Integrating Fast Tracking into Clinical Care and Financial Impact

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Presenter Disclosure
Rob McKenna

The following relationships exist related to this presentation:

Ethicon: Consultant, Speakers Bureau

Covidien: Speakers Bureau

As medical student

- **Internal med rotation, given a symptom, given a patient's symptom. Told to:**
  - **List 10 possible diagnoses**
  - **List 10 tests to rule out each diagnosis**
  - **ORDER THEM ALL???**

Fast-tracking after Lobectomy

- **Era of Cost Containment and Pay for Performance**
- **Need to track our results and develop protocols to reduce costs and improve performance**

McKenna Ann Thor Surg 2007

Goals for this talk

- Evidence based medicine
- Cultural Change to Integrate into clinical Care
- Impact of Fast Tracking
- Financial Impact of Change

Patient Care Pathway

Mass General

-

	Baseline	Pathway	P value
LOS	10.6	7.7	p = 0.03
Cost	$16,063	$14,792	p = 0.47

Fast Tracking

Question

Integration of Evidence Based Medicine into Thoracic Surgery

Fast Tracking

Question

- **? Routine use of CXR ?**

Postop CXR after Thoracic Surgery

- 769 CXRs after 100 thoracotomies (ave + 7.69 per patient!!)
- Only 43 of 769 CXRs (5.6%) changed clinical management of the patient

G r a h a m

Postop CXR after Thoracic Surgery

Indication for CXR vs change in clinical management:

- **Routine CXR 33 (4.5%)**
- **Non-routine CXR 10 (26.3%)**

Postop CXR after Thoracic Surgery 100 thoracotomies

Conclusions:

Routine daily portable chest x-ray studies have a minimal impact on management

Graham

Postop CXR after Thoracic Surgery 100 thoracotomies

Conclusions:

Elimination of 636 (82.7%) of 769 CXRs reduced the cost of care by $725 per patient ($286,000 annually)

Graham

CXR after Chest Tube Removal
151 patients after CABG

Normal	**148 (98.7%)**
Pneumothorax	**3 (1.3.%)**
(2 of 3 symptomatic)	

CXR after Chest Tube Removal 151 patients after CABG

- **Very low incidence of pneumothorax after CT removal.**
- **Symptoms almost always identify patients requiring intervention.**

Tanveer

Fast-tracking Protocol

- No routine postoperative xrays
- No routine CXR in recovery room
- No CXR after removing chest tube

McKenna Ann Thor Surg 2007

Fast-tracking Protocol

- **Remove chest tube when:**
  - **No air leak**
  - **Output < 400 ml day**
- **Discharge with Heimlich valve if persistent air leak and low output**

McKenna Ann Thor Surg 2007

Fast-tracking Protocol

- No routine postoperative labs
- Order Labs/ xrays only when clinically indicated:
  - Atrial fibrillation:
    - get K and Mag
  - Fever/ Dyspnea:
    - get chest xray, CBC

McKenna Ann Thor Surg 2007

Fast-tracking Results

- 282 patients
  - –158 women (56%)
  - –124 men (44%)
- Mean age 71.2 years
  - –Range 46-95 years

McKenna Ann Thor Surg 2007

Fast-tracking Results

- Mean LOS = 2.76 days
- Median LOS = 2 days
- 46% discharged on POD 1 or 2
- Mortality = 1 (0.4%)

McKenna Ann Thor Surg 2007

Fast-tracking Results

- None 251 (89.3%)
- Air Leak 8 (2.8%)
- AF 5 (1.8%)
- Pneumonia 4
- Atelectasis 3
- Urinary Ret 2
- CVA/TIA 2
- Readmit 2
- RLN 2

McKenna Ann Thor Surg 2007

Fast-tracking Results

- **Blood tranfusion = 11 (3.9%)**
- **Readmission = 2 (0.7%)**
  - **–TIA**
  - **–SQ emphysema**

McKenna Ann Thor Surg 2007

Fast-tracking Conclusions

- Fast-tracking Protocols may shorten length of stay without compromising morbidity and mortality
- Cultural Change is needed

Fast Tracking

Cultural Change

- No routine ICU after lobectomy
- No routine labs or xrays after lobectomy

McKenna Ann Thor Surg 2007

Fast Tracking

Cultural Change

- Obtain CXR only for clinical indications after lobectomy.
- No daily CXR
- No CXR after chest tube removal

McKenna Ann Thor Surg 2007

Fast Tracking

Cultural Change

- Fast tracking
- STS database
- Analyze your results to identify outliers

Prolonged air leaks

Impact of Prolonged air Leaks (PAL)

Prolonged air leaks

- **Hospital Costs:**
  - **PALs $59,713**
  - **No PAL $44,077, p≤0.0001)**
- **Incremental economic burden of ~$15,000 per patient to the US healthcare system**

S w a n s o

Risk of nosocomial respiratory infections and pulmonary atelectasis.

