The ProvenCare® Model: Best Practice Management For Surgical Lung Cancer Patients

JOHN A HOWINGTON, MD, FACS, FCCP
CHAIRMAN OF THORACIC SURGERY
SAINT THOMAS HEALTH
MARCH 4, 2017
Objectives

1. Discuss current national standards of care for anatomic lung resection patients.

2. Review the development and rationale for the ProvenCare Lung Cancer Collaborative.

3. Provide an overview of ProvenCare Elements

4. Discuss in detail key pre-operative, intra-operative and post-operative elements.

5. Discuss the role of the team approach to carrying out ProvenCare in clinical practice.
How Reliably “Safe” is Healthcare Today?

- **DANGEROUS** (>1/1000)
- **REGULATED** (<1/100K)
- **ULTRA-SAFE** (<1/100K)

- **Total lives lost per year**
  - Health Care
  - Driving
  - Chartered Flights
  - Chemical Manufacturing
  - Scheduled Airlines
  - European Railroads
  - Nuclear Power

- **Number of encounters for each fatality**
  - Mountain Climbing
  - Bungee Jumping
  - Driving
  - Chemical Manufacturing
  - Chartered Flights
  - Scheduled Airlines
  - European Railroads
  - Nuclear Power
14K Mountains in Colorado
Patterns of Surgical Care of Lung Cancer Patients

Alex G. Little, MD, Valerie W. Rusch, MD, James A. Bonner, MD, Laurie E. Gaspar, MD, Mark R. Green, MD, W. Richard Webb, MD, and Andrew K. Stewart, MA

Department of Surgery, Wright State University School of Medicine, Dayton, Ohio; Memorial Sloan-Kettering Center, New York, New York; Radiation Oncology, University of Alabama, Birmingham, Alabama; Anschutz Cancer Pavilion, University of Colorado Health Science Center, Aurora, Colorado; Hollings Cancer Center, Medical University of South Carolina, Charleston, South Carolina; Department of Radiology, University of California, San Francisco, California; and American College of Surgeons and the National Cancer Data Base, Chicago, Illinois

Background. This survey was performed to determine the patterns of surgical care provided patients with non-small cell lung carcinoma (NSCLC).

Methods. In 2001, the American College of Surgeons carried out a patient care survey of 729 hospitals to retrieve information of NSCLC patients' history, evaluation, pathology, and surgical treatment.

Results. Inclusion criteria were met by 40,090 patients: of whom 11,668 (29.1%) were treated surgically: 74.2% alone and 25.8% as part of multimodality therapy. Of these patients, 59.5% were in stage I, 17.5% in stage II, 17.0% in stage III, and 6.0% in stage IV. Surgery patient demographics were the following: 55% male and 45% female; 46.8% 70 years or older; and 76.3% had significant comorbidities. Tumor characteristics: squamous 28%, adenocarcinoma 37.6%, other 34.4%. Staging: in addition to radiologic examinations, preoperative mediastinoscopy was performed in 27.1% of operated patients with node biopsy in only 46.6% of these procedures. Operations: wedge resection 15.6%, lobectomy 70.8%, pneumonectomy 13.6%. Surgical margins were positive in 7.8%, but only 65.2% had frozen section analysis. Perioperative mortality was 5.2%, but was 4.0% in transfused patients and 12.7% in transfused patients and was 3.2% in high-volume (more than 90 operations per year) versus 4.8% in low-volume hospitals (p < 0.001).

Conclusions. (1) Patients being operated for NSCLC are elderly with significant comorbid conditions. (2) More patients than previously are female and have adenocarcinoma. (3) Mediastinoscopy is infrequently performed and lymph nodes are biopsied in less than 50% of them. (4) Lobectomy is the most common operation, and positive surgical margins are too frequent. (5) Operative mortality is reasonable but transfusion is a marker for increased risk and outcomes are superior in high-volume hospitals. (6) Hospitals with higher volume had fewer perioperative deaths.

The Need for Higher Standards!

Only 27% of resected patients had a Mediastinoscopy.

Only 46.6% of Mediastinoscopy cases had nodes submitted for pathology.

Only 42% operative cases had nodes sampled at any mediastinal level.

