

A Solution to the Decreased Resident Exposure to Open Operations in the Era of Minimally Invasive Surgery and Restricted Duty Hours May Be with Organ Procurement and Transplantation Surgery

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INTRODUCTION: The surgical resident experience regarding open surgical procedures and techniques is being significantly limited by the maturation of minimally invasive surgery (MIS) and duty-hour restrictions. MIS has replaced many open procedures as the current standard of care. As MIS progresses, the surgical residents' access to open surgical techniques will become significantly limited by the lack of exposure to common open operations.

METHODS: The Accreditation Council for Graduate Medical Education (ACGME) database was retrospectively reviewed to quantify and categorize resident experience in self-reported surgical procedures. The United Network for Organ Sharing (UNOS) database was retrospectively reviewed to determine the amount of organ transplants and procurements performed during the study period. Data from 1999-2000 and 2008-2009 were collected and compared.

RESULTS: There were dramatic changes between the time periods regarding the transition from the open to the laparoscopic approach for multiple operations. In 2008, there were 23,276 transplanted organs and 29,077 organs procured (7990 multi-organ procurements). However, the graduating general surgery chief residents reported doing an average of 2 organ procurements and 7 organ transplantations over a 5-year period. This provides the opportunity for each graduating chief resident to perform 38 more procurements during their residency.

CONCLUSION: It is imperative for surgical educators to find solutions to safely train the future general surgery residents to perform more surgical techniques in less time. One solution to this problem may lie within the field of organ transplantation

and procurement. The field of organ transplantation and procurement may be an untapped resource for valuable exposure to the basic principles of open surgical techniques that are declining due to the advancement of MIS and mandated duty-hour restrictions. (J Surg 69:575-579. © 2012 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: surgical education, transplant, duty hours, work hours, minimally invasive surgery, residency

COMPETENCIES: Patient Care, Medical Knowledge, Practice Based Learning and Improvement, Systems Based Practice

INTRODUCTION

The surgical resident experience regarding open surgical procedures and techniques is being significantly limited by the maturation of minimally invasive surgery (MIS) and duty-hour restrictions. MIS has replaced many open procedures as the current standard of care. As MIS progresses, the surgical residents' access to open surgical techniques will become significantly limited by the lack of exposure to common open operations.¹ In the future, this limited exposure to open operations may be further magnified by duty-hour restrictions.

The implied consequences of this decreased exposure to open operations may be leading to an incomplete training of the new general surgeon. New surgeons, well-versed in MIS, may suffer from inexperience with basic principles of open surgery.²⁻⁷ This would include surgical exposure, hemostasis, and surgical anatomy. This inexperience could be disastrous in an urgent setting.⁸ When the minimally invasive operation fails due to technical difficulty or safety issues, it is required of the surgeon to convert the operation to the traditional open approach. This potentially dangerous trend of decreased experience with open

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TABLE 1. (ACGME-National Resident Report) Accreditation Council for Graduate Medical Education

	1999-2000	2008-2009
Total residents	989	1044
Total of major cases	966.5 ± 204	943 ± 152

surgical approaches may be creating a void in surgical training, which can have drastic consequences on the competence of graduating surgeons.

We believe the lack of open surgical experience can be enhanced with participation in organ procurement and transplantation. An organ procurement and transplantation service offers many opportunities for experience in open surgery.

This study was performed to more completely understand how current deficits in general surgery training may be improved by better utilizing the transplantation specialty services.

METHODS

We performed a retrospective review of the Accreditation Council for Graduate Medical Education (ACGME) database to identify operations that were most affected by the impact of MIS. The ACGME database was used to quantify and categorize resident experience in self-reported surgical procedures. This ACGME data collection began in 1999. Data from 1999-2000 and 2008-2009 were collected and compared. Our focus was to highlight cases we felt were core general surgery procedures, which are most affected by MIS. These operations included: antireflux procedure, appendectomy, colectomy, cholecystectomy, and aortic aneurysm repair. The United Network for Organ Sharing (UNOS) database was retrospectively reviewed to determine the amount of organ transplants and procurements performed during the study period. These data included the total number of organ procurements and transplants performed involving the liver, kidney, and pancreas.

RESULTS

In 2000, there were 989 graduating chief residents in general surgery compared to 1044 in 2009. These chief residents performed 966 ± 204 and 943 ± 152 total major cases, respectively; Table 1. There were dramatic changes over this time period from an open to laparoscopic approach in regards to multiple operations; Table 2. The most notable changes are open antireflux procedure decrease by 64%, laparoscopic appendectomy increase by 341%, laparoscopic partial colectomy increase by 766%, open cholecystectomy decrease by 45%, laparoscopic inguinal hernia increase by 138%, and open aortic aneurysm repair decrease by 65%; Table 2.

Table 3 details the average experience of graduating residents in major abdominal and thoracic cases, including trauma. Although these complex and critical open surgical procedures

TABLE 2. (ACGME-National Resident Report) Average 5-Year Total Logged by Graduating General Surgery Resident by Graduating Year

Cases Affected by Laparoscopy	1999-2000 Avg Total	2008-2009 Avg Total	% Change
Antireflux			
Open	4.7 ± 5	1.7 ± 2	-63.8%
MIS	5.4 ± 7	5.4 ± 5	0.0
Appendectomy			
Open	30.7 ± 17	19.1 ± 13	-37.8%
MIS	8.5 ± 8	37.5 ± 19	+341.1%
Colectomy (partial)			
Open	44.6 ± 16	43.7 ± 16	-2.0%
MIS	1.8 ± 3	15.6 ± 11	+766.6%
Cholecystectomy			
Open	15.5 ± 8	8.2 × ± 4	-45.3%
MIS	84 ± 36	108.2 × ± 15	+28.8%
Inguinal hernia			
Open	51.9 ± 22	46 ± 19	-11.4%
MIS	7.6 ± 9	18.1 ± 13	+138.2%
Aorta			
Open (ruptured)	1.4 ± 2	0.7 ± 1	-50%
Open (elective)	7.4 ± 5	2.6 ± 3	-64.9%
MIS	not recorded	3.7 ± 4	

*These results were from the graduating general surgery residents at University of Mississippi Medical Center from 2008-2009.

were not greatly affected by MIS, exposure to these procedures has greatly declined during the 2 time periods.

In 2008, there were 23,276 transplanted organs and 29,077 organs procured (7990 multiorgan procurements). In 2009, the graduating general surgery chief residents reported doing an average of 2 organ procurements and 7 organ transplantations over a 5-year period; Tables 4 and 5.

TABLE 3. Average 5-Year Total Logged by Graduating General Surgery Resident by Graduating Year. Open Cases that would Benefit from Transplant/Donor Procurement Experience

	1999-2000 Avg Total	2008-2009 Avg Total
Aorta		
Open (ruptured)	1.4 ± 2	0.7 ± 1
Open (elective)	7.4 ± 5	2.6 ± 3
EVAR	Not recorded	3.7 ± 4
Liver		
Lobectomy	3.4 ± 4	5.2 ± 5
Choledochoenteric anastomosis	3 ± 3	2.2 ± 2
Whipple	3.1 ± 3	5.6 ± 5
Trauma		
Laparotomy	4.9 ± 28	5.9 ± 6
Thoracotomy	2.5 ± 3	2.4 ± 2
Splenectomy	3.1 ± 3	3.0 ± 3
Nephrectomy	0.5 ± 1	0.9 ± 1

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