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14. ABSTRACT

The Society of Laparoendoscopic Surgeons organized the Gap Analysis Workshop for Training for Reintegration of minimally invasive Surgical Skills in order to discuss gaps and develop a curriculum for military and civilian personnel who are away from their peacetime specialty. The workshop assembled key personnel who convened to survey current strategies, discuss the major factors influencing skill decay, and brainstorm solutions for improving skill retention, and resources for developing a reintegration course. The key research accomplishments of this workshop include an Overview of Ideal Reintegration Program for Returning Surgeon Soldiers: List of Characteristics of Program, List of Domains that should be included, List and description of Program Elements; Summary of Program Outcomes and Evaluation; Example of how Reintegration Program Timeline can be integrated into the Deployment Timeline; and Recommendations for a Coordinated Program. Recommendations made here may be adaptable for civilian use as all surgeons face many similar issues while reentering the workforce. A coordinated reentry effort will create the opportunity for military surgeons as well as civilians to remain on the cutting edge of laparoscopic and minimally invasive surgery and to continue to work to provide the best possible care to their patients. This workshop essentially lays the groundwork for the potential development of a maintenance and reintegration program for laparoscopic skills.

15. SUBJECT TERMS

Skill decay, skill degradation, physician reentry, reintegration, surgeon soldier, military deployment, refresher training

Table of Contents

GAP ANALYSIS WORKSHOP FOR TRAINING FOR REINTEGRATION OF SURGICAL SKILLS

Introduction

The Society of Laparoendoscopic Surgeons (SLS), a non-profit, multidisciplinary and multispecialty educational organization, organized a Gap Analysis Workshop for Training for Reintegration of minimally invasive Surgical Skills in order to discuss gaps and develop a curriculum for military and civilian personnel who are away from their peacetime specialty, whether when deployed or on administrative absences for sabbatical, pregnancy, acquisition of non-medical expertise, etc. The workshop assembled relevant personnel who convened to discuss the major factors influencing skill decay, solutions for improving skill retention, and resources for developing a reintegration course. The goal of the workshop was to combine military expertise in simulation with experience in skill maintenance in order to develop a training strategy that will maximize performance during both wartime and peacetime. The results of the workshop will aid in developing a course that will allow surgeons to remain on the cutting edge of laparoscopic and minimally invasive practices. While designed initially for military personnel, such curricula are "dual use" by nature and can be implemented in civilian trainings as military surgeons and civilian surgeons experience many similar issues. In addition, the results will aid in developing a strong professional and working relationship between the military and civilian sectors. It is expected that development of such program will also aid in lowering costs of future retraining. This report (1) presents issues discussed and evidence towards the need for a coordinated approach to reintegration of surgical skills (2) defines the ideal program as per recommendation with collaborators and (3) provides recommendations for a coordinated approach to achieving this reintegration protocol for surgeon soldiers.

Body

Overview of Workshop

The Society of Laparoendoscopic Surgeons (SLS) is a non-profit, multidisciplinary and multispecialty educational organization established to provide an open forum for surgeons and health professionals interested in laparoscopic, endoscopic and minimally invasive surgery. SLS endeavors to improve patient care and promote the highest standards of practice through education, training, and information distribution.[1] SLS organized the Gap Analysis Workshop for Training for Reintegration of minimally invasive Surgical Skills in order to discuss gaps and develop a curriculum for military and civilian personnel who are away from their peacetime specialty, whether when on deployment or on administrative absences for sabbatical, pregnancy, acquisition of non-medical expertise, etc.

The workshop assembled relevant personnel (See Appendix A for list of Collaborators) who convened to survey current strategies, discuss the major factors influencing skill decay, and brainstorm solutions for improving skill retention, and resources for developing a reintegration course.

To prepare for designing a reintegration protocol, the workshop participants focused on developing an understanding of the deployment cycle and current strategies for reintegration of service members to their surgical subspecialty. This included a review of current military

surgical training and retraining procedures as well as the current military and civilian surgical skills that need to be maintained while surgeons are deployed and otherwise away from their peacetime specialty. This provided a background for the gap analysis. Next, major factors that have been found to influence the decay or retention of surgical skills during nonuse were discussed. An overview of current American Medical Association reentry recommendations was presented followed by an overview of training programs, resident training program guidelines, certification programs and mandates, as well as curricula that may be available. Slides from presentations with this background information are provided in the Appendices B-E).

The gap analysis consisted of a discussion of known skills that are lost/degraded and gaps in military surgical laparoscopic and minimally invasive surgery skills training. This was followed by a Strategy, Brainstorming, and Analysis Session (Please See Appendix F for Brainstorm Map). Workshop attendees analyzed ways to address gaps in training and skill decay issues in order to design and formalize solutions. These solutions were developed into an outline and template for the design of a standardized reintegration course.

The remainder of this report will outline findings and recommendations that resulted from the workshop.

Current Deployment Tempo

Since the Iraq Invasion in 2003, Army general surgeons have deployed 3-4 times to combat theaters with most deployments lasting 6 months. The "Dwell" time between these deployments ranges from 18-24 months. Despite the decreased operational tempo in Iraq, the demand for medical-surgical contingency capabilities has decreased only slightly. There is an increasing operational tempo and geographic dispersion in Afghanistan.

Timeline	Activity
T - 90-180 days	Notification of Deployment
T - 45 days	Unit Level Pre-deployment Training
T - 30 days	Finish elective cases/ Follow-up Clinic
T - 15 days	Family time / leave
T - 0	Deployment from Home Station
T + 10 days	Complete Pre-deployment Training
T + 11-15 days	Arrive at Assigned Location
180 Days	*180 Day Deployment begins at this point*
T + 195 days	Replacements Arrive / Transition
T + 200 days	Re-deploy to Homestation
T + 214 days	Mandatory Re-integration period
T + 228 days	Family time / Leave
T + 250 days	Start Clinics, Call and Booking Elective Cases

Table 1. Deployment Schedule for Military Surgeons

Current Military Approach to Laparoscopic Skills Degradation

Since 2002, surgeons of every specialty have deployed in support of wars in Iraq and Afghanistan. Deployments lengths have ranged from 3-15 months. Surgery in theater has been limited for the most part to traumatic wounds, which provides rare opportunities for laparoscopic surgery. Current Military Treatment Facilities have seen a paradigm shift towards laparoscopy since 2003. For example, from 2003 to 2010, Madigan Army Medical Center has seen a 55

percent increase (from 33% to 88%) in laparoscopic elective surgery procedures. It has been found there is continued patient demand for minimally invasive surgery as well as a continued desire by attending staff to provide and offer these procedures. In addition, residents are graduating with a growing facility in laparoscopic techniques but there are continued demands on the surgical community to support wartime medical requirements which many times require facility with open surgical skills.