Mortality 5.2%, 4.0% in nontransfused and 12.7% in transfused patients.

The Need for Higher Standards!
Prospectively collected 30-day postoperative data was analyzed from 1,023 patients undergoing pulmonary resection who were enrolled from July 1999 to February 2004 in a randomized trial comparing lymph node sampling versus mediastinal lymph node dissection for early stage lung cancer.
Complications occurred in 38% of patients in each group.

Lymph node dissection had a longer median operative time and greater total chest tube drainage (15 minutes, 121 mL, respectively).

There was no difference in the median hospitalization, which was 6 days in each group.
Operative mortality was 2.0% (10 of 498) for sampling and 0.76% (4 of 525) in the lymph node dissection group.

“These data from a current, multiinstitutional cohort of patients who underwent a major pulmonary resection constitute a new baseline with which to compare results in the future.”
Data from The Society of Thoracic Surgeons General Thoracic Surgery database: The surgical management of primary lung tumors

Daniel J. Boffa, MD, a Mark S. Allen, MD, b Joshua D. Grab, c Henning A. Gaissert, MD, d David H. Harpole, MD, e and Cameron D. Wright, MD d

Objective: Our objective was to investigate the surgical management of primary lung cancer by board-certified thoracic surgeons participating in the general thoracic surgery portion of The Society of Thoracic Surgeons database.

Data from The Society of Thoracic Surgeons General Thoracic Surgery DB: The surgical management of primary lung tumors


The authors identified all pulmonary resections recorded in the general thoracic surgery prospective database from 1999 to 2006.

Among the 49,029 recorded operations, 9033 pulmonary resections for primary lung cancer were analyzed.
Data from The Society of Thoracic Surgeons General Thoracic Surgery DB: The surgical management of primary lung tumors


Type of resection was:

- wedge resection in 1649 (18.1%),
- segmentectomy in 394 (4.4%),
- lobectomy in 6042 (67%),
- bilobectomy in 357 (4.0%),
- and pneumonectomy in 591 (6.5%).
Data from The Society of Thoracic Surgeons General Thoracic Surgery DB: The surgical management of primary lung tumors


Mediastinal lymph nodes were evaluated in 5879 (65%) patients;

via mediastinoscopy in 1928 (21%),

nodal dissection 3722 (41%),

nodal sampling in 1124 (12.4%),

and nodal biopsy in 729 (8%).
Data from The Society of Thoracic Surgeons General Thoracic Surgery DB: The surgical management of primary lung tumors


Median length of stay was 5 days (range 0–277 days).

Operative mortality was 2.5% (179 patients).

One or more postoperative events occurred in 2911 (32%) patients.

A higher standard when ABTS surgeons do the work!
Fast-Tracking After Video-Assisted Thoracoscopic Surgery Lobectomy…


The fast track protocol was to perform thoracoscopic lobectomies with no routine postoperative laboratory work or chest x-rays.

The chest tubes were discontinued once the output was < 300 mL in a 24-hour period and there was no air leak present.

If the chest tube output was low, but there was an air leak, the patient was discharged home with a Heimlich valve.
282 consecutive thoracoscopic lobectomies were performed by a single surgeon during 18 months.

158 women (56%) and 124 men (44%)

mean age of 71.2 years.
Fast-Tracking After Video-Assisted Thoracoscopic Surgery Lobectomy…


mean length of stay was 3.26 days

median was 3 days

7 of 282 patients (2.5%) were discharged with a Heimlich valve.
There was 1 mortality.

There were no complications in 251 patients (89%).

Two patients were readmitted to the hospital.

No chest tubes were reinserted.
Comparison of Video-Assisted Thoracoscopic Surgery and Robotic Approaches for Clinical Stage I and Stage II Non-Small Cell Lung Cancer Using The Society of Thoracic Surgeons Database

Brian E. Louie, MD, Jennifer L. Wilson, MD, Sunghee Kim, PhD, Robert J. Cerfolio, MD, Bernard J. Park, MD, Alexander S. Farivar, MD, Eric Vallieres, MD, Ralph W. Aye, MD, William R. Burfeind, Jr, MD, and Mark I. Block, MD

