FULL DAY Didactic and Simulation Lab:
Teach the Teacher: It’s Never Too Late

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AAGL acknowledges that it has received support in part by educational grants and equipment (in-kind) from the following companies:
Target Audience
This educational activity is developed to meet the needs of residents, fellows and new minimally invasive specialists in the field of gynecology.

Accreditation
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SIMU-606
FULL DAY Didactic and Simulation Lab:
Teach the Teacher: It’s Never Too Late
Presented in affiliation with the American College of Obstetricians and Gynecologists (ACOG)

Ernest G. Lockrow, Chair
Sangeeta Senapati, Co-Chair

Faculty: Grace Chen, Susan G. Dunlow, Joseph M. Gobern, Doug Miyazaki, M. Jonathon Solnik,
Brent E. Seibel, Sabrina Whitehurst, Linda C. Yang

Have you ever been asked to create a simulation model or curriculum and don’t know where to start? Are you challenged by the process of educating trainees in and out of the OR? Often surgical educators possess the technical skills to address complex surgical pathology but struggle with their own professional development as it relates to teaching. This course provides a roadmap for developing a curriculum for minimally invasive gynecologic surgical skills. Participants will be instructed on how to construct surgical simulation models from easy-to-obtain materials. They will then master the art of teaching trainees on both constructed low fidelity simulation models as well as some moderate fidelity models from industry. We will provide tips and tricks for teaching the millennial generation who often respond better to innovative educational tools, such as simulation and video technology. This course will provide a collaborative opportunity to engage surgical educators across the country.

**Learning Objectives:** At the conclusion of this course, the clinician will be able to: 1) Use the materials provided to create various simulation models; 2) Assess trainees utilizing simulation models; and 3) outline teaching strategies, conditions, and environments that enhance knowledge and surgical skills.

**Course Outline**

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<td>Welcome, Introductions and Course Overview</td>
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<td>Establishing a Simulation Curriculum</td>
<td>E.G. Lockrow</td>
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<td>7:45</td>
<td>Teaching Strategies: Optimizing Your Teaching Encounters</td>
<td>S. Senapati</td>
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<td>8:15</td>
<td>Build a Model: Ovarian Cystectomy/Adnexal Surgery</td>
<td>S.G. Dunlow, All Faculty</td>
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<td>Set-Up and Use of Limb &amp; Things Model: Laparoscopic Hysterectomy</td>
<td>B.E. Seibel, All Faculty</td>
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<td>9:30</td>
<td>Break Out – Use the Cystectomy Model: Focus on Assessment and Feedback</td>
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<td>Use the Laparoscopic Hysterectomy Model with “One Minute Teacher” Teaching Strategy</td>
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<td>Lecture Assessment and Feedback</td>
<td>G. Chen</td>
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<td>Build a Model: Vaginal Hysterectomy</td>
<td>G. Chen, All Faculty</td>
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<td>Break Out – Use the Model: Vaginal Hysterectomy, Focus on Assessment and Feedback</td>
<td>G. Chen, All Faculty</td>
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<td>Teaching Using a Simulated Model</td>
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<td>3:15</td>
<td>Wrap-Up: Tips and Tricks for Engaging Your Audience</td>
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<td>4:00</td>
<td>Questions &amp; Answers</td>
<td>All Faculty</td>
</tr>
<tr>
<td>4:30</td>
<td>Adjourn</td>
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PLANNER DISCLOSURE
The following members of AAGL have been involved in the educational planning of this workshop and have no conflict of interest to disclose (in alphabetical order by last name).
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FACULTY DISCLOSURE
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Asterisk (*) denotes no financial relationships to disclose.
Establishing a Simulation Curriculum

COL Ernest G. Lockrow, MC, USA
Professor and Vice Chair
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Disclosure

I have no financial relationships to disclose.

Learning Objectives

- Understand the various options for assessment of surgical skills
- Strategize ways to utilize simulators to implement an OSATS
- Outline teaching strategies, conditions, and environments that enhance learning knowledge & skills

Background

In 2000 a survey of all OB-GYN residency programs (70% response rate) revealed:
- Teaching surgical skills:
  - 99% taught in OR
  - 78% in lectures
  - 68% in bench labs
  - 54% in animate labs
- Only 29% of residency training programs reported having a formal surgical skills curriculum
- 74% of programs evaluated surgical skills BUT 56% were subjective faculty evaluations.
- Only 1% used any form of testing

History of Surgical Skill Assessment

- In the operating room- on live patients
- Summative- end of rotation
- Subjective
- No standard criteria

Historical Assessment of Skills

- Problems with the “see one do one teach one approach”
  - Difficult to standardize evaluation
  - Different faculty standards for grading
  - Variation in patient comorbidity (need to get the case done quick)
  - Degree to which residents can or should operate without guidance varies
  - Ethical issues in assessing technical ability without providing guidance on human patients
Background - Times we live in.

