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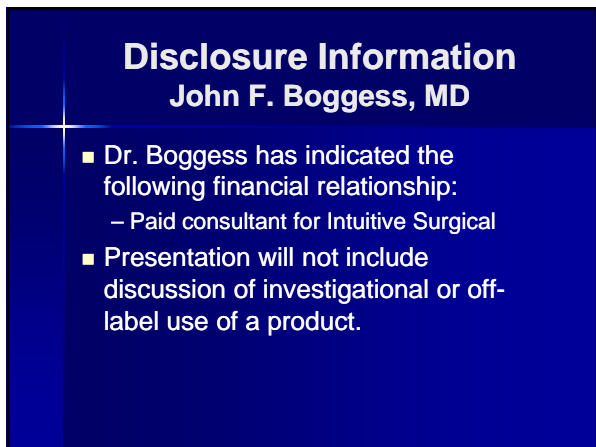
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## Impact of Robotic Surgery on Gynecologic Oncology Fellowship Programs in the United States: A Survey of Fellows and Fellowship Directors

Gregory P. Sfakianos, PJ Frederick, LC Kilgore, WK Huh.  
*University of Alabama at Birmingham*

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## Objective

- To determine the prevalence, application, and acceptance of robotic surgery in gynecologic oncology fellowship programs

Sfakianos et al. *Gynecol Oncol* 112:S8, 2009

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## Methods

- Surveys sent to gynecologic oncology fellowship directors and fellows in approved U.S. gynecologic oncology program
- Responses were tabulated and analyzed

Sfakianos et al. *Gynecol Oncol* 112:S8, 2009

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## Results

- Overall response rate - 39%
  - 20 of 41 (48%) fellowship directors
  - 37 of 105 (35%) fellows
- 95% have the *da Vinci*® Surgical System at their institution
  - 95% of the respondents utilize the system

Sfakianos et al. *Gynecol Oncol* 112:S8, 2009

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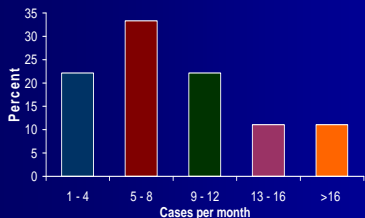
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## Average Cases Performed Monthly



Sfakianos et al. *Gynecol Oncol* 112:S8, 2009

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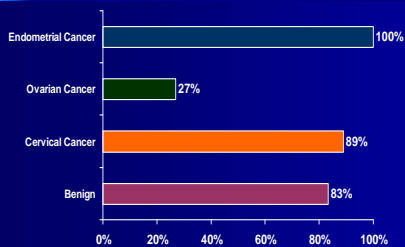
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## Indications for Surgery



Sfakianos et al. *Gynecol Oncol* 112:S8, 2009

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## Fellow and Resident Education

- 89% of fellows have been involved in robotic cases
  - 77% of fellows sit at the console
  - 70% of fellowship directors believe fellows' education is enhanced
- 53% of fellowship directors allow residents to sit at the console
  - 35% believe that residents' education is enhanced

Sfakianos et al. *Gynecol Oncol* 112:S8, 2009

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## Impact

- Majority of fellows (65%) believe they will feel comfortable using the *da Vinci*® Surgical System upon completion of their training
  - 94% of fellows plan on using their robotic skills after fellowship training

Sfakianos et al. *Gynecol Oncol* 112:S8, 2009

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## Fellowship Training in Robotics

- Urology
  1. Robotic certification
  2. Bed-side assisting
  3. Procedure broken down into steps
    - 5 for a prostatectomy
  4. Proficiency in one step needed x 3 before moving to the next step
    - Numbered grade and video review

Rashid HH et al. *Urology* 68(1):75-9, 2006

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### Fellowship Training in Robotics

- Gyn Onc
  1. Robotic "certification"
  2. Bed-side assisting
  3. Procedure broken down into steps
    - 4 for endometrial cancer
  4. Proficiency in one step needed before moving to the next step
    - video review

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### Robotic Surgery Training in Gynecologic Oncology: A Comparison of Fellow and Attending Surgical Times

Alberto Mendivil, LA Cantrell, A Shafer,  
PA Gehrig, JF Boggess  
*Division of Gynecologic Oncology  
University of North Carolina, Chapel Hill*

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### Objectives

- Document docking efficiency
- Document procedure times for an experienced attending surgeon
- Compare specific procedure times to fellows in a training program
- Discuss complications and changes to procedure to avoid them

