resident Perspectives on Feedback Before and After the Introduction of a Mobile Assessment Tool

April L Rodriguez MD, Niten Singh MD, Elina Quiroga MD

Division of Vascular Surgery
University of Washington

APDVS - 2016 Annual Meeting
April 01, 2016
Chicago, IL
Not Giving Feedback? Your Team Isn’t Giving Their Best

- Receive Strength-Based Feedback: Engaged Employees
- Receive Critical Feedback
- Receive No Feedback: Disengaged Employees
Resident and faculty perceptions of effective clinical teaching in family practice.
Gjerde CL, Coble RJ.

Disparity between resident and faculty surgeons' perceptions of preoperative preparation, intraoperative teaching, and postoperative feedback.
Rose JS, Waibel BH, Schenarts PJ.

A comparison of faculty and resident perception of resident learning needs in the operating room.
Pugh CM, DaRosa DA, Glenn D, Bell RH Jr.

Educational feedback in the operating room: a gap between resident and faculty perceptions.
Jensen AR, Wright AS, Kim S, Horvath KD, Calhoun KE.
Feedback

• Discordance between residents and attendings
  – Quantity
  – Quality
Where was the disconnect?

We live in a ratings economy
Mobile assessment tool

- Frequent reminders
- Easy access
- Case specific
<table>
<thead>
<tr>
<th>Date</th>
<th>Procedure</th>
<th>Attending</th>
<th>Comment</th>
<th>Average Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thu, Nov 5 at 11:04 AM</td>
<td>Renal stent</td>
<td>Stames</td>
<td>Very basic endo skills. Need more time with catheters and guide wires. PRACTICE!!</td>
<td>3.0</td>
</tr>
<tr>
<td>Mon, Nov 2 at 4:47 PM</td>
<td>Embolization type ii</td>
<td>Tran</td>
<td>This is a type II endoleak case with microcath. She was helpful. Still need help with needle handling etc. when we repair the brachial artery</td>
<td>1.9</td>
</tr>
<tr>
<td>Mon, Nov 2 at 4:44 PM</td>
<td>Iliac angioplasty and stenting</td>
<td>Tran</td>
<td>Resident did better last week and was prepared. She did not have a plan for today's case. She did not know the type of stent that we will use even though we discussed during Friday conference. I would recommend that resident tries to have a plan of the case as she did last week.</td>
<td>2.6</td>
</tr>
<tr>
<td>Wed, Oct 28 at 9:58 AM</td>
<td></td>
<td>Singh</td>
<td>There is no point in writing everything down if you do not remember to review it. Attention to details makes for a smooth patient encounter versus scrambling to complete tasks. Need to work on this as it is more important than just showing up in the OR.</td>
<td>2.2</td>
</tr>
<tr>
<td>Wed, Oct 28 at 9:55 AM</td>
<td>Angiogram</td>
<td>Singh</td>
<td>Improving endovascular skills. Need to organize an Angio for yourself. That means organizing steps to stand on and practicing good ergonomics and ALARA principles.</td>
<td>2.6</td>
</tr>
<tr>
<td>Mon, Oct 26 at 1:53 PM</td>
<td>Caroid endarterectomy</td>
<td>Tran</td>
<td>Doing much better with pt, prep. Need to work on handling of needles, instruments, and economy of motion. Still rough on tissues. B</td>
<td>2.9</td>
</tr>
<tr>
<td>Wed, Oct 21 at 5:20 PM</td>
<td>Brachiocephalic fistula</td>
<td>Quiroga</td>
<td>Marked improvement this week! You prepared well for the case. Good assessment of anatomy using ultrasound. Continue working on needle positioning/angles, tissue handling.</td>
<td>2.0</td>
</tr>
<tr>
<td>Wed, Oct 21 at 7:06 AM</td>
<td>Angiogram</td>
<td>Singh</td>
<td>Continue to work on basic Angio skills as ultrasound access should be muscle memory</td>
<td>2.6</td>
</tr>
<tr>
<td>Mon, Oct 19 at 5:20 PM</td>
<td>Redo fem tib b</td>
<td>Tran</td>
<td>Came up with good operative plan and email me the night before. Excellent prep and was ready to do the case as well as knowing the patient and relevant surgical history. Did a redo groin with minimal help and was able to gain vascular control</td>
<td>2.8</td>
</tr>
</tbody>
</table>
Survey

Question 1.
In the month of November, how many times did you receive feedback from one of the Division of Vascular Surgery attendings?

Question 2.
How many times that feedback was documented (medhub, medwise, letter, email) by the attending?

Question 3.
Do you have any comments regarding the evaluation process and feedback provided during your training?