Currently, there are some solutions or opportunities for surgeons to maintain their surgical skills while away from their peacetime specialties, however, there is no formalized program for reentry through the Department of Defense. Currently there are proctored cases available where there is dual-attending involvement in return to complex laparoscopic cases, there are teaching hospitals, and small 1-2 surgeon facilities. There is also a local agreement with civilian institutions to scrub/assist in advance laparoscopic cases. Lastly, there are some hands-on courses or "mini" fellowships. It was also learned that there are mentoring opportunities in the military. Yet, these solutions are not sufficient and challenges continue to arise. Some of the challenges include a demand for productivity, issues with patient safety, costs of travel and re-training, additional time needed away from home and family, and fears of administrative obstructions to return to clinical practice. In addition, only self-assessment is currently available to gauge a surgeon's ability to return to advanced cases and there is an effect on retention of surgeons and surgical sub-specialists. Research and clinical practice have shown the limits of self-assessment as confidence and competence are not always aligned after a leave of absence.

Skill degradation is a concern in the military and self-perceived degradation has been shown in a survey of 1500 deployed physicians. A Pre-deployment Skill Self Assessment,[2] survey of 1500 deployed physicians asked physicians rated themselves on perceived degradation of skills. Results showed that physicians rated themselves an average of 6.0+/-1.0 on 7 point Likert Scale with 7 being the best (P=.001). Post-deployment, they rated their skills to be an average 4.0+/-1.5 (P=.001). They perceived that "it took 3-6 months to return to their clinical and surgical performance baseline." Most of the specialty surgeons felt they needed from three to six months to return back to their pre-deployment skill level.

Factors that Influence Skill Decay

Skill decay occurs when there is loss of acquired skills or knowledge after periods of nonuse. Nonuse can be associated with loss of up to 92% of baseline skills.[3] This can become problematic if individuals are asked to perform a skill proficiently after extended periods of time without use of that skill. This scenario is encountered frequently in surgery when surgeons may have to perform a procedure that has not been performed recently. This is particularly relevant to laparoendoscopic military surgeons who may not have the opportunity or resources available to perform this type of surgery when deployed. Factors that influence skill decay are an important topic and consideration when designing a reintegration protocol for returning surgeon soldiers. It has been clearly shown in nonsurgical literature that longer periods of retention can be associated with more skill decay.

Factors that may influence skill decay include: retention interval, task characteristics, methods of testing and conditions of retrieval, training methods and evaluation criteria, individual differences, and degree of overlearning. Overlearning refers to the amount of additional training after initial proficiency is achieved and has been shown to help minimize skill decay. In addition, some specific characteristics of learning may also influence decay. Natural tasks have been

shown to be retained better than artificial tasks. Similarly, physical tasks are usually maintained better than cognitive tasks. Speed has also been shown to be retained better than accuracy.

In addition, training methods are also believed to affect skill retention with better quality training leading to less skill decay over time. Proficiency-based training appears to be associated with better retention compared to time-based training. Furthermore, maintenance training on simulators has been shown to minimize skill decay over time with up to 95% skill retention at 6 months after proficiency-based training.[4,5]

Participants identified the need for an evidence-based skills training curriculum that is learner-centered. This will allow for a positive emotional experience, which is an important part of lasting learning. If learners take no ownership of what they are learning the will not be solid and will not last. This learner-centered curriculum will also include self-assessment where surgeons will be able to objectively measure their proficiency and retrain accordingly.

Current AMA Reentry Recommendations

Participants also looked at the current American Medical Association (AMA) recommendations for reentry of physicians While military surgeons are a unique demographic, many issues that are faced are similar to any physician reentering the workforce. The AMA defines physician reentry as: "A return to clinical practice in the discipline in which one has been trained or certified following an extended period of clinical inactivity not resulting from discipline or impairment."[6]

The AMA found that physicians wishing to return to clinical practice after periods of clinical inactivity may experience difficulties due to the lack of a comprehensive re-entry system in the United States which can result in several barriers including:

- Lack of information on re-entry programs
- Liability and credentialing issues
- Lack of consistency in regulatory guidelines/licensure and maintenance of certification
- Lack of certification related to program completion
- Financial cost of reentering practice
- Lack of access to existing programs
- Limited number of re-entry programs
- Lack of information on the re-entry process

The AMA developed sixteen recommendations in five areas: 1) Regulatory policies, 2) Physician re-entry program policies, 3) Research and evaluation, 4) Program funding and 5) Collaboration and communication among stakeholders.[6] These recommendations are meant to help alleviate some of the barriers and offer a coordinated approach to physician re-entry.

The AMA has also produced a list of ten guiding principles for a physician reentry program. These principles apply to all physician reentry programs and are important when considering a protocol for reentry of surgeon soldiers. These principles are available in Table 2.

AMA 10 Guiding Principles for a Physician Re-entry program
1. **Accessible** *by geography, time and cost*
2. **Collaborative** *to improve communication and resource sharing*
3. **Comprehensive** *to cover relevant areas*

4. **Ethical** *based on principles of medical ethics*
5. **Flexible** *to maximize program usefulness*
6. **Modular** *to meet the specific needs of individual physicians*
7. **Innovative** *in employing state-of-the-art educational formats and content*
8. **Accountable** *by establishing mechanisms for assessment and evaluation*
9. **Stable** *to ensure adequate funding for programs*
10. **Responsive** *to changing circumstances*

Table 2. AMA 10 Guiding Principles for a Physician Re-entry program[7]

As AMA recommendations and principals were reviewed, one advantage that was identified for returning surgeons soldiers was that while other reentering physicians may not have a solid timeline depending on their circumstances, surgeon servicemen have a regular deployment schedule that provides opportunity to anticipate the time when skills may decay. This provides a unique opportunity for a structured course of action to minimize skill decay, maintain skills, and perhaps even provide the opportunity to advance skills. This allows for career planning through available programs rather thank working backwards to re-learn skills. Another advantage of surgeon soldiers is that they will go back to work after time away. Non-military physicians have no guarantee of employment upon completion of a reentry program. Because of these advantages, a structured reentry program for surgeon servicemembers is more feasible. It is important to also take into account the needs of those who leave their practice for other reasons (for example administrative duties or family leave). These individuals would have a similar situation to non-military physicians and would still be able to benefit from many of the items in the proposed reentry protocol outlined in this report.

Overview of Training Programs & Certification Requirements

Participants also reviewed current training programs and certification requirements. It was noted that there is no standardized reentry protocol in US although a survey by the AMA found that about 79% of medical licensing boards have some standards in place or are in the process of developing or planning to develop a reentry policy.