Mendivil et al. *Gynecol Oncol* 112:S8, 2009

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## Results

- 297 cases were included in analysis
  - Only cases where fellows participated
- 8 (range 5-12) cases observed before 1<sup>st</sup> procedure
- BMI= 30 kg/m<sup>2</sup> (17-63)
- Median EBL= 50mL (10-1200mL)
- Median change in HCT= -5% (p<0.0001)

Mendivil et al. *Gynecol Oncol* 112:S8, 2009

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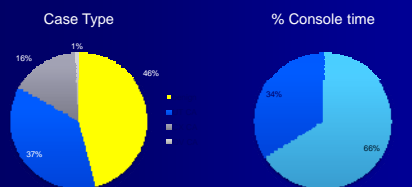
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## Results



Mendivil et al. *Gynecol Oncol* 112:S8, 2009

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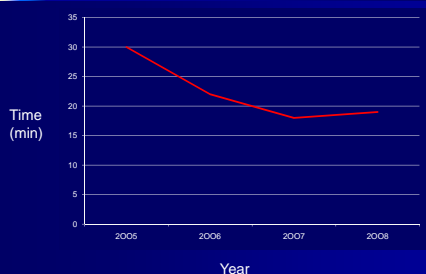
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## Docking Time



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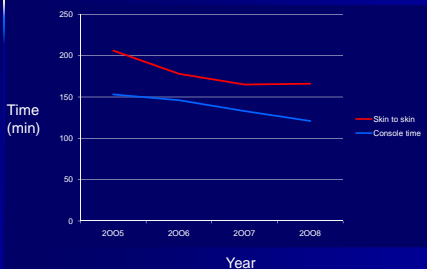
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### Total operative time



Mendivil et al. *Gynecol Oncol* 112:S8, 2009

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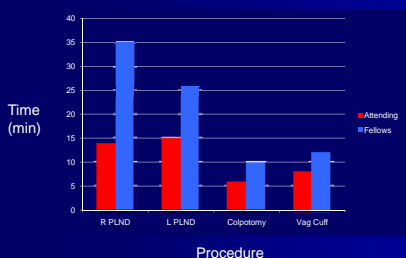
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### Attending vs. Fellows



Mendivil et al. *Gynecol Oncol* 112:S8, 2009

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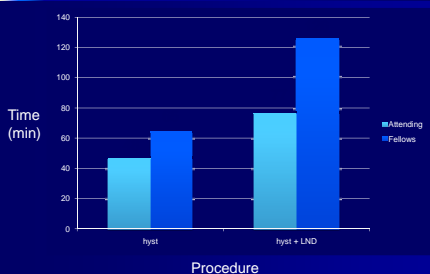
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### Median total case time



Mendivil et al. *Gynecol Oncol* 112:S8, 2009

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### Results

- Complications (all surgeons):
  - Blood transfusion: 3/297 (1%)
  - 2 intra-operative (0.6%)
    - 2 enterotomies
  - 21 post-operative (6%)
    - 5/67 umbilical port site herniations\*
    - 7 infections, 6 lymphedema, 2 fistula, 1 transient femoral nerve palsy

\*No port site hernias since switching to left upper quadrant entry

Mendivil et al. *Gynecol Oncol* 112:S8, 2009

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### Conclusions- UNC Study

- Acceptable difference in operative times
  - Total case difference: 49 min
- Specific procedures longer for fellows vs. attending
- Able to improve on docking time, decrease total case time/ console time
- Low complication rate

Mendivil et al. *Gynecol Oncol* 112:S8, 2009

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### Objective

To describe the feasibility and safety in training gynecologic residents in robotic surgery.



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**Methods**

- IRB approval obtained
- Study period
  - » July 1, 2006 through June 20, 2008
- Inclusion criteria (on slide after data sheet)
  - » Hysterectomy performed with robotic assistance by the gynecology oncology division
- Exclusion criteria
  - » Inadequate data on robotic data-sheets or in Webcis



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**Methods**

- Variables describing feasibility
  - » Cases as bedside assistant
  - » Cases as console surgeon
  - » Hysterectomy operative times
- Variables describing safety
  - » Blood loss
  - » Length of hospital stay
  - » Perioperative and short term complications



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**Methods - Resident Training**

- Progressive responsibility
  - » DVD of hysterectomy
  - » Robotics dry lab
  - » Learning robot set-up and observing
  - » Bedside assistant
  - » Console surgeon with direct supervision



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### Methods - Data Sheets

- **Retrospective review**
  - » Previously completed robotic data-sheets
  - » Webcis electronic medical record
- **Operative time**
  - » Defined as completion of the following 4 steps:
    - Right sidewall dissection
    - Left sidewall dissection
    - Colpotomy
    - Vaginal cuff closure