Division of Thoracic Surgery, Swedish Cancer Institute, Seattle, Washington; Division of Thoracic Surgery, Beth Israel Deaconess Medical Center, Boston, Massachusetts; Duke Clinical Research Institute, Duke University Medical Center, Durham, North Carolina; Department of Cardiothoracic Surgery, University of Alabama at Birmingham, Birmingham, Alabama; Division of Thoracic Surgery, Memorial Sloan-Kettering Cancer Center, New York, New York; Division of Thoracic Surgery, St. Luke's University Health Network, Bethlehem, Pennsylvania; and Division of Thoracic Surgery, Memorial Healthcare System, Hollywood, Florida

The STS-GTD versions from 2009-2013 was queried for primary lobectomy operations for lung cancer.

Patients with clinical stage I or II NSCLC were included.

Patients with conversion operations or induction therapy were excluded.

Centers performing less than 20 Robotic or VATS cases were excluded.

1,220 Robotic lobectomies and 12,378 VATS lobectomies were identified from 140 reporting centers.
Patients undergoing robotic lobectomy were older, less active, and less likely to be an ever smoker and had higher body mass index (BMI) (all p < 0.05).

They were also more likely to have coronary heart disease or hypertension (all p < 0.001) and to have had preoperative mediastinal staging (p < 0.0001).

Robotic lobectomy operative times were longer (median 186 versus 173 minutes; p < 0.001).

All other operative measurements were similar.
All postoperative outcomes were similar, including complications and 30-day mortality
Robotic lobectomy: 0.6% versus VATS: 0.8% (p = 0.4).

Median length of stay was 4 days for both, but a higher proportion of patients undergoing robotic lobectomy had hospital stays less than 4 days (48% versus 39%; p < 0.001).

Nodal upstaging overall was similar (p = 0.6) but with trends favoring VATS in the cT1b group and robotic lobectomy in the cT2a group.
Conclusions:
Patients undergoing robotic lobectomy had more comorbidities and robotic lobectomy operative times were longer.

However, Quality outcome measures: including complications, hospital stay, 30-day mortality, and nodal upstaging, suggest that robotic lobectomy and VATS are equivalent.
Patient-Centered Quality Indicators for Pulmonary Resection

Stephen D. Cassivi, MD, MS, Mark S. Allen, MD, Gregg D. Vanderwaerdt, MPA, Lori L. Ewaldt, RN, Mary E. Cordes, RN, Dennis A. Wingle, MD, PhD, Francis C. Nichols, MD, Peter C. Pairolero, MD, and Claude Deschamps, MD

Division of General Thoracic Surgery, Mayo Clinic, Rochester, Minnesota

Background. Quality of care is increasingly scrutinized. However, no standard quality measures exist for surgical care of patients undergoing pulmonary resection.

Methods. Our thoracic surgical team developed a set of patient-centered quality of care measures specific to patients undergoing pulmonary resection. Measures were chosen that demonstrated evidence-based preoperative assessment, adequate mediastinal staging, and interventions to prevent and expeditiously treat postoperative morbidity. Medical records of all patients undergoing pulmonary resection in 2005 were analyzed.

Results. In all, 606 patients (men:women = 330:276) underwent 628 pulmonary resections. Median age was 65.8 years (range, 2 to 93). Operative mortality was 2.1%. Pulmonary function testing within 1 year before surgery was documented in 74.2%. Electrocardiogram within 90 days before surgery was documented in 81.6% of patients 50 years and older. Smoking history was documented in all patients, and smoking cessation consultation was offered to 85.7% of current smokers. Deep venous thrombosis prophylaxis was implemented in 99.7%. Mediastinal staging was documented in 94.0% of patients undergoing lung cancer resection (n = 333). Postoperatively, 92.4% of patients used incentive spirometry. Atrial fibrillation treatment occurred within 45 minutes of onset in 70.5%. Postoperative analog pain scores were above 6 in only 14% of assessments; treatment and reassessment occurred within 2 hours in 81.0%. Follow-up planning was documented at hospital discharge in 100%. No National Quality Forum “never events” occurred.

Conclusions. Patient-centered and clinically relevant quality measures can be developed and evaluated in general thoracic surgery. This panel of quality indicators highlights and guides areas for potential improvement in the care of patients undergoing pulmonary resection.