	Complications
No PAL (n=215)	19 (8.8%)
PAL (n=23)	5 (21.7%)

Prolonged air leak odds ratio; odds ratio: 2.85 (95% CI: 0.96-8.58)

Varela G et al. Eur J Cardiothorac Surg 2005;27:329-333

EUROPEAN JOURNAL OF CARDIO-THORACIC SURGERY

Economic Burden of Prolonged air leak (PAL)

- US national payor database study
- PAL > 5 days
- 27,366 patient records

Economic Burden of Prolonged Air Leaks

- **Open versus VATS**
- **MarketScan and Medicare database**
  - **10,585 lobectomies**
  - **2,100 segmentectomies**

Swanson Chest 2014

Economic Burden of Prolonged air leak (PAL)

- **open procedures are 40% (95% CI: 26% to 55%; p<0.0001) more likely to result in a PAL than VATS procedures**

Economic Burden of Prolonged air leak (PAL)

- **Significantly longer LOS**
  - **Open 12.2 days**
  - **VATS 11.4 days p=0.0067)**
- **more likely to get readmitted within 30 days.**

Prolonged air leaks

	Open	VATS	P value
PAL incidence	13%	9%;	p<0.0001
Hospital cost if PAL	$39,141	$35,265	p<0.0001

S w a n s o

Prolonged air leaks

Treatment of Prolonged air Leaks

Economic Burden of Prolonged air leak (PAL)

- **107 patients after LVRS**
- **Discharge with Heimlich Valve**
- **Outpatient chest tube days / total days with chest tube**

McKenna, Ann Thor Surg 1996

Economic Burden of Prolonged air leak (PAL)

40% reduction in LOS till chest tube out

McKenna, Ann Thor Surg 1996

Economic Burden of Prolonged air leak (PAL)

- **20 patients prolonged air leak**
- **Discharge portable chest drainage saved 772 bed-days and 270,000 GBP**

Southey, Int Card Thor Surg 2015

Chest drainage system

Digital read out for air leak and volume drainage

Digital Chest drainage system: CT days

Author	Digital	Traditional
Cerfolio (2008)	3 days	4.4 days
Meir (2010)	2.4 days	4.5 days
Pompili (2014)	3.6 days	4.7 days
Miller (2015)	3.6 days	5.3 days

Digital Chest drainage system: LOS

Author	Digital	Traditional
Cerfolio (2008)	3.9 days	4.6 days
Meir (2010)	N/A	N/A
Pompili (2014)	4.6 days	5.6 days
Miller (2015)	4.1 days	5.9 days

Prolonged air leaks

Prevention of Prolonged air Leaks

Randomized study of lung sealant

3M Surgical Sealant Study Group

- **161 patients randomized 2:1**
- **Biodegradable sealant**

Allen, Ann Thor Surg 2004

Randomized study of lung sealant

	control	sealant
Intra-op leak	77%	16%
Post-op leak	86%	65%
Median LOS	7 days	6 days

Allen, Ann Thor Surg 2004

Pulmonary Sealants after Lung Cancer Surgery- Meta-analysis

- Randomized, controlled trials
- Sixteen trials
- 1642 randomized patients

Pulmonary Sealants after Lung Cancer Surgery- Meta-analysis

- 13 of 16 showed differences
- 6 of 16 showed significant differences
- 3/16 showed significant reduction in chest tube drainage
- 3 of 16 showed shorter LOS

Belda-Sa

Fast Tracking Cultural Change

- If PAL occurs:
  - Use Heimlich valve and discharge
  - Use digital chest drainage system
  - Blood patch, pleurodesis

Complications

Atrial Fibrillation

Risk Factors for Atrial Fibrillation

- STS database
- 13,906 who underwent lobectomy or pneumonectomy
- 1,755 (12.6%) had postop AF