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### Methods: Data Sheet

**DaVinci Surgery**


Radical Hyst: _____	Endometrial nodes, cervix nodes: _____	Hysterectomy +/- Ovary: _____	Other: _____
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Date: \_\_\_\_\_

Patient Name: \_\_\_\_\_ MR # \_\_\_\_\_ Age: \_\_\_\_\_ Race: \_\_\_\_\_  
 WT: \_\_\_\_\_ HT: \_\_\_\_\_ BMI: \_\_\_\_\_ ASA: \_\_\_\_\_  
 PRE-OP HCT: \_\_\_\_\_ POST-OP HCT: \_\_\_\_\_ ERB: \_\_\_\_\_  
 Size of uterus (weeks) \_\_\_\_\_ Central/Art line: YES / NO  
 Size of other cancers removed: \_\_\_\_\_ cm

Console Surgeon: \_\_\_\_\_  
 Patient side Surgeon: \_\_\_\_\_ Other Asst: \_\_\_\_\_  
 Time in Room: \_\_\_\_\_  
 Incision Time: \_\_\_\_\_  
 Docked Time: \_\_\_\_\_  
 Complications: \_\_\_\_\_

	START	END
Aortic nodes - right	_____	_____
Aortic nodes - left	_____	_____
Pelvic nodes - Right	_____	_____
Pelvic nodes - Left	_____	_____
Right side wall	_____	_____
Left side wall	_____	_____
Colpotomy	_____	_____
Specimen Delivered	_____	_____
Vaginal Cuff	_____	_____
Cover	_____	_____
System undocked	_____	_____
Skin closed	_____	_____
Out of Room	_____	_____




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### Methods

- **Statistics**
  - » Student's T-test
  - » Chi-square
  - » SPSS 16.0 (Chicago, IL)




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### Results: Feasibility

- 341 Robotic cases during study period
  - » 247 cases with resident assistance
  - » 73 cases with resident participation on the console
  - » 21 cases without a resident



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### Results: Feasibility

- Mean Hysterectomy Times
  - » Resident on console = 64.5 minutes
  - » No resident on console = 62.9 minutes
- P = 0.69



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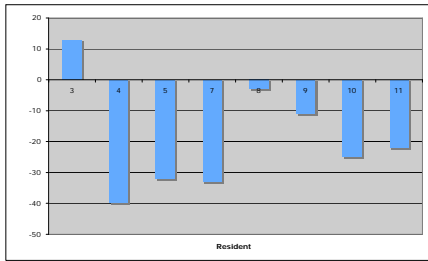
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### Results: Feasibility

- $\Delta$  in hyst time from first case to last case in those performed entirely by resident



Resident	$\Delta$ in hyst time
3	12
4	-40
5	-32
6	-2
7	-35
8	-2
9	-22
10	-25
11	-28



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### Results: Feasibility

- Hysterectomy Time vs Median Uterine Weight**

Specimen Weight (g)	Approximate Time (min)
<100	60
101-200	65
201-300	70
>300	85

Specimen Weight (g)

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### Results: Safety

- Resident vs Non-Resident Cases**

	Resident N=73	Non Resident N=169	
Mean EBL (ml)	77	81	P=0.82
Mean Δ Hct	4.6%	5.3%	P=0.12
Mean stay (days)	1.4	1	P=0.34
Complication rate	2.7%	2.4%	P=0.21

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### Discussion

- Stepwise approach**
  - » Progressive involvement
  - » Excellent supervision
- Variables affecting operative times**
  - » Console Time
  - » Specimen Weight
- Overall feasible and safe**
  - » Resident vs Non-Resident cases
    - Mean OR times comparable
    - Blood loss and complication comparable

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### Discussion

- **11 residents in this study**
  - » **2 MFM fellows**
    - +/- on cervicoisthmic cerclage in future
  - » **1 Gyn Oncology fellow**
    - Active on robot
  - » **1 REI fellow**
    - Possible use - myomectomy, tubal reanastomosis
  - » **7 Generalists**
    - 4 active on robot
    - 3 at institutions without robot



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### New Platforms

- Full integration into OR
- Additional DOF
- Smaller size
- Rapid deployment
- Easier to use



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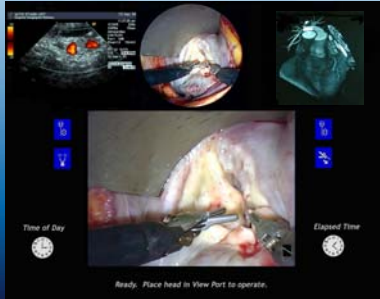
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### High Resolution Display – Multiple Inputs



Time of Day

Elapsed Time

Ready. Place head in View Port to operate.

