The Challenges in Surgical Education:
Autonomy, Assessment, & Accountability

Edward D. Verrier, MD
Surgical Director of Education
Joint Council on Thoracic Surgery Education

K. Alvin Merendino Professor of Cardiovascular Surgery
University of Washington
Historical Perspective
Surgical Education
• To vision the future one must acknowledge the past
Medical School Education Structure

- Flexner report 1910
  - Carnegie Foundation Commission
  - “Medical Education in US and Canada”
  - Embraced Johns Hopkins Model

- Recommendations:
  - Prerequisite Education
    - High school, University (>2 years)
  - Medical School Requisite Education
    - 4 years
    - 2 basic science, 2 clinical clerkship
  - Post graduate resident training essential

- Apprenticeship model gone except in Surgery

Remained essentially unchanged for last century
Early Surgical Education Structure

- **William Halsted, MD (1903)**
  - Formalization of apprenticeship model
  - Science foundation
  - Graduated responsibility
  - Defined structure
  - Standardization of training
  - Pyramidal system of surgical education

- **William Osler, MD (1908)**
  - Residents at different levels working together
  - Supervision / mentorship by competent faculty
  - Bedside teaching

- **Edward Churchill, MD (1933)**
  - Eliminate pyramidal system
  - Recommended rectangular system of surgical education
  - Mandated ultimately by ACGME

Remained essentially unchanged for last century
We believe that in the future, expertise rather than experience, will underlie competency-based practice and certification.

Aggarwal & Darzi, 2066)
Competency Based Medical Education (CBME)

• competency based education is an approach to preparing physicians for practice that is fundamentally orientated to graduate outcome abilities and organized around competencies derived from an analysis of societal and patient needs. It deemphasizes time based training and promises greater accountability, flexibility, and learner-centeredness.

International CBME Collaborators, 2011
What then is competency?
ACGME: ~1990 “Outcomes Project”

- Competencies: “Specific knowledge, skills, behaviors and attitudes and the appropriate educational experiences required of residents to complete GME programs.”

- GME Competencies:
  - Patient Care
  - Medical Knowledge
  - Professionalism
  - Interpersonal and Communication Skills
  - Practice-based Learning and Improvement
  - Systems-based Practice

- Evolving concepts about competency
  - Technical skill?
  - Life Long (Maintenance of Certification)
  - Competency vs Expertise
  - Milestone Project 2012
Competence - a simple model
Dreyfus Model of Skill Acquisition

Responsibility extends to others and the environment.

Sense of responsibility increases with experience.

Sense of responsibility arises from actively making decisions.

Still does not experience personal responsibility.

Only feels responsible to follow the rules.

**Scope of vision & Range of capability**

Follows specific rules for specific situations. Rules are not conditional. “Only capable of following the rules”

Begins to create and identify conditional rules. All decisions still follow rules. “Rules have nuances and become conditional in nature”

Learns organizing principles. Information sorting by relevance begins. “Higher order rules shape contexts and conditions”

Uses pattern recognition to assess what to do. Uses rules to determine how to do it. “Intuition aids in identifying the situation; the actions are governed by the principals”

No analysis or planning. Pattern recognition extends to plan as well as action. “Just does what works.”
The Challenges in Surgical Education

Autonomy

• Trainee - Trainer Disconnect
  – Trainee:
    • Exposure / Experience = Competency
    • Facts / Data = Knowledge
      – Google Generation
      – Information Overload
  • Adult learners
  • Generational / Gender Issues
  • Work Hour Priorities

– Trainer:
## The Generational Divide

<table>
<thead>
<tr>
<th></th>
<th>Traditionalists</th>
<th>Baby Boomers</th>
<th>Generation X</th>
<th>Millennials</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Business Focus</strong></td>
<td>Quality</td>
<td>Long hours</td>
<td>Productivity</td>
<td>Contribution</td>
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<tr>
<td><strong>Motivator</strong></td>
<td>Security</td>
<td>Money</td>
<td>Time off</td>
<td>Time off</td>
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<tr>
<td><strong>Company Loyalty</strong></td>
<td>Highest</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td><strong>Money is</strong></td>
<td>Livelihood</td>
<td>Status symbol</td>
<td>Means to an end</td>
<td>Today’s payoff</td>
</tr>
<tr>
<td><strong>Value</strong></td>
<td>Family/Community</td>
<td>Success</td>
<td>Time</td>
<td>Individuality</td>
</tr>
</tbody>
</table>
Gender Related Issues