Onaitis, Ann Thor Surg 2010

Risk factors for Atrial Fibrillation

- male sex
- Increasing age
- Increasing magnitude of lung or esophagus resected
- history of congestive heart failure,
- concomitant lung disease preoperative episodes of AF
- length of procedure [3–15]

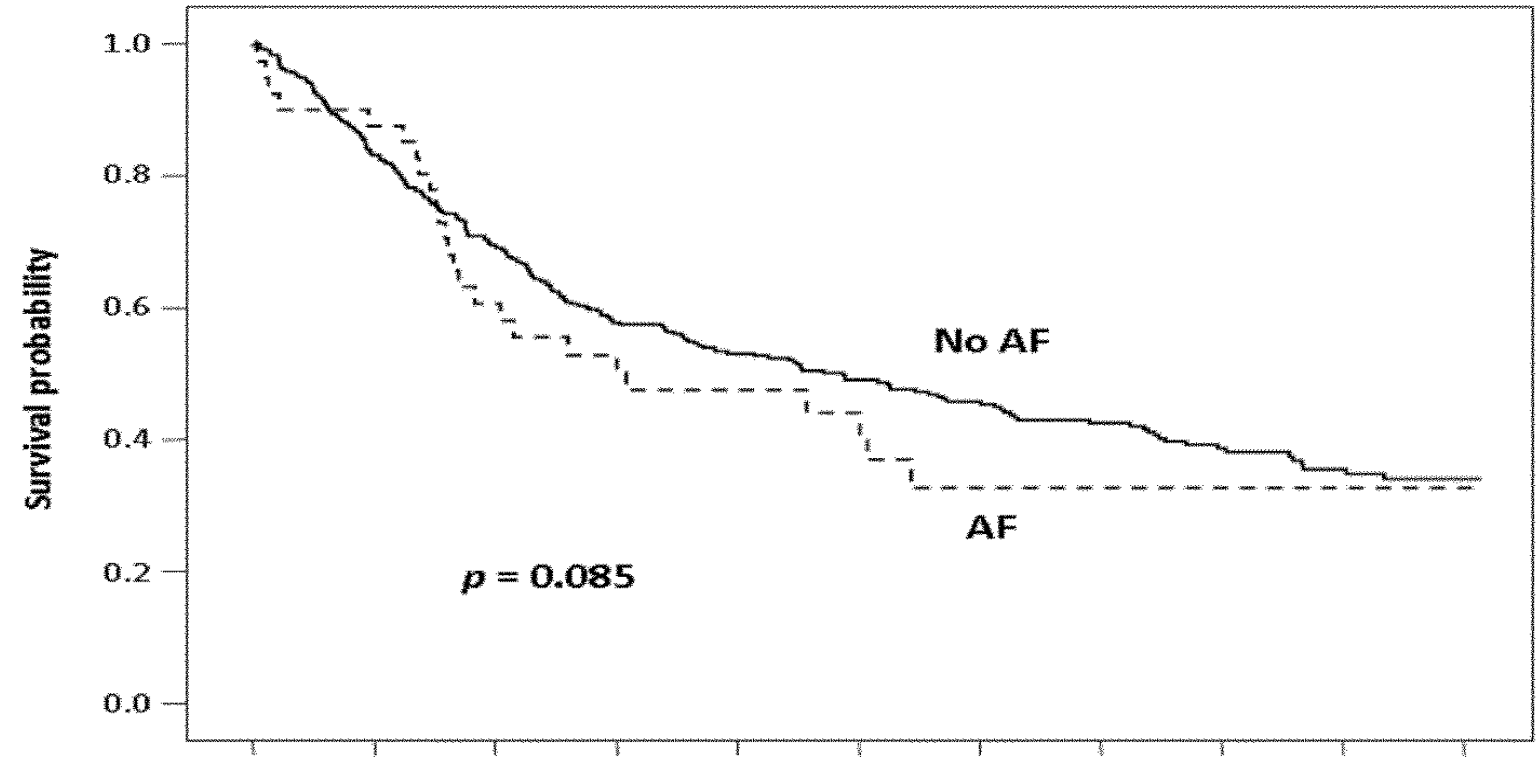
Onaitis, Ann Thor Surg 2010

Consequences of Atrial Fibrillation

- 12% and 44% of patients after pulmonary and esophageal surgery.
- increased pulmonary complications, increased length of stay, and increased mortality [1, 2]