Abstract

**Objective:** To test whether an integrated delivery system could, through the application of process redesign methodology and reliability science, implement multiple evidence-based medical practices across the continuum of care for a specific surgical intervention and deliver these practices consistently.

**Methods:** The programme—*ProvenCare*—had three components: establishing best practices for elective coronary artery bypass graft (CABG) patients; assembling a multidisciplinary team to “hardwire” these best practices into everyday workflow; and implementing the programme with real-time data collection, feedback and focused redesign to reach high reliability. Surgeons reviewed all class I and IIa 2004 ACC/AHA guidelines for CABG surgery and translated them into 19 clinically applicable recommendations. A frontline multidisciplinary team “hardwired” these, resulting in 40 measurable process elements. Feedback of gaps in care was given and the process redesigned as needed. Clinical outcome data on consecutive elective CABG patients seen in the 12 months pre-intervention were then compared with a post-intervention group.

**Results:** Initially, 59% of patients received all 40 elements. At 3 months, compliance reached 100%, fell transiently to 86% and then reached 100% again, and was sustained for the remainder of the study. The overall trend in reliability was significant (p=0.001). 30-day clinical outcomes showed improved trends in 8/9 measured areas (eg, patient readmissions to ICU decreased from 2.9% to 0.9% and blood products usage decreased from 23.4% to 16.2%). Operative mortality decreased to zero, but only likelihood of discharge was significant (p=0.033). Frequency and length of readmissions fell, as did mean hospital charges.

**Conclusion:** Frontline medical care providers, led by process design specialists, can successfully redesign episodic processes to consistently deliver evidence-based medicine, which may improve patient outcomes and reduce resource use.
Feasibility and Impact of an Evidence-Based Program for Gastric Bypass Surgery

Anthony T Petrick, MD, FACS, Christopher D Still, DO, Craig G Wood, MS, Mary Anne Vitunac, MBA, RN, Mathew Plank, PA-C, Linda McGrail, RN, William E Strodel, MD, FACS, Jon D Gabrielsen, MD, FACS, Joanne Rogers, RN, Peter Benotti, MD

BACKGROUND: Health care in the United States is expensive and quality is variable. The aim of this study was to investigate whether our integrated health system, composed of academic hospitals, a practice plan, and a managed care payer, could reliably implement an evidence-based program for gastric bypass surgery. A secondary aim was to evaluate the impact of the program on clinical outcomes.

STUDY DESIGN: A standardized program for delivery of clinical best-practice elements for patients undergoing initial open or laparoscopic Roux-en-Y gastric bypass was implemented in 2008. Best-practice elements were embedded into the workflow. The best-practice elements were refined after reviewing failures observed during the early implementation period. The study period was divided into 3 groups: group \( \alpha \) = year preceding program implementation (control), group \( \beta \) = first year of implementation (unreliable), and group \( \Omega \) = 2nd to 4th years of implementation (reliable). Outcomes data were collected for all patients who had undergone Roux-en-Y gastric bypass between May 2008 and April 2012 and were compared with a control group from the preceding year using multiple logistic regression analysis.

RESULTS: Two thousand and sixty-one patients were studied, with no significant demographic differences between study groups. Best-practice elements delivery was 40% in group \( \beta \), but was >90% for group \( \Omega \) (p < 0.001). Length of stay for group \( \alpha \) was 3.5 days and improved to 2.2 days (p < 0.001) for group \( \Omega \). Complications and readmission rates improved considerably with reliable delivery of best-practice elements.

CONCLUSIONS: Standardization of evidence-based care delivery for Roux-en-Y gastric bypass was feasible and reliable delivery of this pathway improved clinical outcomes. (J Am Coll Surg 2015;220: 855–862. © 2015 by the American College of Surgeons)
ProvenCare for Lung cancer treatment

• Geisinger's ProvenCare™ Program (for elective coronary artery bypass surgery, total hip replacement, and others) has shown that the principles of reliability science, facilitated by a robust electronic health record and institutional commitment, allow the re-engineering of complicated clinical processes.

• This eliminates unwarranted variation and promotes the completion of evidence-based elements of care. It has not been established that ProvenCare can be generalized to other institutions.
Why this Collaborative?