- Resident work hour restrictions
- ACGME movement toward competency-based assessment
- Increasing concern over medical errors and patient safety
- Constant development of new surgical techniques and technologies

Background

- Abundant data to support surgical skill training and evaluation outside of the operating room:

OSATS

- Concept of OSATS
- Improved upon inherent inconsistencies in traditional methods of teaching/assessing surgical technique
- Validated a global assessment form for technical skill

What exactly is an OSATS

- Specific task to perform
- Standardized so that all residents/learners perform identical procedure
- Performance rated objectively by strict criteria developed prior to task performance
- Residents operate completely independently
Selecting Instruments

Many faces of OSATS

- OSATS is useful in several ways:
  - Establish the baseline knowledge of your learner
  - Repeat testing year to year to determine if a learner is advancing in their knowledge/skill level appropriately or at the same level as their peers
  - Test an educational curriculum to determine the effectiveness.
  - Being considered in credentialing of physicians and possibly in other high-stakes exams

OSATS- Feasibility

- In many cases educational curricula have been developed, pre and post tested with an OSATS to determine effectiveness of teaching in the curriculum.
  - Important components to curriculum:
    - Effective
    - Feasible
    - Inexpensive
  - Assessment of resident surgical skills: is testing feasible? Am J Obstet Gynecol 2008 Apr;199(4):1314-8
  - A new curriculum for hysteroscopy training as demonstrated by an OSATS. Am J Obstet Gynecol 2007;197:1506-08

Educational Curricula

- Have been developed for:
  - Open procedures
  - Laparoscopy (basic skills and those specific to OB-GYN)
  - Hysteroscopy
  - Colposcopy
- Important:
  - Task specific checklists
  - Global assessment
- Tested with OSATS

Laparoscopy

- SAGES has already validated a fundamental skill set for laparoscopy
- You can get FLS qualified

Laparoscopy

- Take a known curriculum and then validate
- Lots of studies can be done and it involves both residents and staff
Simulation training is gaining acceptance as a complement to traditional ob/gyn surgical training and may prove beneficial as a pre-surgical "warm-up" for experienced surgeons.

-ACOG SIMULATION CONSORTIUM

Do you remember….

The Role of EMOTION

- The body talks to brain and vice versa
- Awareness of emotion = Feelings
- Getting to know is full of feeling
- Our body develops certain feelings associated with specific cognitive tasks (Damasio – somatic marking)

The Ideal: Relaxed Alertness

- A personally meaningful challenge
- Learner is intrinsically motivated
- There is no perceived immediate threat

Psychomotor Learning Takes Place in 3 Steps:

1. Cognitive
2. Associative (Fixation)
3. Autonomous

Clear Performance Model

- Include cognitive piece in “curriculum”
- Conduct effective demonstration
- Encourage mental preparation
- Use an organized teaching approach
- Use models when possible

Openness to Learning

- Make it easy for learners to acknowledge that they lack knowledge or skill
- Don’t belittle
- Tone of voice and body language = patience
- Encourage students to think aloud, pose and answer questions
- Facilitate & encourage “what if” questions

Assess Learning (Testing)

- Promote self-assessment
- Use checklist when feasible
- Give specific feedback
- Observe directly to ensure proficiency

Communicate with Learners

- Ask “What should I do next?” or “What happens if…?” Questions
- Help learners find their own solutions
- Listen
- Use words that create mental images
- Focus on important / difficult steps

Conclusions

- Being able to understand the balance between excited expectancy and unhealthy pressure is a key to good teaching.
- Practice, Practice, Practice

IN THE END EDUCATORS BEST SERVE STUDENTS BY HELPING THEM BE MORE SELF-REFLECTIVE. THE ONLY WAY ANY OF US CAN IMPROVE IS IF WE DEVELOP A REAL ABILITY TO ASSESS OURSELVES.

RANDY PAUSCH

Questions?
Teaching Strategies: Optimizing Your Teaching Encounters

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Clinical Assistant Professor
Pritzker School of Medicine, University of Chicago

Disclosure

• Consultant:
  • EMMI

Objectives

• Discuss the unique characteristics of the adult learner
• Identify the knowledge gap and understand how to address that gap
• Apply effective teaching strategies to engage the trainee across various clinical settings and educational environments

Adult Learning Theory

• Adults are self-directed and self-regulated
• Intrinsically motivated to learn
  – Must believe information is practical and relevant and usable immediately
  – Teachers become facilitators of learning rather than transmitters of information

Zigmont JJ, Semin Perinatol, 2011

Adult Learners

• Prior knowledge and experience provide a foundation and resource for their learning
  – Attainment of information (history)
  – Synthesis of data (work-up)
  – Drawing conclusions (assessment)
  – Developing a plan of action (plan)