Onaitis, Ann Thor Surg 2010

Impact of AF on Survival after Lobectomy



Impact of AF on 5 year Survival after Lobectomy

Factor	P value	HR	95% CI
AF	0.007	3.75	1.44 - 9.81
FEV1 < 80%	0.027	2.07	1.09 - 3.93

Imperatori JTCS 2012

STS Practice Guidelines for Atrial Fibrillation

- **Class I: Beta blockers for thoracic surgery (Level of evidence B)**
- **Class IIa : Diltiazem for major pulmonary resection (Level of evidence B)**

Onaitis, Ann Thor Surg 2010

Atrial Fibrillation: Diltiazem Prophylaxis

- 5 RCT:
- 50% reduction AF
  - 10.6% versus 21.5%
  - relative risk 0.50; 95% confidence interval: 0.34 to 0.73)
- Preop in recovery room
- 30 to 60 mg every 6 hours

Fernandez, STS Guidelines

Fast Tracking

Cultural Change

- **Use beta blocker or calcium channel blockers for patients with high risk for AF**

Evidence Based Medicine

Nodes Dissection

Technique for node dissection during lobectomy:

Energy versus Cautery

Lymph Node Dissection Operative Technique

Blunt Dissection

Energy Device

Cautery

Nodes: Operative Technique Emory: 350 Lobectomies

	Energy	Cautery
Node stations	4.2	4.1
# NODES	19.5	18
CT days	2.9	4.1
Pl Drainage	610	906
LOS	3.8	5.3

Fast Tracking

Cultural Change

- **Use Harmonic scalpel for node dissections**

Fast Tracking and Cost Saving

- **Protocols appear to reduce LOS and produce savings**

Fast Tracking and Evidenced based medicine

Members of the division need to agree to cultural change

Fast Tracking and Evidence Based Medicine

So what…..

The Changing Healthcare Environment

- More Medicaid
- No payments for readmissions or certain complications
- Value-based purchasing
- Alignments of hospitals and physicians
- Market consolidation
- Access

Fast Tracking and Cost Saving

- **Improved Quality for patients**
- **Public information re M and M**
- **Who gets Insurance Contracts?**

  They know your cost, average #consults/ case, etc.

Fast Tracking and Cost Saving

- Get the quality information at your hospital
- Use Society of Thoracic Surgeons Database
- Analyze the Data to Find where there is a problem and fix it

Fast Tracking and Cost Saving

- **Analyze the Data to determine if your LOS or complication rates are outliers**
- **Use fast tracking and evidence based medicine to fix it**

Fast Tracking and Cost Saving

- **Make division more profitable:**
  - **More support resources (salaries, NPs)**

Fast Tracking and Cost Saving

- **Know the codes for your procedures**

Fast Tracking and Cost Saving

- How to maximize payments
- Payers do all they can to reduce what they pay
- You deserve to be paid

Medicare CPT Payment for lobectomy

	2001	2010	2016
VATS 32663	$1,515.07	$1,509.27	$1,540.71 (+$24)
Open 32480	$1,478.12	$1,603.57	$1,624.85 (+$124)

Medicare CPT Payment for lobectomy (COL)

	2001	2016	2016 (2001 $)
VATS 32663	$1,515.07	$1,540.71	$1155 (-25%)
Open 32480	$1,478.12	$1,624.85	$1218 (-25%)

Medicare CPT codes Payment for lobectomy

- Know the name of the codes for your procedures
- List them all in your operative notes for your billers
- 6 different wedge resection codes
  - XXXX wedge followed by anatomic dissection
- Know globals for the codes
  - Bill hospital visits for 0 global

Medicare CPT codes
Payment for wedge resection

procedure	code	Medicare payment	Location
infiltrate	32607	$320.84	0
Mass dx	32608	$390.68	0
Tx mass	32666	$904.40	90
Additional wedge	32667	$163.65	90
Wedge to anatomic	32668	$163.65	90

How hospitals get paid by Medicare

- **DRG: diagnosis related groups (800)**
- **Formerly, one code for major lung resection (075)**
- **Now, there are 3 (163, 164, 165)**

Criteria for DRGs

- **Now…MS-DRG: Medicare Severity-Diagnosis Related Group**
- **CC: complicating or comorbid condition (N1 disease)**
- **MCC: major complicating or comorbid condition (e.g. MI)**

Major Chest Procedures

DRG	*Comp*	$$
163	MC	$37,901.40
164	CC	$19,886.29
165	None	$14,172.14

Medicare Payment for DRG (Yale U Project)