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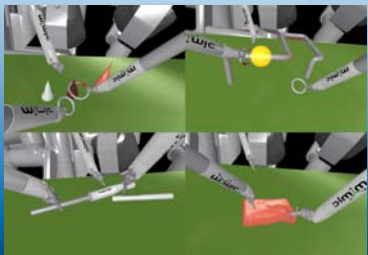
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### Training Simulation: Robotic Task Trainers



- Task trainers help new users learn to control the robot and perform common tasks.

Courtesy: **mimic**

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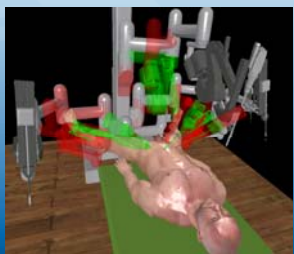
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### Advanced Software: Preoperative Planning

- Optimal path planning/port selection
- Identification of landmarks/measurements
- Registration between models and robot



The port placement module allows trainees to position the robot arms and the patient and then test the robot's resulting range of motion and camera view.

Courtesy: **mimic**

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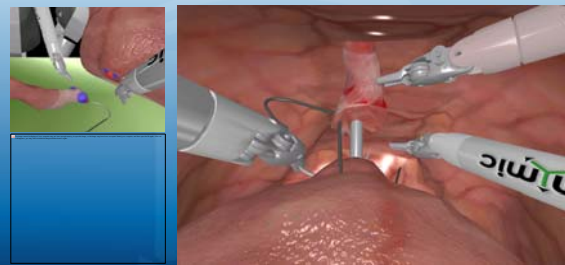
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### Pre-Operative Planning



Complex tasks, such as anastomosis in prostatectomy, can be practiced with proximal and terminal outcomes reporting.

Courtesy: **mimic**

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### Augmented Reality

- Real time data fusion & No-Fly Zones



Courtesy: CRYON

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### Mentoring / Proctoring Console

- Senior Surgeon to Junior Surgeon
- Same 3-D field of view
- Ability to seize control in order to teach or prevent patient harm



Mentoring Console

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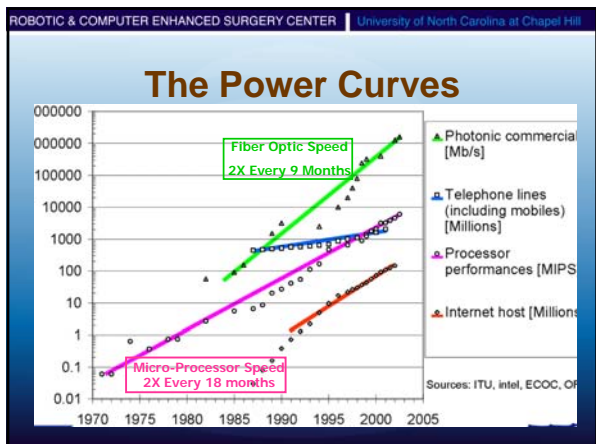
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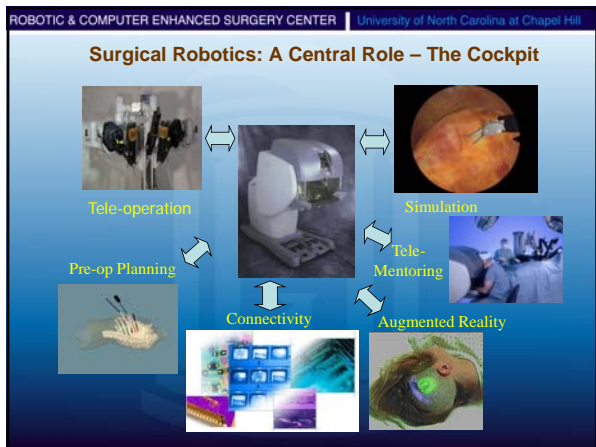
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QuickTime™ and a YUV420 codec decompressor are needed to see this picture.

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## Disruptive Technologies

“Great economic and social forces flow with a tidal sweep over communities that are only half conscious of that which is befalling them. Wise statesmen are those who foresee what time is thus bringing, and endeavor to shape institutions and mold men’s thought and purpose in accordance with the change that is silently surrounding them.”

Quotation from  
*The Life of Richard Cobden*  
By John Morely

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## INNOVATION

- Our world is a field of treasures.

1<sup>st</sup> Transistor

Limited only by our imagination

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