Zigmont JJ, Semin Perinatol, 2011
The Way We Learn: Fleming’s VARK model

- **Visual learners**
  - Think in pictures, diagrams, graphics
- **Auditory learners**
  - Discussion, debate, conversation
- **Read/Write**—literary learners
  - Reading, write, re-write, lists
- **Kinesthetic or tactile learners**
  - Hands-on, interactive, touch-driven
- **NOT mutually exclusive, learner can vary dependent on subject matter**

**An Example: TLH**

| **Visual** | Diagrammatic books, watch others live, watch videos |
| **Auditory** | Discuss: after putting your preop note in, while the patient is going to sleep, while positioning the patient, at the scrub sink |
| **Read/Write** | Read a text outlining the steps of the procedure, list the steps for a TLH |
| **Kinetic** | Sim lab—suturing, eye hand coordination, run through steps on a model |

**Miller’s Pyramid for Clinical Competence**

- **Knows**
- **Knows how**
- **Shows how**
- **Does**

- Evaluation of actual practice (i.e., audit of performance, direct observation, etc.)
- Performs in artificial testing situation (OSCE)

**Kolb’s Experiential Learning Theory**

- have a concrete experience
- re-iterate experience
- reflect/review on experience
- abstract and conceptualize experience
It's a process

How do we best facilitate learning in the office or on the wards?

Knowledge Gap

- Identify what needs to be taught
  - Skill, patient communication, data gathering or synthesis, fundamental knowledge
- Can be identified by teacher (observation or questions)
- Or identified by learner
  - What do you want to work on?
  - What are your learning objectives today?

Microskills for Teaching

“The one minute preceptor”

1. Get a commitment from the trainee
   What do you think is going on?
2. Probe for supporting evidence
   What clinical findings led you to that conclusion?
3. Encourage discussion/teach general rules
   Convey at least one teaching point (this should not be a lecture!)
4. Reinforce what was right
5. Correct 1 mistake
   This is the opportunity to provide positive and constructive feedback

Microskills

- Helps facilitate clinical outcomes
- Encourages the trainee to engage in independent learning and outside reading
- Increases the quality and frequency of feedback
- Increases the clinical teacher’s confidence in evaluating the trainee

How do we best facilitate learning in the OR?
Learning a Procedure

Deliberate Practice
- Consistent gradual improvement of performance occurs when individuals are:
  - (1) Instructed to improve some aspect of performance for a well-defined task
  - (2) Able to get detailed, immediate feedback on their performance
  - (3) Provided ample opportunity to improve performance gradually by performing the same or similar tasks repeatedly

Ericsson KA, Acad Med. 2004

Acquisition of Surgical Skills
- Cognitive Phase
  - Learning of steps and basic skills
    » Observing, reading, listening, asking questions
- Integrative Phase
  - Independent steps become part of the procedure
    » Receives feedback while practicing and integrating knowledge with the appropriate motor responses
- Autonomous Phase
  - Skills are executed smoothly without any cognitive input

Kopta JA, Clin Orthop, 1971

Roles in the OR
- Learner
  - Observes
    » With direction
- Participates
  - Common uncomplicated cases
- Practices
  - More responsibility
- Refines & extends
  - Learning variation instead of rules
- Teacher
  - Models
    » Normal practice with explanation
  - Models
    » Point out meaningful info, interventions, allow interruptions
  - Coaches
    » Debriefing
  - Fades
    » Withdraw, but at the ready

Resident Perceptions
- Results of a national survey
  - 998 surgery residents (20% response rate)
- The good:
  » Attendings verbalized their approach: 55%
  » Include residents in intraoperative decisions: 61%
  » Offer technical advice: 84%
- Room for improvement:
  » Preoperative identification of goals: 18%
  » Discuss areas of improvement: 37%


Teaching Surgical Procedures
- Break down the procedure into teachable measurable standardized segments
  - What can or needs to be learned prior to the case? – Role of simulation
- Think about which steps to focus on today prior to starting the case
- If multiple levels of trainees are present – think about which portions of the procedure are appropriate for each level of trainee (graduated learning)
Assessing the Gap

- Have you had the opportunity to do….?
- How comfortable do you feel doing….?
- Describe to me the anatomical landmarks you need to be aware of when …..?
- Describe how you would go about doing….?