Establish the precedent of working with a national, disease-specific, professional organization

Determine scalability

Determine generalizability

Establish feasibility in organizations without an EHR

Determine ability to implement in a non-employed physician environment
Formation

- CEO Glen Steele, Jr. proposed collaboration between Geisinger and American College of Surgeons Commission on Cancer (CoC) for ProvenCare® national cancer pilot
- CoC reps visited Geisinger in March, 2009
  - Group agreed on non-small cell lung cancer
  - The Society of Thoracic Surgeons (STS) suggested as another collaborator
  - 6-8 facilities, academic and community
- Concept approved by CoC Executive Committee
- ACS Commission on Cancer National Pilot Study for ProvenCare® Lung Cancer
Proven Care for Lung cancer treatment

- Now, under the auspices of the American College of Surgeons Commission on Cancer, ProvenCare was adapted to a multi-institutional collaborative for the care of the patient with resectable lung cancer.
COLLABORATIVE ENGAGEMENT RULES

Data

- Collaborative members agreed to complete a readiness assessment
- Collaborative members agreed to share all HIPPA compliant data in a transparent and timely manner
- CoC developed a web-based standardized data collection tool
- A single analytic study will be promoted
ProvenCare® Components

Activated patient and family

Appropriateness documented

Evidence/consensus-based best practices

“Hardened,” optimized work flows to assure reliable delivery
ProvenCare® Goals

Decrease complication and mortality rates

Increase efficiency of care processes

Increase efficiency in providing evidence based care

Eliminate unwanted variation
Evidence Consensus

• Existing “best practices” examined thoroughly
  – No pre-existing comprehensive guideline

• Original draft – 3 Geisinger surgeons

• Final draft – 14 surgeons
  – One meeting, one day
  – Consensus in just a few hours
  – 38 total elements
Pilot Study Chronology

- Aug 2009 – Thoracic leader engagement and consensus on rules and evidence
- Sept to Dec 2009 – Institutional commitment, team formation & pre-work
- Jan 2010 – Collaborative team kick-off session
- Mar 2010 – Collaborative WebEx 1
- May 2010 – Collaborative team face-to-face session
- July 2010 – GO LIVE
- Sept 2010 – Collaborative WebEx 2
Collaborative Participants

6 Diverse Institutions

- 4 Academic Medical Centers
  - 2 Urban (NCI designated Comprehensive Cancer Centers)
  - 1 Suburban
  - 1 Rural (NCI designated Community Cancer Centers Program)

- 2 Community Medical Centers
  - 1 Suburban (University affiliate)
  - 1 County-owned
    - Solo thoracic surgeon
    - Minimal IT support, paper based medical record
ProvenCare® Collaborative Outcomes/Objectives

PRIMARYPE: Reliably deliver all 38 elements of care.
→ every patient
→ every time

SECONDARY: Clinical (morbidity / mortality).
ProvenCare® Lung Cancer

Clinic

- PET/CT
- Clinical Stage
- PFTs
- EKG (age ≥ 50)
- Smoking status
- Engage patient

Pre-op

- Antibiotics
- DVT prevention
- "Time Out"

OR

- Bronchoscopy
- Mediastinoscopy
- R0 resection
- ≥3 lymph nodes

Post-op

- CXR ≤ 4 hrs
- Pain protocol
- Pulmonary plan
- DVT prevention
- Follow-up plan

Return Clinic

- Final Stage
- Oncology plan
- Smoking status
Commission on Cancer National Pilot Study for the ProvenCare® Lung Cancer Collaborative

DATA REVIEW

INCLUDES DATA SUBMITTED TO ACS – COC FOR CASES PRIOR TO NOVEMBER 2016
**Completed Cases – By Institution**