Submit responses
Quantitative outcomes

Number of evaluations per month increased

1 → 17
Qualitative outcomes

- Face to face
- Targeted
- Timing
- Comments not numbers
Feedback as an expectation

• Dispel fear
• Create trust
Comments not numbers

Forbes / Leadership

AUG 26, 2015 @ 06:50 PM   34,166 VIEWS

Feedback Is The Killer App:

Not Surveys, Simple Questions

We don’t need to develop long surveys with long questions. Think about questions like “what was one thing that went well for you this week?” or “what is one thing that wasted your time this week?” These simple questions, asked regularly, help companies and managers gain immediate feedback and see trends.
Conclusions

• A mobile assessment tool can objectively improve the number of evaluations and most importantly the residents perception of the quality of feedback provided.
Specific feedback

- A tool developed with residents in mind that also meets compliance, not a compliance tool that might be useful to residents.

- Well timed, targeted, face-to-face

- My two cents
Reported Differences in Vascular Surgery Operative Experience Between Integrated Vascular Residents and Independent Vascular Surgery Fellows

Adam Tanious, MD; Mathew Wooster, MD; Andrew Jung, BA; Peter Nelson, MD; Paul Armstrong, DO; Murray Shames, MD

APDVS
4/1/2016
Conflicts of Interest

• None
IVSR Program Assessment

• 2015 – Integrated Vascular Surgery Residents (IVSR) vs. Vascular Fellows (VF) graduate survey
  – 9 IVSR and 16 VF (same institutions)
  – Groups reported similar

• Training Case Volume, Training Satisfaction, First Job Attainment, Starting Salary
  – IVSR higher disposition towards academic jobs
  – VF had more interview offers

IVSR Program Assessment

• 2015 – First case-log comparison of IVSR to their VF counterparts
  – Case Log analysis of 11 IVSR and 121 VF
    • Similar Open Vascular Training
    • IVSR > VF in Overall Vascular and Endovascular Volume
    • VF > IVSR in Overall Surgical Volume

Objectives

1. What is the overall operative experience offered by both the integrated vascular and vascular surgery fellowship programs?

2. How does the training experience differ with respect major case categories (as defined by the ACGME) between both groups?
Methods

• ACGME National Resident Reports compiled for both graduating IVSR and VF
  – Focused on Vascular Surgery Cases
  – Between 2012 – 2014
    • 30 IVSR
    • 243 VF
Methods

• Case Categories
  – IVSR
    • Surgeon Chief, Surgeon Junior, and Secondary Procedures
  – VF
    • Surgeon Fellow and Secondary Procedures
    • All vascular cases done in general surgery residency (using averages of General Surgery Resident ACGME case log data)
## Results

<table>
<thead>
<tr>
<th>Category</th>
<th>Integrated Vascular</th>
<th>Vascular Fellows</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Major Vascular</td>
<td>694.7</td>
<td>616.3</td>
<td>.0106</td>
</tr>
<tr>
<td>Total Peripheral Obstructive</td>
<td>343.6</td>
<td>293.4</td>
<td>.0032</td>
</tr>
<tr>
<td>Total Extra-Anatomic</td>
<td>21.4</td>
<td>14.4</td>
<td>.0001</td>
</tr>
<tr>
<td>Total Thrombolysis/Thrombectomy</td>
<td>24.6</td>
<td>14.1</td>
<td>.0001</td>
</tr>
<tr>
<td>Total Vascular Trauma</td>
<td>30.0</td>
<td>22.5</td>
<td>.0172</td>
</tr>
<tr>
<td>Total Venous</td>
<td>120.8</td>
<td>75.0</td>
<td>.0001</td>
</tr>
<tr>
<td>Total Amputations</td>
<td>54.8</td>
<td>44.8</td>
<td>.0008</td>
</tr>
</tbody>
</table>
## Results

<table>
<thead>
<tr>
<th>Category</th>
<th>Integrated Vascular</th>
<th>Vascular Fellows</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Vascular Procedures</td>
<td>1446.0</td>
<td>1533.6</td>
<td>.2648</td>
</tr>
<tr>
<td>Total Open Aortic</td>
<td>58.0</td>
<td>57.4</td>
<td>.9020</td>
</tr>
<tr>
<td>Total Endovascular Aortic</td>
<td>121.1</td>
<td>115.8</td>
<td>.4131</td>
</tr>
<tr>
<td>Total Aneurysm</td>
<td>114.0</td>
<td>114.6</td>
<td>.9217</td>
</tr>
<tr>
<td>Total Cerebrovascular</td>
<td>78.8</td>
<td>85.0</td>
<td>.1132</td>
</tr>
<tr>
<td>Total Abdominal Obstructive</td>
<td>34.0</td>
<td>32.3</td>
<td>.6162</td>
</tr>
<tr>
<td>Total Upper Extremity</td>
<td>21.7</td>
<td>22.4</td>
<td>.7241</td>
</tr>
<tr>
<td>Total Endovascular Diagnostic</td>
<td>437.3</td>
<td>395.2</td>
<td>.1557</td>
</tr>
</tbody>
</table>
Conclusions

• IVSR and traditional VF graduate with comparable overall vascular surgery operative experience.