- **Definitions of Complications that affect DRGs were changed**
- **Yale University Project analyzed the impact of the change in definitions**

Medicare Payment for DRG (Yale U Project)

	CC	Revised
# CC codes	3326	2583
% pts. with CCs	77	40
% no CCs	22%	59%
Charge w/ CCs	$24,538	$31,451
Charge no CC	$14,795	$16,215

Medicare Payment for DRG (Yale U Project)

- **Keep track of the definitions.**
- **Make sure to document them**
- **E.g. positive nodes in CC group increase DRG (that is worth >$5000), document in progress note**

DRGs for Thoracic Surgery

Document

Document

Document

Fast Tracking and Cost Saving

Impact of Length of stay on Profit

Medicare Lobectomy Profit / hospital bed

	LOS =2	LOS = 7
Revenue	$23,870	$23,870
Direct Costs	$5,838	$8,548
Gross Margin	$18,032	$15,322
Profit/ year	$2,254,000	$776,100

Fast Tracking and Cost Saving

Work with administrators

VATS Lobectomy cost analysis

- Surgery is the engine that drives hospital
- 75% hospital profit from surgical services

Profit of Surg Specialties

(Resnick: Ann Surg , 2005)

Specialty	Margin/ RVU	Margin/ OR hr
Thoracic	34.55	233.94
Transplant	25.13	275.74
Trauma	19.42	127.26
Cardiac	16.20	112.95
Vascular	15.21	15.21
Orthopedics	9.01	59.63
Gynecology	1.66	12.12
Plastics	(0.57)	(3.83)

Medicare 2 midnight Rule

- Outpatient care is less expensive
- Medicare is promoting out patient and minimally invasive surgery (MIS)

Medicare 2 midnight Rule

- **Hysterectomy:**
  - **–Outpt, MIS pays $3000 more than inpt open**
- **Hernia:**
  - **–Open pays less than cost**
  - **–MIS pays $3000 more**

Medicare 2 midnight Rule

- **Currently, all major thoracic operations are inpatient only**

Fast-tracking: Conslusion

- Fast Tracking is good for patients
- Reduces cost of health care

Fast-tracking: Conslusion

- Surgeons must understand all these issues
- Surgeons work with hospitals re this

VATS Lobectomy cost analysis

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Fast Tracking and Cost Saving

We are in the era of large database analysis, not randomized, prospective studies

VATS Lobectomy versus open lobectomy

- **Premier Database**
  - **600 US hospitals**
  - **20% of all hospital admissions in US**
  - **Compare hospital costs and clinical outcomes**

Swanson JTCVS, 2012

VATS Lobectomy versus open lobectomy

- **Multi-hospital Database showed VATS, compared to thoracotomy, had lower:**
  - **LOS**
  - **Cost**
  - **Re-admission rates**

Swanson JTCVS, 2012

VATS Lobectomy versus open lobectomy

- Less Costs
- Earlier recovery
- ?Less impact on immune system
- Earlier start for adjuvant chemotherapy

Fast Tracking

Cultural Change

- In US, 40% of lobectomies are done by VATS
- Can be 90%
- Increase Use of VATS lobectomy

VATS vs Robot

Prospect Data Base: 20% hospitalizations in US

Category	Robot	VATS
Patients	335	3818
Female	52.5%	54.7%

VATS vs Robot hospital course

Category	Robot	VATS	P value
Mean LOS (days)	6.07	5.83	0.6131
Hospital costs	$25,040	$20,476	<.0001
Procedure time	4.49 h	4.23 h	0.0959

VATS vs Robot complications

Category	Robot	VATS	P value
Major	16.95	18.98	NS
Pneumonia	8.47	9.83	NS
BPF	1.69	1.02	NS

VATS vs Robot complications

Category	Robot	VATS	P value
Minor	36.95	38.31	NS
Air Leak	25.42	23.73	NS
Atelectasis	11.19	14.58	NS

VATS vs Open hospital course

Category	Open	VATS	P value
# patients	3487 (77%)	1045 (23%)	
Hospital costs	$24,501	$21,397	<.0001
LOS	9.01 days	6.46 days	<.00001

Fast Tracking

Cultural Change

- **Learn how to perform VATS Lobectomy**

VATS Lobectomy: Conclusions

- Create Clinical Pathways
- Get data to evaluate areas to improve