In regards to training and assessment tools, currently, some professional credentialing organizations have training and assessment tools in place. Recently, there have been training requirements developed for surgical programs as well as skills training models for laparoscopic surgery certification like the Fundamentals of Laparoscopic Surgery (FLS) sponsored by the American College of Surgeons (ACS) and the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES).[8] SCORE (General Surgery Resident Curriculum Portal) is currently in place for general surgery and identifies what general surgeons are expected to know at the end of their surgical trainings. Several organizations are members of SCORE including the American Board of Surgery (ABS), ACS, American Surgical Association (ASA), Association of Program Directors in Surgery (APDS), Association for Surgical Education (ASE), Residency Review Committee for Surgery (RRC-Surgery), and SAGES.

In order for physicians to be certified by the American Board of Surgery, they must pass a written examination followed by an oral examination. FLS is required for them to take the qualifying examination. There are no special operative profile or numbers required. In addition, there is still no consensus or mandate to assure a sustained level of competency. It was determined that a list of expectations may help inform that list of laparoscopic expectations would serve to inform specific content to be included in military surgeon for reintegration

program. ABS does have a defined group of essential laparoscopic cases, which may be a good starting point for the curriculum.

It was also found that like the ABS, many other organizations do not have current reentry requirements but work with physicians on a case-by-case basis. Global competency assessment (in all dimensions) for laparoscopic surgeons is not yet generally available or accurate

Key Findings

The key findings of this background information include the following:

1. Skill degradation is real and is a concern. This is particularly an issue for laparoendoscopic surgeons who many not have the opportunity or resources to utilize or practice their minimally invasive skills when deployed.
2. A reintegration program is needed and must be customized to the surgeon and to the practice
3. Surgeon service members have a regular deployment schedule that provides opportunity to anticipate the time when skills may decay and for a structured course of action to minimize skill decay, maintain skills, and perhaps even provide the opportunity to advance skills.
4. There is a tradition of mentoring in the military, which can be used towards the advantage of the program.
5. Competency (in all dimensions) assessment is not yet generally available or accurate and more accurate assessment of competency is required

Program Overview

Based on these findings, an ideal program was outlined for reintegration of surgical skills. There was universal agreement that the program should include "maintenance" strategies and not just post-deployment activities. As a first step, skills were identified that would need to be taken into account; these include: Psychomotor, Cognitive, Communication, and Affective skills. Table 3 outlines examples of the domains of the program. Next, the program characteristics were defined. After much debate, there was eventual universal agreement that the reintegration program should be (1) learner-centered, (2) individually administered, (3) longitudinally structured throughout, and (3) self-monitored. Self-monitoring will include tools to address weaknesses as well as standardized objective assessment. Self-monitoring is essential, as it will allow surgeons to evaluate themselves without fear of repercussion. This will allow for a positive learning experience, which will in turn help to improve learning. The program (including the assessments) should be formative and not punitive.

Reintegration Program Domain Examples
Psychomotor • Navigation • Tissue handling and dissection • Intracorporeal suturing and knot tying • Hand eye coordination
Cognitive • Judgment • Ability to recognize tissue planes • "What if" scenarios • Steps of a given procedure

Communication • Team formation and reformation • Shared mental model • Closed-loop communication • Team STEPPS
Affective • Internal human factors • External factors

Table 3. Reintegration Program Domain Examples

The group felt that a learning management and reintegration program could be developed with the following key elements:

(1) *Evaluate each surgeon's pre-deployment practice for the individual surgeon's personal 10 most common laparoscopic procedures using GOALS or equal assessment.* This will include communication and cognitive skills. For example, a gynecological surgeon may list diagnostic laparoscopy and cognitive ectopic pregnancy as most common laparoscopic procedures. May want to pair up with a mentor that matches such a practice.

(2) *Specialty specific goals will be developed within curricular domains, as identified for each surgeon participating in the reintegration program. Personal skills goals will be solicited from the surgeon and may be adjusted at any time.* For example, the above surgeon would provide individualized goals, perhaps the surgeon would like to not only retain the pre-deployment skills but also learn robotic skills.

(3) *Baseline skills assessment will compare physicians' skill level to that of their peers and available established benchmarks. Scores will be confidential and available only to the surgeon and his or her mentor.* This assessment should be structured and marketed as not just "one more thing" that needs to be completed or a burden, it should be marketed as an opportunity to improve and continue to improve skills while deployed. The group recognized that a MIS practice is a "moving target". This assessment should also balance a patient safety focus with the individual surgeon's professional role and rights. For example, there are currently some specialty and procedure assessment available.

(4) *Define surgeon-specific areas of challenge and opportunity for focused work.* For example, the gynecological surgeon may need to focus on laparoscopic suturing, eye-hand coordination, and perception of tissue planes.

(5) *Provide links to existing training curricular elements.* Existing curricula should be used as a first step where expertise of existing reentry programs are utilized where possible and applicable. Curricula based on challenging areas and goals should be prioritized. The domains of the curricula are listed in Table 3. Platforms used will include both physical and computer-based training. Please see Appendix G for a list of existing programs and educational resources that might be used as curricula for this program.

(6) *Development of needed curricular elements.* These elements will fill in the gaps for those skills that do not have existing curricula in place. The domains and platforms will be as listed above.

(7) *Deployment schedule will be utilized to maximize timing issues.* Table 4 outlines the times where program elements were identified to best fit into the deployment schedule.

(8) *Formative Feedback will be provided to help guide next phases of the program.*

(9) *Objective summative assessment of training effectiveness.* This portion may be in the second phase of the program.

(10) *Mentored Practice.* There is a strong tradition of mentoring in the military and this will be utilized to help in the learning process.

(11) *Program Evaluation.* Evaluation will include objectives achieved, ongoing monitoring, and sequential outcomes.

(12) *Program Management and Administration.*

Timeline	Activity	Program Elements
Pre-Deployment		Introduction to Reintegration Program
T - 90-180 days	Notification of Deployment	Reminder of Program Opportunities
T - 45 days	Unit Level Pre-deployment Training	Baseline Assessment
T - 30 days	Finish elective cases/ Follow-up Clinic	
T - 15 days	Family time / leave	
T - 0	Deployment from Home Station	
T + 10 days	Complete Pre-deployment Training	
T + 11-15 days	Arrive at Assigned Location	
180 Day Deployment begins at this point		Address deficiencies in practice and training identified during assessment
T + 195 days	Replacements Arrive / Transition	
T + 200 days	Re-deploy to Homestation	
T + 214 days	Mandatory Re-integration period	Re-assess skills and needs
T + 228 days	Family time / Leave	
T + 250 days	Start Clinics, Call and Booking Elective Cases	Return to practice & 360 Evaluation

Table 4. Program Elements According to Deployment Schedule for Military Surgeons

Program Outcomes & Evaluation

The desired outcomes of the program are as follows: (1) Surgeons achieve a basic competency level as they return to practice, (2) Minimize skill loss before, during, and after deployment for military surgeons, (3) Surgeons are reassured that we care about their practice and skills, and (4) Surgeons will understand the patient safety aspects of having adequate skills.