- “Men are from Mars…. Women are from Venus”¹
  - Different reward perspectives
  - Different responses to stress
  - Biological / hormonal differences

¹John Grey, PhD 1992
The Study of Adult Learning

Critical Assumptions

- The “adult” learner……
  - is self-directing…relatedness to others
  - enters an educational situation with a great deal of experience
  - learn when they perceive a need to know
  - motivated to learn after they experience a need in their life situation…problem focus, task centered
  - motivated to learn because of internal factors, not external pressure

- PROCESS > CONTENT

“The Adult Learner;” Knowles et al
Experiential Adult Learning Cycle

Kolb’s Cycle of Experiential Learning

FROM Apprehension

WHILE Transforming

TO Comprehension

LEARNING EXPERIENCE

GO TO Strategies/Methods

START AGAIN

What happened?

What do I do?

What do I conclude?

EXPERIMENT AND INTEGRATE

GO TO Strategies/Methods

GENERALIZE AND CONCEPTUALIZE

image by Karin Kirk
Learning Styles

- Cognitive
- Affective
- Physiological
- Interpersonal

"As we start a new school year, Mr. Smith, I just want you to know that I'm an Abstract-Sequential learner and trust that you'll conduct yourself accordingly!"
The Challenges in Surgical Education

Autonomy

• Trainee - Trainer Disconnect
  – Trainer:
    • No Educational Training
    • Resistant to “Change” by definition
    • Priority issues
    • May face Promotion Issues
    • Many with Huge Clinical loads
    • Large administrative Load
  – Trainee:
### Critical Concepts in Adult Teaching…a Science

<table>
<thead>
<tr>
<th><strong>Dewey’s “Keys Concepts” of Adult Teaching</strong></th>
<th></th>
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</thead>
</table>
| **Experience** | Experience  
  • Process not result |
| **Democracy** | Democracy  
  • No room for autocracy / harshness |
| **Continuity** | Continuity  
  • Logical growth |
| **Interaction** | Interaction |

<table>
<thead>
<tr>
<th><strong>Bandura’s Extension of Dewey’s Concepts</strong></th>
<th></th>
</tr>
</thead>
</table>
| **Teaching through Inquiry / Discovery** | Teaching through Inquiry / Discovery  
  • Self – directed learning  
  • Problem-solving learning |
| **Teaching Through Modeling** | Teaching Through Modeling  
  • Imitation / Identification / Modeling |
Characteristics and Skills of Motivating Instructors

- **Expertise**: Power of knowledge and preparation
  - Knows something beneficial, knows it well, is prepared to convey

- **Empathy**: Power of Understanding and Consideration
  - Realistic understanding of learner needs
  - Adapts to learner’s level of experience and skill development

- **Enthusiasm**: Power of Commitment and Animation
  - Cares about and values what is being taught
  - Appropriate degrees of emotion, and energy

- **Clarity**: Power of Language and Organization
  - Can be understood and followed by learners
  - Has ability to adapt to second presentation
Adult Education Learning Backbone

- Timely repetition
- Formative feedback
  - personal
- Choice
  - content
  - time
  - level
  - depth
- Mentorship
- Learning objectives
The Challenge of Surgical Education
Assessment

• Challenge in all medical specialties
• Relationship to “Competency”
• Part of all Modern Educational Curricular design
  – Learning Objectives, Curriculum design, Assessment tools, Validation, Adoption to certify
• Learning Management Systems (LMS)
Purpose of Assessment?

- To aid learning through constructive feedback:
  - Assessment *for* Learning (formative)
  - Must be done frequently e.g. WBA

- To check knowledge or skill has been learned:
  - Assessment *of* Learning (summative)
  - Done infrequently e.g. Exams (MSF?)
Classic Surgical Training Model

- **Classic Apprenticeship & Examination**
  - Time based
  - Minimal training of trainers
  - Formative evaluations:
    - In training exams
    - Faculty or Program Director evaluations
    - Little structure
  - Summative assessment
    - Case Logs
    - Program Director recommendation of competency
    - Qualifying examination (cognitive)
    - Certifying examinations (affective)
    - No technical exam
Skill Assessment

• Do our current methods of assessment guarantee competency?
  – Case Numbers
    – High variability
    – Loose definitions / Little audit
    – No established benchmark
  – Observation
    – Inter- and intra-rater variability
    – Case variability
    – No uniform instrument
    – No established benchmark
    – Now splitting cases
  – Summative exams (Qualifying / Certifying)
    – Little correlation with later success as surgeon
    – Remains our benchmark