Setting Expectations

- Unless explicitly stated, the teacher and trainee may have diverging goals (and definitions of success)

  Ex: hysteroscopy
  - Trainee: Just get the polyp out
  - Teacher: Proper positioning, appropriate choice of equipment and set-up, trouble shooting

Graduated Approach to Education

- Learning appropriate to the level of trainee
- Supervision appropriate to the level of trainee
- Increase autonomy as skills develop

Application in the OR

- Trainee observes the procedure
- Trainee assists on the procedure
- Trainee performs the procedure
- Trainee learns how to assist another trainee
  - DOUBLE SCRUBBING
    - Involvement can vary depending on the level/experience of the trainee
    - Comfort level of the attending
    - Complexity of the case (or portions of the case)
- Trainee can teach the procedure
Teaching in the context of new innovations

- Attending needs to learn the technology/procedure (may include a proctor)
- Attending is competent and feels confident in the new technology/procedure
- Resident observes the new procedure/learns about the new technology
- Resident assists with the new technology/procedure
- Resident is able to utilize the new technology/perform the procedure

Engagement

- Advice to the educator:
  - Ask, ask, ask!
  - We often assume baseline knowledge and build on it
  - Need to insure a good foundation of knowledge to ultimately promote deeper learning
  - Knowledge gap can be filled by role-modeling, discussion of case, topic review, teaching pearls

Summary

- Foster active learning – involve learners – Don’t just teach at them
- Get learners to relate what they are learning to their previous experience
- Help learners understand why what they are learning will be important to them
- Facilitate reflection
- Provide feedback
- Use multiple strategies when possible

References

Lecture Assessment and Feedback

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Department of Gynecology and Obstetrics

Disclosures

I have no financial relationships to disclose.

Objectives

• Traditional paradigms of surgical skills teaching and assessment
• Surgical assessments
• Future directions

Beginning of Surgical Training and Assessment

Surgical education was an informal process
• Training was an apprenticeship
No fixed time period or progressive responsibility
Mentor determined what the trainee did and when
The trainee did little as a primary operator before independent practice

Hopkins Founding Fathers

Establish basic principles of surgery

William S. Halsted

Adopted the German system of residency with graded responsibility
• “See one, do one, teach one”
• Residency is a fixed length

Halsted, Bull Johns Hopkins Hospital 1904
Fewer Cases

More interventional radiologic procedures
Super-subspecialization
  • Fellow training leading to reduced number of resident cases
Resident work hour limitation
119/170 gynecologic surgeons surveyed
  • >60% reported residents less prepared surgically than residents 5 yrs before
  • 82% felt that more time is needed for surgical experience

Sokorsky, Gynecol Oncol 1999

Surgical Training in Gen Surgery

Review of the 2008 RRC procedural log for 1022 graduating general surgery residents
  • Of the 121 cases that they should perform competently
    — 18/121 cases were performed ≥ 10x
    — 83/121 cases were performed < 5x
80% of graduating residents pursue more training


Surgical Training in OBGYN

1997 – 1998 survey of OBGYN residencies
  • 99% taught surgical skills in the OR
  • 29% had a formal surgical curriculum with bench and animal lab training
  • 17% used standardized assessment of resident surgical skills

Mandel, Obstet Gynecol 2000

More recent Survey of OBGYN residencies
  • 66% had a formal surgical curriculum
  • 25% used standardized assessment of resident surgical skills
  • 77% reported 80 hr work week affected decision to proceed with formalized surgical curriculum

Skiadas, AAGL Abstract 2005

Not Cost-Effective or Ethical

Agency for Healthcare Research and Quality: 32,000 mostly surgery related deaths costing $9 Billion/ year
Surgical technique is a more important predictor of morbidity/mortality
$53 Million/ year to teach surgical residents in the operating room
“Education by random opportunity”
  • Exposure to necessary cases may be unstructured and unpredictable


Traditional Surgical Assessment

Attending evaluation at the end of rotation
  • Relies on recall and is highly subjective
  • Poor reliability and validity
  • May not provide constructive feedback

Direct observation in the operating room using a detailed task-specific checklist with defined criteria is time consuming

Traditional Surgical Assessment

Case log
- May attest to range of experience but not technical expertise
- Important for residency accreditation

Mortality and morbidity data is not always reliable

Accountability to the public

Mortality and morbidity data is not always reliable


Psychometric Properties

Validity: degree to which a simulator reflects real world or a test measures what it is designed to measure
- Face and Content: reflect real world characteristics
- Construct: measure what it is suppose to measure
- Convergent: agreement between different evaluation systems
- Discriminate: disagreement between characteristics that should be different

Psychometric Properties

Reliability: the ability of a test to generate similar results
- Intra rater: agreement between results by the same examiner at different time points
- Inter rater: agreement between results by different examiners

Objective Structured Assessment of Technical Skills (OSATS)

Several stations with simulators addressing open skills with time limits for task completion
- Evaluation is performed by attending surgeons
  - Checklist, global rating scale (GRS), Pass/Fail
  - Checklist and GRS demonstrate reliability and validity with GRS demonstrating better reliability and validity
- Psychometric properties of GRS in vivo setting and for different types of procedures unclear
- Multiple GRS validated in general surgery, gynecology, urology for open, vaginal, laparoscopic, and robotic skills