As a result of this program, surgeons deployed will be offered opportunities to improve their skills, help to minimize laparoscopic skill loss and, as necessary, help to effectively and efficiently return to clinical practice, adapting for any changes that have occurred since they left. The idea for the program is to be supportive and helpful rather than punitive and to provide surgeon service members opportunities to maintain and perhaps even improve their skills while

deployed. This would fill an important gap that is currently needed for surgeon service members, especially for laparoendoscopic surgeons.

The program can be evaluated through a number of metrics. One metric would be the number of enrolled surgeons in the program and percent of participants. In addition, the percent of program completion could be calculated. The surgeons' program assessment and evaluation would provide valuable feedback as well as post-implementation evaluation of cases, case types, complication rates, and changes from pre-deployment in challenging areas if available. In regards to assessing the individual surgeon, there will be a baseline assessment, self-assessments, and proctored assessment. This will allow for formative feedback throughout the process. Post-deployment and after returning to practice, there will be a 360 degree evaluation. All of this information combined will help to provide a picture of the effectiveness of the program for the individual surgeon as well as of the program as a whole.

Key Research Accomplishments

The key research accomplishments of this workshop include the following items:

- Summary of Current Military Approach to Laparoscopic Skills Degradation
- Summary of Current Gaps in Military Reintegration Opportunities
- Summary of Skill Decay Issues and Opportunities for prevention
- Summary of Current Reentry Initiatives and Recommendations
- Summary of Current Training Programs and Certification Requirements
- Summary of Key Findings
- Overview of Ideal Reintegration Program for Returning Surgeon Soldiers
    - List of Characteristics of Program
    - List of Domains that should be included
    - List and description of Program Elements
- Summary of Program Outcomes and Evaluation
- Example of how Reintegration Program Timeline can be integrated into the Deployment Timeline
- Recommendations for a Coordinated Program

Reportable Outcomes

This workshop essentially lays the groundwork for the potential development of a maintenance and reintegration program for laparoscopic skills. We intend to present our findings at both civilian and military meetings and publish the findings in the Journal of the Society for Laparoendoscopic Surgeons. We plan on applying for funding for the development of such a program.

Conclusion

This workshop brought together key individuals who were able to discuss the issues facing the returning surgeon servicemember and ways to maintain and reintegrate surgical skills. As a result of this research and workshop, participants were able to identify key issues that need to be addressed in regards to the opportunities currently available to returning military surgeons. When deployed, they may not have the opportunity to retain their skills, especially

laparoendoscopic skills that are many times are not utilized. This may lead to decay of skills if steps are not taken to mitigate this.

An ideal reintegration program and protocol is outlined in the report and participants are hopeful that the recommendations made will help guide a re-entry programs for post-deployment surgeons. A reintegration program as outlined above can have an impact on skill decay among deployed surgeons including a reduction of attrition after periods of nonuse, increased efficiency in the operating room, as well as cost saving and improved patient outcomes. Recommendations made here may be adaptable for civilian use as all surgeons face many similar issues while reentering the workforce. A coordinated reentry effort will create the opportunity for military surgeons as well as civilians to remain on the cutting edge of laparoscopic and minimally invasive surgery and to continue to work to provide the best possible care to their patients.

Recommendations for a Coordinated Reintegration Program

Based on the discussion and information presented, it is recommended that a coordinated approach is taken in order to provide a systematic reintegration program for post-deployment surgeons. This is an issue that applies to civilians as well as there are no current national reentry programs. All programs should consist of the following items in order to provide the opportunities needed for surgeons to retain or regain their skills. These programs should:

- Follow AMA Guiding Principles for a Physician Re-entry program (See Table 2)
- Be organized with clear milestones and deliverables
- Be funded
- Include repeated training and reinforcement training
- Incorporate communication, psychomotor, and cognitive skills - assessment, deficit
- Include overtraining
- Have long term interval follow-up
- Have a tracking database for workforce management
- Be self-regulated to avoid a "one size fits all" regulatory solution that may be less acceptable

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Appendices

Appendix A. List of Participants and Collaborators

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Appendix B - Presentation: Current Military Tempo and Approach to Laparoscopic Skills Degradation

Laparoscopic Skills Degradation Gap Analysis Workshop

13 Sep 2011

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General Surgeon
Medical Director
Andersen Simulation Center
"Training Today Saves Lives Tomorrow"

Military Background

- Background
  - Since 2002, surgeons of every specialty have deployed in support of wars in Iraq and Afghanistan
  - Deployment lengths have ranged from 3-15 months
  - Surgery in theater limited to care for traumatic wounding
  - Limited opportunities for specialty specific surgery
  - Rare opportunities for laparoscopic surgery

Elective Surgery

- Military Treatment Facilities (2003-present)
  - Elective surgery paradigm shift towards laparoscopy

Madigan Army Medical Center
Elective General Surgery

2003	67%	33%
2010	12	88%

Current Status

- Continued patient demand for minimally invasive surgery
- Continued attending staff desire to provide/offer minimally invasive procedures
- Residents graduating with a growing facility in laparoscopic techniques

(Ironically raising concerns for open surgical skills for wartime deployment)

- Continued demands on surgical community to support wartime medical requirements

Deployment Tempo

- Since 2003 (Iraq invasion)
  - Army General surgeons have deployed 3-4 times to combat theaters
  - Most deployments lasting 6 months
  - "Dwell" time between deployments ranging from 18-24 months
  - Despite decreased operational tempo in Iraq- demand for medical-surgical contingency capabilities has decreased only slightly
  - Increasing operational tempo and geographic dispersion in Afghanistan

Deployment Cycle- 6 month

- T- 90-180 days- notification of deployment
- T-45 days- unit level pre-deployment training
- T-30 days- finish elective cases/ follow-up clinic
- T- 15 days- family time / leave
- T- 0 Deployment from home station
- T+10 days- complete pre-deployment training
- T+11-15 days- arrive at assigned location

180 day deployment starts at this point

Appendix B - Presentation: Current Military Tempo and Approach to Laparoscopic Skills Degradation