• IVSR reported, on average, a significantly higher number of major vascular procedures during their tenure as trainees as well as a significantly increased number of cases in 6 of the other ACGME categories.
Thank You

Questions?
Use of Mock Oral Exams in Vascular Surgery Training Programs: A Nationwide Survey

Matthew R. Smeds, MD, FACS

Rose An, MD, Katherine Kimbrough, MD, Mohammed M. Moursi, MD

Division of Vascular and Endovascular Surgery, University of Arkansas for Medical Sciences, Little Rock, Arkansas

Department of Surgery, University of Arkansas for Medical Sciences, Little Rock, Arkansas
Disclosures

None.
Background

Vascular Surgery Certifying Examination (VCE): important and final step for board certification.

Requires:

• Vascular knowledge-base
• Communication/interpersonal skills:
  - Clarity/certainty of answers
  - Mastery of anxiety
  - Body language
Background

- Use of mock oral examinations (MOE) ubiquitous in general surgery programs
  - Resident preparation for CE
  - Program evaluation of resident
  - Program evaluation of curriculum

- Literature supports:
  - Improved pass rates
  - Predictive value for passing
  - Improved resident comfort level with CE
Use of MOE by vascular surgery training programs not extensively studied
- Newly approved for residency training
- Familiar with fellows
Background

- MOE programs at regional vascular professional society meetings:
  - Positive preparatory experience by examinees and examiners
  - No advantage in VCE pass rates by participants

- Examiners identified common deficits among examinees
  - Management of complications
  - Ability to describe open procedures

Objective

- Determine current use and design of MOE in U.S. vascular surgery training programs
Methods

- Anonymous electronic survey (www.surveymonkey.com) sent to program directors of all U.S. vascular surgery training programs (n = 108)
  - Importance of MOE
  - Details of current use
  - Barriers to implementation
  - Preparedness of current trainees to sit for the VCE
Results

Surveys completed by 59/108 (55%)
Results

30/59 (51%) programs provide mock oral experiences

*No correlation with size of program, geographical location, or years of program
Results

Ø 48/59 (81%) thought MOE was moderately/very important for fellows preparation for VCE

Ø 51/59 (86%) thought MOE was moderately/very important for residents preparation for VCE
Results

- Level of training of those who receive MOE:
  - **Fellowship** only programs:
    - 13/14 (93%) give MOE to both Junior and Senior fellows

- Programs with vascular **residencies**:
  - 5/16 (31%) give MOE to all years of training
  - 1/16 (6%) give MOE to PGY2 and above
  - 7/16 (44%) give MOE to PGY3 and above
  - 3/16 (19%) give MOE to PGY4 and above
Results

Frequency of Exam

- 1x/year
- 2x/year
- >2x/year

Location of MOE

- Faculty Office
- Testing Center
- Other

Number of Scenarios

- <4
- 4
- >4

Number of Rooms

- 1 rooms
- 2 rooms
- 3 rooms
- >3 rooms
## Results

<table>
<thead>
<tr>
<th>MOE Characteristics</th>
<th>% Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Images Used?</td>
<td>83%</td>
</tr>
<tr>
<td>Questions Modified Based on PGY Level?</td>
<td>27%</td>
</tr>
<tr>
<td>Recorded?</td>
<td>7%</td>
</tr>
<tr>
<td>Other Trainees in the Room?</td>
<td>17%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>How is Feedback Given</th>
<th>% Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numeric Score</td>
<td>3%</td>
</tr>
<tr>
<td>Pass/Fail Based on PGY Level</td>
<td>13%</td>
</tr>
<tr>
<td>Review of Correct/Incorrect Answers</td>
<td>23%</td>
</tr>
<tr>
<td>Pass/Fail Compared to “Real VCE”</td>
<td>30%</td>
</tr>
<tr>
<td>Group Debriefing</td>
<td>47%</td>
</tr>
<tr>
<td>One on One with PD</td>
<td>60%</td>
</tr>
</tbody>
</table>
Results

18/30 (60%) use results in their CCC evaluations
29/30 (97%) give feedback on communication styles
### Results