Global Rating Scale

- Respect for tissue
- Time and motion
- Instrument Handling
- Knowledge of Instruments
- Flow of operation
- Use of assistants
- Knowledge of specific procedure

Surgical Assessment in OR

Feasible, reliable and valid OSATS requires additional cost and faculty time

- OSATS for 24 OB/GYN residents cost $6,000 for animal lab and $1,900 for bench lab annually
- 176 faculty man-hours

Live surgery setting

- Highest face validity
- Evaluators not blinded
- Complete std not possible
- Amount of independent practice may vary and may not be best for patient care

Global Rating Scales for LSC

GRS: depth perception, bimanual dexterity, efficiency, tissue handling, autonomy

Validated for laparoscopic cholecystectomies in OR
- Demonstrate construct validity
- ICC 0.89 (95%CI, 0.74 – 0.95)
- Interrater reliability 0.82 (95%CI, 0.67 – 0.92)
- Superior to checklist and VAS

Global Rating Scale for Vaginal Surgery

- In 2003, over 600,000 hysterectomies performed in the US with 22% via vaginal route
- Vaginal surgery is the approach of choice b/c morbidity is lower
- Vaginal surgery requires unique skills due to limited exposure, limited assistance, narrow cavity
- Need GRS to assess vaginal surgical skills

Global Rating Scale for Vaginal Surgery: VSSI

The Vaginal Surgical Skills Index (VSSI)

- GRS: initial inspection, incision, maintenance of visibility, use of assistant, knowledge of instrument, tissue and instrument handling, electro-surgery, knot tying/ligation, hemostasis, procedure completion, time and motion, flow of operation and forward planning, knowledge of specific procedure
- Parameters were felt to be essential to the safe and efficient performance of vaginal surgery by pelvic surgeons and received input from SGS
- Scale from 0 – 4 (and N/A) with descriptors

Visual Analogue Scale of Overall Performance

Wu, Obstet Gynecol 2007

Larsen, BJOG 2008


Goff, Obstet Gynecol 2000, 2001

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- Superior to checklist and VAS

Global Rating Scale for Vaginal Surgery

- In 2003, over 600,000 hysterectomies performed in the US with 22% via vaginal route
- Vaginal surgery is the approach of choice b/c morbidity is lower
- Vaginal surgery requires unique skills due to limited exposure, limited assistance, narrow cavity
- Need GRS to assess vaginal surgical skills

Global Rating Scale for Vaginal Surgery: VSSI

The Vaginal Surgical Skills Index (VSSI)

- GRS: initial inspection, incision, maintenance of visibility, use of assistant, knowledge of instrument, tissue and instrument handling, electro-surgery, knot tying/ligation, hemostasis, procedure completion, time and motion, flow of operation and forward planning, knowledge of specific procedure
- Parameters were felt to be essential to the safe and efficient performance of vaginal surgery by pelvic surgeons and received input from SGS
- Scale from 0 – 4 (and N/A) with descriptors

Visual Analogue Scale of Overall Performance

Wu, Obstet Gynecol 2007

Larsen, BJOG 2008


Goff, Obstet Gynecol 2000, 2001
Methods

- Multicenter, Cross Sectional Study Design
- Subjects: OBGYN Residents (Years 1-4) and FPMRS Fellows (Years 5-7)
- Procedure: Vaginal Hysterectomy
  Assessed from initial inspection until uterus is removed and hemostasis achieved

Trainee Performs Vaginal Hysterectomy
(Incision until Uterus Removal)

VSSI, VAS, GRS by Surgeon
Recorded Procedure
4 weeks

VSSI, VAS, GRS by Same Surgeon
VSSI, VAS, GRS by Another Surgeon

Results

- 29 trainees (PGY 1 – 7) from the Cleveland Clinic and the Mayo Clinic
- 76 Surgeries were assessed and recorded
- 5 Attending surgeons from Cleveland Clinic and Mayo Clinic
- 1 Attending surgeon from UCSF
- Mean time to complete VSSI form and GRS: 2 ± 1 minutes (range 1 – 10 minutes)

Results- Reliability Measures

<table>
<thead>
<tr>
<th>Evaluation Method</th>
<th>VSSI</th>
<th>GRS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Live surgery</td>
<td>0.96</td>
<td>0.95</td>
</tr>
<tr>
<td>Blinded videotape review by same surgeon</td>
<td>0.93</td>
<td>0.64</td>
</tr>
<tr>
<td>Blinded videotape review by different surgeon</td>
<td>0.92</td>
<td>0.31</td>
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</table>

<table>
<thead>
<tr>
<th>Evaluation Method</th>
<th>VSSI</th>
<th>GRS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recorded Procedure</td>
<td>0.97</td>
<td>0.94</td>
</tr>
</tbody>
</table>