Deployment Cycle

- T+195 days- replacements arrive / transition
- T+200 days- re-deploy to homestation
- T+214 days- mandatory re-integration period
- T+228 days- family time / leave
- T+ 250 days- start clinics, call and booking elective cases

Deering et. al- AJS 200

- Survey of 1500 deployed physicians and perception of skill degratation
- Pre-deployment Skill Self Assessment
  - 6.0+/-1.0 / 7 point Likert Scale (7 best) (P=.001)
- Post-deployment Skill Self Asessment
  - 4.0+/-1.5 / 7 point Likert Scale (7 best) (P=.001)
- Perception: "it took 3-6 months to return to their clinical and surgical performance baseline"

Current Solutions

- Proctored cases
  - Dual- attending involvement in return to complex laparoscopic cases
    - Teaching hospitals
    - Small 1-2 surgeon facilities
  - Local agreement with civilian institutions to scrub/ assist in advance laparoscopic cases
  - Hands-on courses / "mini"fellowships

Challenges

- Demand for productivity
- Patient Safety
- Self assessment as standard to return to advanced cases
- Cost of travel and re-training
- Additional time away from home / family
- Fears of administrative obstructions to return to clinical practice
- Effects on retention of surgeons and surgical sub-specialists

The Next Step...

- Objectify perceived degradation
  - Pre-deployment laparoscopic virtual reality assessment
  - Post-deployment laparoscopic virtual reality assessment

Specialty specific procedures (lap cholecystectomy / lap ectopic pregnancy)

Study scheduled to start in next 6 months

The Way Forward

- Combine laparoscopic skill retraining with didactic/ clinic updates in specialty
  - Incentivize rather than penalize
- Determine specialty specific emphasis for refresher training
- Utilize Telemedicine / Tele-health infrastructure
- Utilization of Simulation / Virtual reality platforms
- Minimize travel and disruption of clinical duties

Appendix C. Presentation: Factors that Influence Skill Decay

Factors that Influence Skill Decay and Retention

Gap Analysis Workshop - SLS 2011

Dimitrios Stefanidis, MD, PhD, FACS, FASMBS
Clinical Associate Professor, UNC
Medical Director, Carolinas Simulation Center
Charlotte, NC

Disclosures

Nothing to disclose

Definitions

Skill decay refers to loss or decay of trained or acquired skills (or knowledge) after periods of nonuse

It is particularly relevant and problematic in situations where individuals receive initial training on knowledge and skills that they may not be required to use for extended periods of time

- Military, infrequent clinical situations or procedures

Factors that Influence Skill Decay

Retention interval

Degree of Overlearning

Task Characteristics

- Natural vs. artificial
- Physical vs. cognitive
- Open-looped vs. closed-looped
- Speed vs. Accuracy

Methods of testing and conditions of retrieval

Training methods and evaluation criteria

Individual differences

Factors that Influence Skill Decay

Longer retention intervals were associated with higher skill loss

Overtraining modestly impacted retention

Physical tasks were significantly better retained than cognitive tasks

Natural tasks were slightly better retained than artificial tasks

Accuracy tasks decayed over three times as much as speed tasks

Factors that Influence Skill Decay

Recognition tests resulted in less decay than recall tests

Different retrieval conditions compared to learning conditions resulted in large decay differences

Behavioral criteria led to less decay of performance compared to learning criteria probably due to their relation to natural vs artificial tasks

Closed-looped tasks better retained than opened-loop tasks

Appendix C. Presentation: Factors that Influence Skill Decay

Relative Importance of Decay Factors

Conditions of retrieval	1.13
Speed/Accuracy	0.68
Physical/ cognitive	0.40
Closed/open looped	0.33
Evaluation criteria	0.27
Retention interval	0.20
Methods of testing	0.11
Overlearning	0.08
Natural/artificial	0.05

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What Evidence Exists for Skills Retention after Simulation Training?

Surgical Simulation
Laparoscopic Surgery

Carolinas HealthCare System

Evidence for Skill Decay

Medical students randomized in two groups (n=34); experimental trained for 10min on LCN simulator and control did not. Retention tested after 6 weeks surgery rotation; no differences found[1]

60 medical students trained in neonatal resuscitation skills and received booster training after 4 months either on a simulator or with video. There was no effect on their skill retention 4 more months later[2]

1 Bennett et al Am J Surg 2011

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ACLS Skills Decay

Most studies show that ACLS skills deteriorate over time and retraining at regular intervals is beneficial[1-3]

A study from Northwestern university, however, demonstrated that ACLS skill of internal medicine residents did not deteriorate over a period of 14 months after structured initial training using simulators[4]

1 Wollard et al 2004 Resuscitation
2 Anthonypillai et al 1992 Int Crit Care
3 Chamberlain et al 2002 Resuscitation

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Arthroscopy Skills Retention

6 orthopedic surgeons were trained in arthroscopic Bankart suturing on a realistic shoulder simulator

Each performed a total of 12 repetitions during 4 training sessions and retention was assessed 6 months later

At 6 months all the initially acquired skill had decayed

	First Study		Repeat Study	
	Initial	Final	Initial	Final
Path length (mm):				
Median	1826	1497	2376	1348
Interquartile range (standard error)	1605.2398 (161)	1424.1529 (28.4)	1457.2939 (273)	1136.1558 (82.8)
No. of hand movements:				
Median	238	131	285	114
Interquartile range (standard error)	188.296 (25.6)	125.140 (3.8)	150.376 (39.6)	83.141 (13.2)
Time taken (sec):				
Median	221	104	220	94
Interquartile range (standard error)	146.245 (19.7)	103.111 (2.3)	110.317 (37.9)	0999 (7.9)

Carolinas HealthCare System

Colonoscopic Skill Retention

32 medical students trained to proficiency in colonoscopy using a VR simulator

13 students had their retention tested at 4.5 months with almost no skill decay (score 10 retention vs. 10 post training vs. 5 at baseline)

Speed was retained fully but accuracy to a lesser degree (31% did not meet proficiency at retention due to overinsufflation or excessive force)

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Appendix C. Presentation: Factors that Influence Skill Decay

Retention of VR laparoscopic skill

- 33 general surgery residents (PGY I-III) trained on 6 VR basic laparoscopic tasks (LapSim) until an expert derived goal was achieved
- Their performance was assessed 6 months later
- At retention 20-80% of residents were unable to meet the expert level
- Skill decay was more pronounced for juniors than seniors
- Accuracy metrics deteriorated more than speed

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FLS Task Retention

- 16 residents trained on FLS tasks for 16 weeks (4 hrs each)
- Retention was assessed 8 months later

Average Task Completion Times

	Peg transfer	Pattern cut	Extracorporeal knot-tying	Intracorporeal knot-tying
PRE TCT (s)	201 ± 84	315 ± 144	328 ± 157	465 ± 245
POST TCT (s)	107 ± 46	165 ± 71	152 ± 61	263 ± 109
Delay TCT (s)	104 ± 68	184 ± 94	204 ± 65	267 ± 114
Relative retention	103%	89%	47%	59%

- Retention ranged 47%-103%
- Individual differences were noted
- While training goals were provided to residents no proficiency–based paradigm was used

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FLS Task Retention

- 42 surgery residents received proficiency-based training on all 5 FLS tasks
- Retention was assessed at 6.5±1 and at 12.5±1.3 months after training in two tasks (#4 and #5).