Skill Assessment

• What has been tried?
  • Simulation testing
    – OSATS
    – Virtual Simulators (MIST-VR)
  • Structured observation
    – Live observation
    – Recorded observation
  • Error detection
  • Motion tracking
  • Procedure time

Workplace based assessment in surgical training: the UK experience (so far)

Chris Munsch
Cardiac Surgeon, Leeds UK
Chair, Joint Committee on Surgical Training (2007-2011)
The purpose of assessment

- **Formative** – assessment *for* learning
- **Summative** – assessment *of* learning
Assessing competencies in the new curriculum: traditional assessment tools

<table>
<thead>
<tr>
<th>CanMeds</th>
<th>MCQs</th>
<th>Clinicals</th>
<th>Vivas</th>
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</thead>
<tbody>
<tr>
<td>Medical expert</td>
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<td>Communicator</td>
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<td>Collaborator</td>
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<td>Professional</td>
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Workplace based assessment tools

- Case Based Discussion (CBD)
- Mini clinical evaluation exercise (miniCEX)
- Multisource Feedback (MSF)
- Direct observation of procedural skills (DOPS)
- Procedure based assessment (PBA)
- Linked to Educational Supervisors Report
- Feeds into Annual Review of Competence Progression
General Surgery PBA: Laparoscopic cholecystectomy

Competencies and Definitions

<table>
<thead>
<tr>
<th>Competencies and Definitions</th>
<th>Rating</th>
<th>Comments</th>
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</thead>
<tbody>
<tr>
<td>IV. Intra operative technique</td>
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<tr>
<td>IT1(G) Follows an agreed, logical sequence or protocol for the procedure</td>
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<td>IT2(G) Consistently handles tissue well with minimal damage</td>
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<td>IT3(G) Controls bleeding promptly by an appropriate method</td>
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<td>IT4(G) Demonstrates a sound technique of knots and sutures/staples</td>
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<td>IT5(G) Uses instruments appropriately and safely</td>
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<td>IT6(G) Proceeds at appropriate pace with economy of movement</td>
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<td>IT7(G) Anticipates and responds appropriately to variation e.g. anatomy</td>
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<td>IT8(G) Deals calmly and effectively with unexpected events/complications</td>
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<tr>
<td>IT9(G) Uses assistant(s) to the best advantage at all times</td>
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<tr>
<td>IT10(G) Communicates clearly and consistently with the scrub team</td>
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<tr>
<td>IT11(G) Communicates clearly and consistently with the anaesthetist</td>
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<tr>
<td>IT12(T) Creates a pneumoperitoneum safely</td>
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<td>IT13(T) Safely inserts an appropriate number of ports</td>
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<tr>
<td>IT14(T) Dissects cholecystectomy triangle safely</td>
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<tr>
<td>IT15(T) Safely ligates and divides cystic duct and artery</td>
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<td>IT16(T) Carefully mobilises gallbladder off the liver</td>
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<tr>
<td>IT17(T) Safely extracts gallbladder from a port site</td>
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<tr>
<td>VI. Post operative management</td>
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<tr>
<td>PM1 Ensures the patient is transferred safely from the operating table to bed</td>
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<td>PM2 Constructs a clear operation note</td>
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<tr>
<td>PM3 Records clear and appropriate post operative instructions</td>
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<tr>
<td>PM4 Deals with specimens. Labels and orientates specimens appropriately</td>
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<tr>
<td>Global summary</td>
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<tr>
<td>Level at which completed elements of the PBA were performed on this occasion</td>
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<tr>
<td>Level 0 Insufficient evidence observed to support a summary judgement</td>
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<tr>
<td>Level 1 Unable to perform the procedure, or part observed, under supervision</td>
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<tr>
<td>Level 2 Able to perform the procedure, or part observed, under supervision</td>
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<td>Level 3 Able to perform the procedure with minimum supervision (needed occasional help)</td>
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<tr>
<td>Level 4 Competent to perform the procedure unsupervised (could deal with complications that arose)</td>
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Comments by Assessor (including strengths and areas for development):

Comments by Trainee:

PBA Assessment: Produced by OCAP, OpComp & the SAC for General Surgery
<table>
<thead>
<tr>
<th>CanMeds</th>
<th>Curriculum domains</th>
<th>CBD</th>
<th>Mini CEX</th>
<th>MSF</th>
<th>DOPS</th>
<th>PBA</th>
<th>AES report</th>
<th>Exams</th>
<th>ARCP</th>
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<tbody>
<tr>
<td>Medical expert</td>
<td>Knowledge Clinical Skills Technical Skills</td>
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<td>Communicator</td>
<td>Clinical Skills (professional and generic)</td>
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<td>Collaborator</td>
<td>Technical Skills (professional and generic)</td>
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<td>Manager</td>
<td>Knowledge (professional and generic)</td>
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<tr>
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<td>Knowledge</td>
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Faculty Development

- Training and Assessment in Practice (TAIP) course
- Webcasts on ISCP website
- Regional delivery of training sessions
- Leader as educator programme
Effective Assessment in CBME

- Continuous and Frequent
  - Robust on-going formative feedback
- Criterion based
  - Milestones or benchmarks
- Emphasis on what Trainee will ultimately do
  - Robust work-based assessments
- Quality assessment tools
- Qualitative measures and methods
  - Judging portfolios
- Emphasize group wisdom
  - Activate trainee involvement
I’ll read your faults one at a time. Tell me when your performance improves.
The Challenge of Surgical Education

Accountability

• Who will hold us accountable for outcomes, performance, quality and safety?
  – Government
  – Payors
    • Pay for Performance
  – Medical societies
  – ACGME / Specialty Boards
    • Milestone Project
  – Society in general
    • Airline standards
  – Ourselves
Are We Achieving “Competency” in Surgical Training in 2011?
ABS Examination Results

2010
Qualifying exam pass rate: 75%
Certifying exam pass rate: 75%
ABTS Qualifying (Written) Exam Pass Rate 1988 - 2009

2010
Qualifying exam pass rate: 73%
Certifying exam pass rate: 68%
Should we be Striving for Expertise in Surgical Training in 2012?
<table>
<thead>
<tr>
<th>Competency</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Must be put into context of evolution of medical education</td>
</tr>
<tr>
<td>– Emphasis on competency….expertise</td>
</tr>
<tr>
<td>• Must meet acceptable outcomes and safety standards</td>
</tr>
<tr>
<td>– Internally or externally defined</td>
</tr>
<tr>
<td>• Must meet societal standards</td>
</tr>
<tr>
<td>– Airline standards</td>
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</tbody>
</table>
Surgical Education - Paradigm Shift

Traditional
- **Halstedian** - “See one, do one, teach one”
- Determined by patient flow
- “Conventional” fixed didactic lectures
- Subjective personal evaluation
- Specific time and place

Next Generation
- Simulation – “Do many, mentored always”
- Each student every variation at own pace
- Interactive, updated (web based) lectures
- Standardized, objective, criterion based evaluation
  - Formative and Summative
- Continuous at point of clinical care
Thank you
The Evolving Structure of Resident Education

- Remains time based
- Assessment / Competency:
  - Case logs
  - Summative exams
  - Program Director recommendations
- “Integrated” training algorithms increasing
  - Plastics / Vascular / Cardiothoracic
- Duty hours limitations real impact in surgery
- Discussions of “Criterion” based training
  - Formative evaluations
### Can We Measure Competency?

**Do We Measure Competency?**

**How Should We Measure Competency?**

- **Time spent in training**
  - Apprenticeship holdover
- **Log book**
  - Case numbers, ABTS determined
- **Program Director recommendation**
  - Can they say no?
- **Summative exams**
  - Qualifying / Certifying exams
- **Formative feedback**
  - Variable
Goals and Purposes for Learning

Individual and Situational Differences

Core Adult Learning Principles

1: Learner’s Need to Know
   Why, What, How

2: Self Concept of the Learner
   Autonomous
   Self-Directing

3: Prior Experience of the Learner
   Resource
   Mental Models

4: Readiness to Learn
   Life related
   Developmental task

5: Orientation to Learn
   Problem centered
   Contextual

6: Motivation to Learn
   Intrinsic Value
   Personal payoff

Knowles MS et al: The Adult Learner; Elsevier, 2005
There are several purposes to formative assessment:

- to provide feedback for teachers to modify subsequent learning activities and experiences
- to identify and remediate group or individual deficiencies;
- to move focus away from achieving grades and onto learning processes, in order to increase self efficacy and reduce the negative impact of extrinsic motivation.

Frequent, ongoing assessment allows both for fine-tuning of instruction and student focus on progress.

Feedback is the central function of formative assessment. It typically involves a focus on the detailed content of what is being learnt rather than simply a test score or other measurement of how far a student is falling short of the expected