Results- Construct Validity

Correlations between VSSI, VAS, GRS (Pearson Correlation Coefficient)

- Live surgery: r = 0.91, P<0.001
- Blinded videotape review by same surgeon: r = 0.93, P<0.001
- Blinded videotape review by different surgeon: r = 0.92, P<0.001

Training Levels

<table>
<thead>
<tr>
<th>Training Level</th>
<th>VSSI Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.74</td>
</tr>
<tr>
<td>2</td>
<td>0.76</td>
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<td>3</td>
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<tr>
<td>4</td>
<td>0.80</td>
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<tr>
<td>5</td>
<td>0.82</td>
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<tr>
<td>6</td>
<td>0.84</td>
</tr>
<tr>
<td>7</td>
<td>0.86</td>
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</table>

r = 0.64, P<0.001
### Assessing Robotic Skills

**Results**

- **Construct Validity**
  - Number of TVH Performed
  - VSSI Scores
  - $r = 0.76$, $P < 0.001$

**Findings**

- **Vaginal Surgical Skills Index (VSSI)**
  - Feasible, reliable, and valid instrument to evaluate the performance of vaginal hysterectomy
  - More reliable and valid than Reznick’s GRS

  Trainees were considered minimally competent to perform vaginal hysterectomy if they scored “32” (95% CI, 28 – 36) on VSSI (52 points)

- Trainees must score a “3” (“most times” performs various skills correctly) on most VSSI parameters

- Trainees were likely to achieve this score after performing at least 21 vaginal hysterectomies

---

### Assessing Robotic Skills

**Assessing Robotic Skills**

- **Construct validity**
- **Excellent internal consistency and interrater reliability**

**Da Vinci surgical system**

(Intuitive Surgical Inc., Sunnyvale, CA)

Facilitates accurate assessment of surgical skills by streaming motions and events via an Ethernet application programming interface

- Surgical video can also be separately archived for off-line expert analysis

---

### Assessing Robotic Skills

**Subjects**

- Surgeons with different levels of robot experience
- Non-surgeons

**Methods**

- Tasks (mod FLS): interrupted suturing, ring transfer
- Stereo video and motion data captured
- Expert surgeons evaluate the stereo video task performance using Reznick’s GRS and GEARS

---

### Assessing Robotic Skills

**Table 1. OSATS evaluation of experimental dataset.**

<table>
<thead>
<tr>
<th>User</th>
<th>Task</th>
<th>R</th>
<th>T</th>
<th>M</th>
<th>H</th>
<th>K</th>
<th>F</th>
<th>KP</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>Expert 1</td>
<td>Manip.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>23</td>
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<tr>
<td></td>
<td>Suturing</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>14</td>
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<tr>
<td>Expert 2</td>
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<td>3</td>
<td>3</td>
<td>3</td>
<td>18</td>
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</tr>
<tr>
<td></td>
<td>Suturing</td>
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<td>1</td>
<td>1</td>
<td>2</td>
<td>13</td>
<td></td>
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</tr>
<tr>
<td>Beginner 1</td>
<td>Manip.</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>9</td>
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<td></td>
</tr>
<tr>
<td></td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beginner 2</td>
<td>Manip.</td>
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<td>1</td>
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<td>1</td>
<td>10</td>
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<tr>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>7</td>
<td></td>
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</tr>
<tr>
<td>Non-clinical 1</td>
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<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Suturing</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-clinical 2</td>
<td>Manip.</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>9</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Suturing</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>9</td>
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</table>

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Page 19
Assessing Robotic Skills

<table>
<thead>
<tr>
<th>User</th>
<th>Tasks</th>
<th>Time (sec)</th>
<th>Care?</th>
<th>Clutch?</th>
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<tbody>
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<td>75</td>
<td>5</td>
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<tr>
<td>Expert 2</td>
<td>Suture</td>
<td>290</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Beginner 1</td>
<td>Manip</td>
<td>912</td>
<td>112</td>
<td>28</td>
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<tr>
<td>Beginner 2</td>
<td>Suture</td>
<td>914</td>
<td>2</td>
<td>40</td>
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<tr>
<td>Non-clinical</td>
<td>Manip</td>
<td>405</td>
<td>43</td>
<td>26</td>
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<td>Non-clinical</td>
<td>Suture</td>
<td>914</td>
<td>2</td>
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<td>Non-clinical</td>
<td>Suture</td>
<td>914</td>
<td>2</td>
<td>40</td>
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</tbody>
</table>

Table 3. System usage measures (times and distances) for experimental tasks.