<table>
<thead>
<tr>
<th>Barriers to Implementation / Continuing MOE</th>
<th>% Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of Examiner’s Time</td>
<td>56%</td>
</tr>
<tr>
<td>Lack of Available Faculty</td>
<td>47%</td>
</tr>
<tr>
<td>Lack of Available Questions</td>
<td>24%</td>
</tr>
<tr>
<td>Lack of Trainee Time</td>
<td>24%</td>
</tr>
<tr>
<td>Lack of Testing Location</td>
<td>7%</td>
</tr>
<tr>
<td>Lack of Trainee Interest</td>
<td>3%</td>
</tr>
</tbody>
</table>
Results

62% of programs not providing MOE expect their residents to get MOE experiences elsewhere
- 95% from regional/national conferences
- 5% from another institution
Results

97% of respondents believe trainees are adequately prepared for VCE.

Comparing residents to fellows preparedness:
- 64% thought fellows = residents
- 30% thought fellows > residents
- 2% thought fellows < residents
Conclusions

- MOE are regarded as highly valuable tool in preparation for the VCE... but only half of programs currently provide institutional MOE programs

- Most common barriers to implementation include faculty availability and time
Conclusions

- A third of PD believe fellows are more prepared than residents for VCE

- Further investigation into more rigorous and standardized preparation of residents for the VCE may be warranted
Virtual/Augmented Reality

Physics-Based Simulator to Teach Hands-On Vascular Surgical Skills

NIH SBIR grant #2 R44 HL118939

HR Champion, MD, FRCS, FACS
Professor of Surgery
Uniformed Services University of the Health Sciences
Founder, Executive Chairman, SimQuest
The Problem
- Challenges in vascular surgery training
- Open/endovascular: multiple specialties
- General/vascular/trauma surgeons
- Military and civilian

The Solution
- Biofidelic technology-assisted training
- Objective Performance Metrics
- Real time assessment
- Adaptive learning
- Personal and metadata
Prototype System

Funded by US Government, SimQuest has produced a prototype system that allows trainees to hold real surgical tools while looking at their hands as simulated surgical scenes are presented on a stereoscopic display surface. The tools are held in an advanced, low-cost seven degree-of-freedom (7DOF) haptic device specifically designed for surgical training.

The system has enabled the team to solve the human factors issues for an effective trainer, and is the foundation of an open-incision surgery simulation platform.
Discriminant Attributes

- Physics-based biofidelic simulations of real-life operative experiences
- One platform, multiple simulation-based training procedures with different instruments
- Progressive technical and cognitive challenges (scenarios), variety and flexibility
- Objective metrics formulated by training experts
- Unencumbered practice
- Real-time performance feedback
- Adaptive learning – documented proficiency
- Databasing and training metadata potential
- Cost savings
- Patient safety activation
- Open-source development platform for interested partners
Phase II
In Process

- Benchmarking: novice/intermediate/skilled on fresh perfused cadavers
- Development of physics simulation for suturing
- Development of automatic metrics
- Refinement of haptic interfaces
- Implementation of an initial specific learning scenarios
- User/learner feedback to refine the simulator, and evaluation to assess how well it meets the training needs
- Outline didactic and decisionmaking knowledge acquisition
Phase II
In-Progress Screenshot
Phase II

Metrics to discriminate novice from expert

1. Distance of hands from knot when knot tying
2. Movement of vessels when knot tying
3. Slowness
   - Placing sutures
   - Total time
4. Smoothness – Multiple steps to pull needle through
5. Placement
   - Distance from edges
   - Distance between
6. Pull-through completeness
7. Inversion of surface line
8. Vessel narrowing
9. Repeat placement of suture
10. Attending surgeon takeover
11. Amount of leakage
Exemplar Real Time Metric Dashboard

- Preoperative steps
- Suture placement metrics
- Thread tension
- Knot tying
- Leak test
- Overall

**FAIL**
Return to didactics & pretest

**REMEDIAL**
Simpler scenarios
Open-ended questions
Trigger mentor

**ACCEPTABLE**
Simpler scenarios

**EXCEL**
More difficult scenarios
Validation Methodologies
by Anthony Gallagher, PhD, DSc

“The vascular simulator currently being developed and validated by SimQuest is the best and most promising open virtual reality simulator that I have seen.”
Involvement of Vascular and Trauma Surgery Community

- Benchmarking exercise
- Hands-on testing of prototypes
- Iterative design
- Metrics evaluation
- Case scenarios – presentation
- Learning sciences
- Adaptive learning testing
- Summative metrics
- Validation studies
Contact

Howard Champion
hchampion@simquest.com
410-280-2244
443-822-5880