Table III. Performance scores at testing intervals

Task	Pretest	Posttest	Retention 1	Retention 2
1	180.0 ± 90.7	298.2 ± 70.5*	256.0 ± 88.8	268.1 ± 59.1
5	297.8 ± 116.2	491.2 ± 34.2†	427.1 ± 34.2‡	478.9 ± 35.6

*Posttest versus pretest, $P < .0001$.
†Posttest versus pretest, $P < .0001$.
‡Posttest versus retention 1, $P < .0001$.

- Skill retention was 86%/ 96% (#4) and 87%/ 96% (#5)
- Retraining was required for 55-86% of residents and led to improved retention at 12 months

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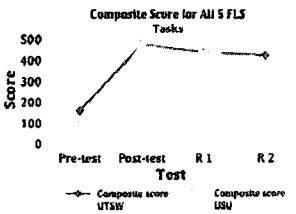
FLS Task Retention

- 15 medical students trained to proficiency on the 5 FLS tasks
- After 6 and 12 months post training skill retention was 93-95%



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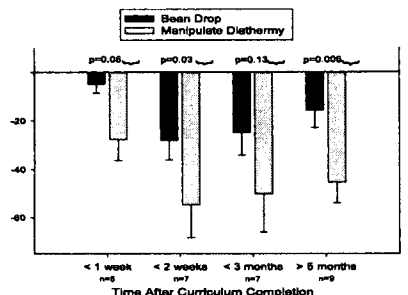
Laparoscopic Skill Loss over Time



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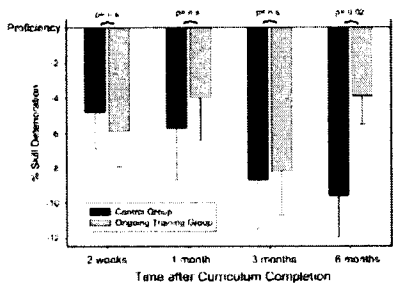
Skill Loss With/Without Retraining



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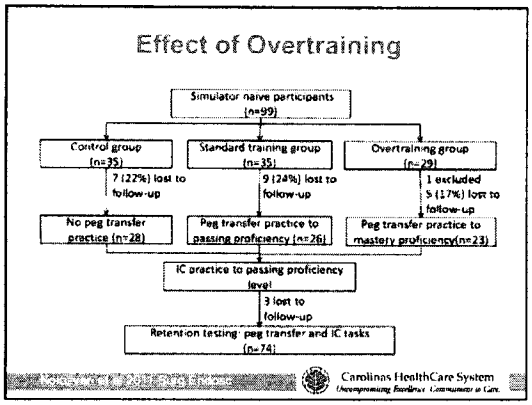
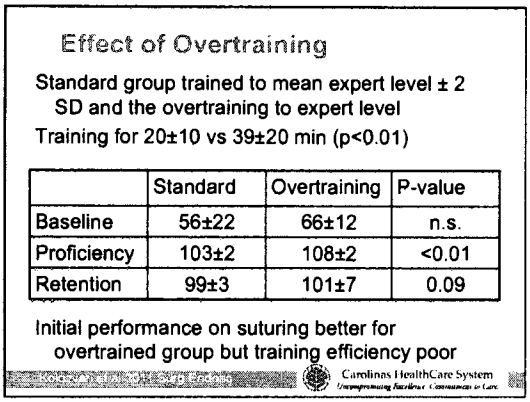
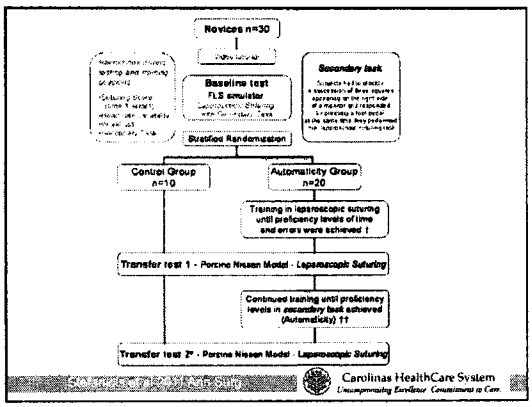
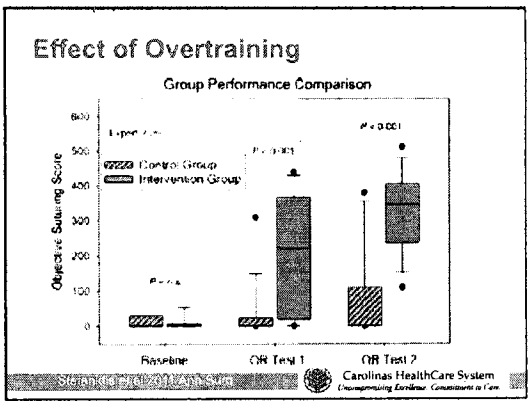
Appendix C. Presentation: Factors that Influence Skill Decay

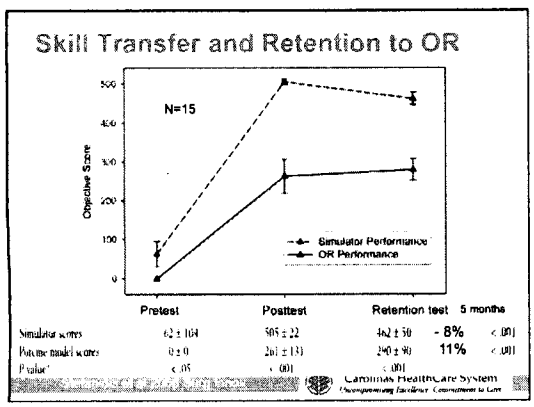


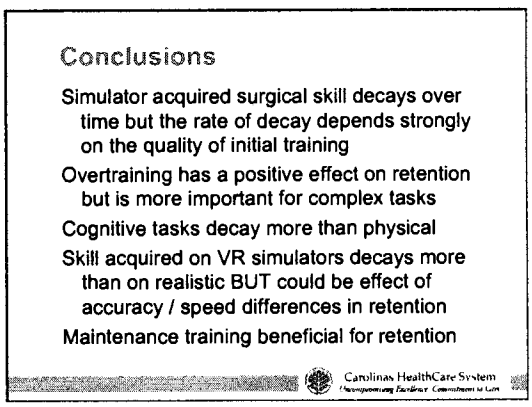


	Standard	Overtraining	P-value
Baseline	56±22	66±12	n.s.
Proficiency	103±2	108±2	<0.01
Retention	99±3	101±7	0.09