Imperative to also assess other aspects of surgical performance

- Surgical procedures are 75% cognitive skills and 25% technical skills
- Surgical judgment
- Professionalism and teamwork

Surgical Skills Assessment: Tip of the Iceberg

Halstedian apprentice model is no longer adequate

Traditional means of trainee evaluation is not valid or reliable

There are different global rating scales that have been shown to be feasible, valid, and reliable for assessing different types of surgical skills in OR

Imperative to also consider other aspects of surgical performance

Summary

Thank You and Questions?

“...Health care will increasingly focus on the outcomes of care...” ACGME 2002
From Learner to Instructor: Teaching Skills with Simulated Models

M. Jonathon Solnik, MD FACOG FACS
Associate Professor
Director, Division of Urogynecology & MGSS
Co-Director, Women’s Guild Simulation Center for Advanced Clinical Skills
Cedars-Sinai Medical Center &
The David Geffen School of Medicine at UCLA

Disclosures
I have no financial relationships to disclose.

Objectives
• Discuss the obvious and perhaps not-so-obvious obstacles to effective surgical instruction (how do we learn?)
• Describe practical techniques for teaching surgical skills using simulated models
• Preventing

Tell me and I forget; show me and I remember; involve me and I understand

— Chinese proverb

The times they are a-changin...

“The Bridge to Nowhere”

Bob Dylan, circa 1963
Choluteca River

Teaching

*A planned experience that brings about a change in behavior*

• 3 Stages:
  • SET: environment, objectives, roles (off the bat...)
  • DIALOGUE: interaction (the meat...)
  • CLOSURE: Q&A, summary (the end...)

...and it just so happens that health care professionals don’t enjoy being told what to learn or when they should learn it (resistance to learning), so make it stimulating and enjoyable...

How to make simulation effective

• Be clear with your goal and avoid ambiguity
• Stimulate interest (charisma trumps content)
• The ‘how’ is more important than the ‘what’
• Avoids ‘lecturing’ by nature of involvement

Change with your learner

<table>
<thead>
<tr>
<th>Teacher Strategies</th>
<th>Independence</th>
<th>Dependence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitoring</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Teaching</td>
<td>Low</td>
<td>High</td>
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<tr>
<td>Supervising</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Performance</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>learner competence</td>
<td>Low</td>
<td>High</td>
</tr>
</tbody>
</table>

Barriers

• The cognitive (big picture, context)
• The perceptual (what’s intuitive about this?)
• Visual-spatial orientation
• Psychological obstacles
• OR distractions
• Motivation
Psychomotor Learning Theory

• Learning Requires 3 Phases
  
  **Cognitive:**
  Learner thinks through each step, relates it to what came before and comes after.
  
  **Fixative/Associative:**
  Repetition and practice; variations are introduced and knowledge assimilated; some activity requires conscious deliberation while others are automatic.
  
  **Autonomous:**
  Smooth execution without autonomous input.

Technical skills

Unconscious incompetence  →  Conscious incompetence

Unconscious competence  →  Conscious competence

**Cognitive phase**
Aware that they don’t know...

**Associative phase**
They don’t know what they don’t know...

Perform task while talking about something else

Experts make lousy instructors

For technical/procedural skills:
• Residents teach students better than faculty
• Fellows teach residents better than faculty

However, for evaluation experts are most appropriate and useful
• Better intra- and inter-observer reliability

Teaching Technical Skills

• The problem with technical training is that instructors are often too competent to instruct effectively

• Can no longer appreciate step-by-step method by which tasks are performed and understood by consciously incompetent.

Virtual reality simulation training can improve technical skills during laparoscopic salpingectomy for ectopic pregnancy.

Simulated training actually works!

• Acquiring these skills requires:
  • Factual knowledge
  • Psychomotor performance
  • Attitude

• Skills are often lost within 4-6 months without practice.
Teaching Technical Skills

- Simple to complex
- One technique at a time
- Ongoing reinforcement
- Practice
- Encourage confident employment of skills
- Be prepared (have SET ready)

Four-Stage Technique

I. Demonstration of the skill at normal speed (with or without speech)

II. Repeat with dialogue, providing rationale

III. Repeat guided by one of the learners

IV. Repeat by the learner and practice

Stage I

- Demonstrate as it would normally happen, creating a realistic visual cue
- Creates strong visual imagery
- Animating clinical expertise!

Stage II

- Repeating with dialogue to allow for exchange of facts and ideas
- Slow it down so that learners really become involved – increases motivation
- Instructor can identify what the learner knows and what he/she doesn’t know
- Q&A
- Reinforcing components of clinical expertise!

Video

Video
Stage III

- Demonstration repeated with guidance from one of the learners
- Learner ‘gathers and organizes’ environmental factors to form useful patterns (cognitive understanding)
- Helps with recall (useful during real-time stressful situations)
- Transitioning responsibility!

Stage IV

- Learner repeats demo and all learners follow in practice
- Completes transference from instructor (expert) to learner (novice)
- Must engage in continued PRACTICE
- Independent learner practice!