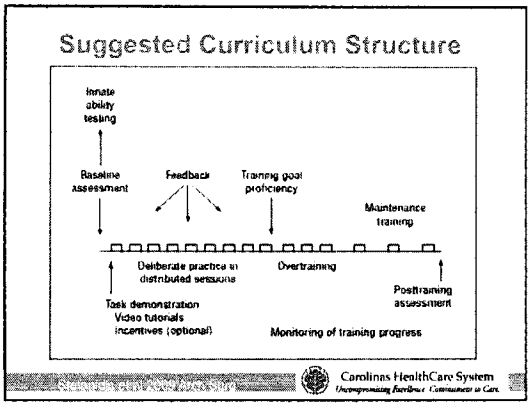


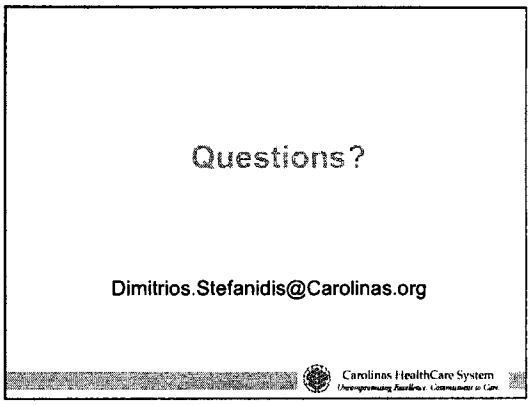






Appendix C. Presentation: Factors that Influence Skill Decay





Appendix D. Presentation: Current AMA Reentry Recommendations

Physician Re-entry to the Workforce: Recommendations for a Coordinated Approach

Gap Analysis Workshop For Training For Reintegration of Surgical Skills
September 13, 2011

Gretchen P. Kenagy, Ph.D.
Senior Research Associate
American Medical Association

AMA Definition of Physician Re-entry

A return to clinical practice in the discipline in which one has been trained or certified following an extended period of clinical inactivity not resulting from discipline or impairment.

Distinct from remediation or retraining.

AMA State Medical Licensure Requirements and Statistics, 2011

- 58% (n=33) of boards have a policy on physician re-entry (as defined by the AMA)
- 2.9 years is the average length of time after which boards with a re-entry policy require physicians to complete a re-entry program
- 50% of the 24 boards without a re-entry policy are either currently developing or planning to develop a policy on physician re-entry
- 7% (n=4) of boards require a physician to engage in a certain amount of patient care for relicensure

Challenges to Developing Physician Reentry Regulatory Policies

- Medical boards face many challenges to developing physician reentry regulatory policies including:
  - 1) lack of consistency in state medical licensing laws and regulations;
  - 2) lack of a coordinated database on reentering physicians and physicians needing a reentry process; and
  - 3) issues related to maintenance of licensure, including "performance in practice requirements," for inactive physicians.
- The following recommendations are offered as a step toward easing these challenges

AMA Recommendations

Regulatory policies

Principle: Ensure that there is a comprehensive, transparent and feasible regulatory process for physicians to return to clinical practice.

Physician re-entry program policies

Principle: Develop policies that assure the quality of re-entry programs and the readiness to resume practice of their graduates.

Research and evaluation

Principle: Create an evidence base that can be used to inform policymakers, reentering physicians and re-entry program development.

AMA Recommendations

Program funding

Principle: Develop means to ensure that a physician re-entry system is financially feasible.

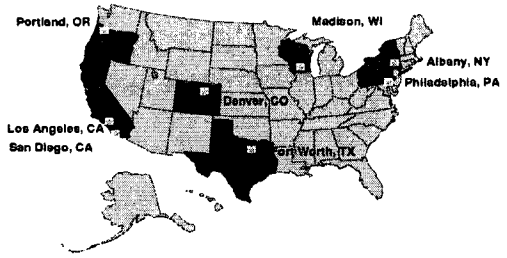
Collaboration and communication among stakeholders

Principle: Ensure that all stakeholders participate in planning for a physician re-entry system.

The recommendations are available in their entirety at: www.ama-assn.org/go/reentry

Appendix D. Presentation: Current AMA Reentry Recommendations

Location of Physician Reentry Programs in the U.S.



What is the Future Direction of Physician Reentry?

Questions for Consideration

- Are we moving toward a coordinated system of physician reentry in the U.S.?
  - Should programs operate under shared principles?
  - Should programs become more standardized?
  - Should a federal funding scheme (at least in part) be put in place to fund a reentry system?

Resources

American Medical Association
www.ama-assn.org/go/reentry

American Academy of Pediatrics
www.physicianreentry.org

Federation of State Medical Boards
www.fsmb.org

Appendix E. Presentation: Overview of Training Programs & Certification Requirements

GAP ANALYSIS WORKSHOP FOR TRAINING
FOR REINTEGRATION OF SURGICAL SKILLS

Sponsored by the USAMRMC Telemedicine & Advanced Technology Research Center (TATRC)

Overview of Training Programs & Certification Requirements

Richard H. Bell, Jr. M.D.

September 13, 2011

Definition of the problem

- Military surgeons who are assigned to war zones may partially lose the cognitive and psychomotor skills that they will need when they return to U.S. or other non-combat venues
- Focus for this workshop is on laparoscopic skills

My objectives

1. Discuss the current American Board of Surgery certification requirements in laparoscopic surgery
2. Discuss the American Board of Surgery Maintenance of Certification (MOC) requirements
3. Discuss ABS re-integration policies
4. Discuss training tools that could be utilized for re-integration training

ABS laparoscopic surgery expectations for certificate in surgery

- Diagnostic laparoscopy and biopsy
- Repair inguinal/femoral hernia
- Repair ventral hernia
- Cholecystectomy
- Splenectomy
- Fundoplication
- Repair paraesophageal hernia
- Lysis of adhesions for SBO
- Appendectomy
- Colectomy

Resident operative experience in laparoscopic surgery - 2009

Lap appendectomy	41.8	21.6
Lap cholecystectomy	105.6	41.7
Lap hernia repair	19.6	13.7
Lap splenectomy	1.7	1.7
Lap fundoplication	6.1	5.9
Lap colectomy	15.4	10.7

N=976

Resident case experience 2009

Esophagus	10.6	11.1
Stomach	30.2	31.2
Small intestine	48.5	44.0
Large intestine	128.0	144.8
Biliary	101.8	123.2
Spleen	2.5	3.7
Hernia	114.3	112.8

Appendix E. Presentation: Overview of Training Programs & Certification Requirements

ABS Maintenance of Certification

Ten year cycle with intermediate requirements

Part I – Documentation of status (two year cycle)
Part II – Continuing medical education involving self-assessment (three year cycle)
Part III – Secure examination (ten year cycle)
Part IV – Practice Improvement

ABS Maintenance of Certification

- No current requirement for laparoscopic or any other technical skills performance
- No specific operative profile or numbers required

Re-integration issues for ABS

- ABS recognizes a "clinically inactive" status
- Sometimes temporary (child-rearing, divorce, caring for parent, etc.)
- No specific requirement for re-entry – ABS deals with requests to return to unconditional certification on a case-by-case basis.
- ABS has not identified a standard tool for technical or laparoscopic skills re-training

Re-integration for military surgeons

- Standardized versus customized versus hybrid
- Takes into account learner's previous experience
- Evaluation – formative, summative ?
- Train to proficiency level?
- Interim training versus massed training

Tools available for re-integration training in laparoscopy

- Generic skills training
- Specific operation training
- Web-based tools
- Assisting
- Proctored performance

Generic skills lab-based training

- Fundamentals of Laparoscopic Surgery (FLS)

Appendix E. Presentation: Overview of Training Programs & Certification Requirements

Operation – specific lab-based training

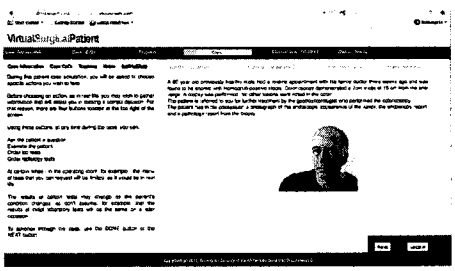
- Variety of procedure-specific simulators

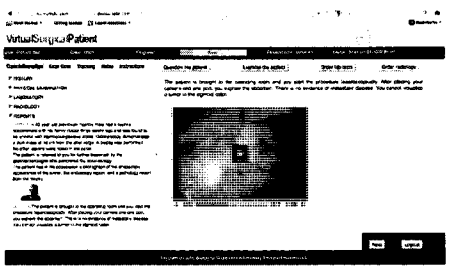
Web-based tools

- Red Llama
- Discourse Virtual Surgical Patient

Red Llama Sim Praxis

Discourse Virtual Surgical Patient©





Assessment tools

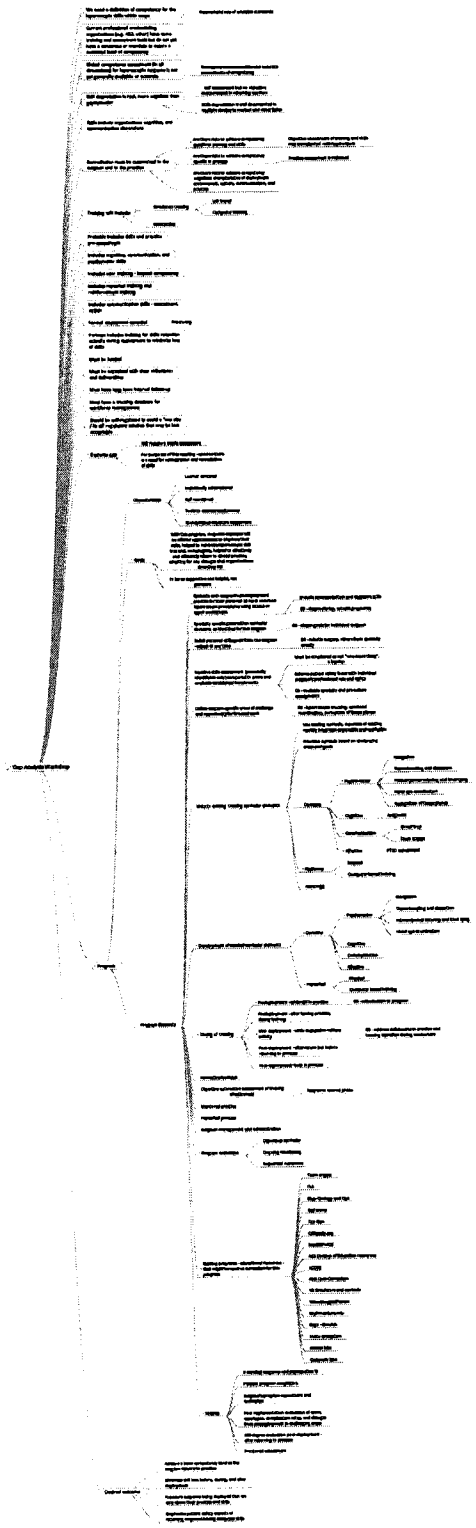
- GOALS
- OSATS
- FLS

Assisting and Proctored Performance

Summary

- ABS has defined a group of essential laparoscopic cases
- ABS does not require verification of proficiency in these cases for MOC
- There are several tools available for re-integration training and assessment including lab trainers and web-based programs
- Training could be modular / customized

Appendix F. Brainstorm Session Map



Appendix G. Existing Programs and Educational Resources

- American College of Surgeons (ACS) Division of Education Resources - http://www.facs.org/education/
- Animal Labs
- American Urological Association (AUA) Core Curriculum - http://www.auanet.org/eforms/elearning/core/
- Blus (Urology and Gynecology)
- Cadaveric Labs
- Edge – Simulab – www.simulab.com
- Fundamentals of Laparoscopic Surgery (FLS) - http://www.flsprogram.org/
- Insitu Simulation
- American Association of Medical Colleges (AAMC) MedEdPortal - https://www.mededportal.org/
- MyProcedure.edu
- ORReady – www.ORReady.org
- Red Llama - http://www.redllamainc.com/
- SCORE - General Surgery Resident Curriculum Portal - https://portal.surgicalcore.org/
- Team STEPPS - http://teamstepps.ahrq.gov/
- Top Gun - http://www.rossermis.com/AMTI/topgun-amti.html
- VirtualSurgicalPatient - https://vspatient.com/
- VR Simulators and curricula