4-Step vs. TODOSO

2 independent blinded video assessors:

3 Months
BPSL3M: 94.8/86.4%
TRAD3M: 86.1/73.2%

6 Months
BPSL6M: 95.4/88.0%
TRAD6M: 84.7/72.5%
Cystoscopy, GU Injuries & Laparoscopic Hysterectomy

- Taiwanese Group 2,702 LAVH’s
- Contemporary Study from Taiwan

A COG COMMITTEE OPINION

The Role of Cystourethroscopy in the Generalist Obstetrician-Gynecologist Practice

- 7,725 LH’s over 11 years
- Bladder: 1.9/1000 (96% detected)
- Ureter: 1/1000 (50% detected)


2007 Belgian Group had no ureteral injuries in 1,120 LH’s

Contemporary Study from Taiwan had no ureteral injuries in 2,006 cases when ‘window’ was developed in anterior and posterior broad ligament

7,725 LH’s over 11 years
- Bladder: 3.9/1000 (96% detected)
- Ureter: 1/1000 (50% detected)

Soong YK, et al. JMIG 2007

Role of Cystoscopy Only 40% of GU injuries detected at time of surgery WITHOUT cystoscopy

Mental Imagery (what???)

- Envision the procedure without motion
- Study: multi-center RCT with 68 gyn residents
  - Observed one cysto, but performed <3
  - Study arm (mental imagery) vs control (read...)
  - Sessions <20 minutes and 24-48h prior to case
  - Blinded assessors for 2 cystoscopies
  - GSOP plus time, competence, preparedness
  - Imagery 15.9% higher in first
  - No difference in time

Motivate Your Learners

CURIOSITY INTERDEPENDENCE CHALLENGE
INDEPENDENCE ESTEEM SOCIAL COMPARISON

Building Blocks of the Instructor

Role
Model
In role self-awareness
Expertise in teaching & learning methods
Clinical credibility that promotes clinical competence

Practice, practice, practice

Elite performers at any activity perform constant repetition

“If I don’t practice for one day, I know it. If I don’t practice for two days, the critics know it. If I don’t practice for three days, the audience knows it.”
- Ignace Paderewski, concert pianist
Summary

• Armed to teach a new generation of learners
• Simulation avoids many of the pitfalls of past methods (lecturing) by focusing on ‘hands-on’
• Be prepared and be clear
• Consider the four-stage method
• Have fun!

References

CULTURAL AND LINGUISTIC COMPETENCY

Governor Arnold Schwarzenegger signed into law **AB 1195** (eff. 7/1/06) requiring local CME providers, such as the AAGL, to assist in enhancing the cultural and linguistic competency of California’s physicians (researchers and doctors without patient contact are exempt). This mandate follows the federal Civil Rights Act of 1964, Executive Order 13166 (2000) and the Dymally-Alatorre Bilingual Services Act (1973), all of which recognize, as confirmed by the US Census Bureau, that substantial numbers of patients possess limited English proficiency (LEP).

California Business & Professions Code §2190.1(c)(3) requires a review and explanation of the laws identified above so as to fulfill AAGL’s obligations pursuant to California law. Additional guidance is provided by the Institute for Medical Quality at [http://www.imq.org](http://www.imq.org)

**Title VI of the Civil Rights Act of 1964** prohibits recipients of federal financial assistance from discriminating against or otherwise excluding individuals on the basis of race, color, or national origin in any of their activities. In 1974, the US Supreme Court recognized LEP individuals as potential victims of national origin discrimination. In all situations, federal agencies are required to assess the number or proportion of LEP individuals in the eligible service population, the frequency with which they come into contact with the program, the importance of the services, and the resources available to the recipient, including the mix of oral and written language services. Additional details may be found in the Department of Justice Policy Guidance Document: Enforcement of Title VI of the Civil Rights Act of 1964 [http://www.usdoj.gov/crt/cor/pubs.htm](http://www.usdoj.gov/crt/cor/pubs.htm).

**Executive Order 13166, “Improving Access to Services for Persons with Limited English Proficiency”,** signed by the President on August 11, 2000 [http://www.usdoj.gov/crt/cor/13166.htm](http://www.usdoj.gov/crt/cor/13166.htm) was the genesis of the Guidance Document mentioned above. The Executive Order requires all federal agencies, including those which provide federal financial assistance, to examine the services they provide, identify any need for services to LEP individuals, and develop and implement a system to provide those services so LEP persons can have meaningful access.

**Dymally-Alatorre Bilingual Services Act** (California Government Code §7290 et seq.) requires every California state agency which either provides information to, or has contact with, the public to provide bilingual interpreters as well as translated materials explaining those services whenever the local agency serves LEP members of a group whose numbers exceed 5% of the general population.

~