**July 2010 – November 2016**

*Phase II sites live on August 6, 2012*

<table>
<thead>
<tr>
<th>Institution</th>
<th>Number of Completed Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Washington</td>
<td>451</td>
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<tr>
<td>Geisinger Health System</td>
<td>431</td>
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<tr>
<td>NorthShore Health System</td>
<td>267</td>
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<tr>
<td>Northwestern University Medical School</td>
<td>161</td>
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<tr>
<td>Baystate Medical Center/Tufts University School of Medicine Program</td>
<td>137</td>
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<tr>
<td>Providence Portland</td>
<td>122</td>
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<tr>
<td>Duke University</td>
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<tr>
<td>Stony Brook University Medical Center</td>
<td>101</td>
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<tr>
<td>Providence Everett</td>
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<tr>
<td>UMass Memorial Medical Center</td>
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<tr>
<td>Sinai Hospital of Baltimore Program</td>
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<tr>
<td>Kern Medical Center Program</td>
<td>19</td>
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<tr>
<td><strong>Grand Total</strong></td>
<td><strong>2011</strong></td>
</tr>
</tbody>
</table>
Overall Reliability

ProvenCare Lung Cancer Collaborative - Overall Reliability
Pre-admission Elements

1. Treatment options will be discussed and patient preferences determined* Yes No NA
2. Beta-blockade for all patients on beta-blockers will be maintained through the perioperative period.* Yes No NA
3. Determine & document pre-operative use of ASA / clopidogrel* Yes No NA
4. Withhold warfarin for 5 days prior to surgery* Yes No NA
5. Spirometry performed within 180 days prior to surgery and surgeon documents awareness of results* Yes No NA
6. EKG performed within 180 days prior to surgery (if age > age 50 years) and surgeon documents awareness of result* Yes No NA
7. Documentation of smoking history* Yes No NA
8. Chest CT imaging performed within 60 days prior to surgery and surgeon documents awareness of result* Yes No NA
9. PET scan imaging performed within 60 days prior to surgery and surgeon documents awareness of result.* Yes No NA
10. Brain MRI obtained for any patients Clinical State III-A or greater and surgeon documents awareness of result* Yes No NA
11. Multidisciplinary evaluation performed for any patients Stage III-A or greater and surgeon documents awareness of result* Yes No NA
12. If any prior biopsy has been performed then a copy of the pathology report is available in the medical record and has been reviewed by the surgeon* Yes No NA
13. Clinical performance status will be measured (Zubrod & ASA systems)* Yes No NA
14. Clinical disease stage is established, discussed with the patient, and documented in the medical record* Yes No NA
15. Patient activation (signed contract - based upon previous ProvenCare® projects)* Yes No NA
In Patient operative

1. Warfarin will be withheld 5 days pre-op (if applicable)*   Yes No NA
2. Pre-op antibiotics will be given within 60 minutes prior to incision (120 for vanco).*   Yes No NA
3. The appropriate antibiotic will be selected*   Yes No NA
4. A cervical mediastinoscopy will be performed on all patients with Clinical Stage I-B (T2) or greater unless the mediastinal lymph nodes have been previously pathologically evaluated*   Yes No NA
5. At least 3 mediastinal lymph node stations will be sampled or dissected during resection*   Yes No NA
6. DVT prophylaxis will be accomplished pre-operatively and maintained during the peri-operative period using mechanical, pharmacologic, or both methods (low molecular weight heparin; fondaparinux; unfractionated heparin)*   Yes No NA
7. Documentation of hair removal method, if done (clip, not shave)*   Yes No NA
8. A universal protocol, as defined by the Joint Commission (including surgical time out), will be performed in the operating room prior to the procedure*   Yes No NA
9. Bronchoscopy must have been performed prior to attempted resection.*   Yes No NA
10. For Stage T1b or greater (>2 cm lesion), pulmonary resection will be accomplished in an anatomic fashion*   Yes No NA
11. If a pneumonectomy is performed, surgeon documents consideration of sleeve resection*   Yes No NA
In patient post-operative

Although an R0 is the goal of every resection, if a pathology report reveals a positive margin then the limitations shall be documented and implications and alternatives for further care will be reviewed.*  Yes No NA

2 Antibiotics will be discontinued within 24 hrs of surgery end time (institution SCIP definition).*  Yes No NA

3 Smoking cessation counseling will be reinforced:*  Yes No NA

4 A structured post-resection pulmonary toilet regimen will be used*  Yes No NA

5 Pain assessment protocol, including reassessment for recurrent pain above threshold will be followed*  Yes No NA

6 A CXR will be performed within 4 hours of leaving the operating room and notation of its review made in the chart*  Yes No NA

7 Justification for indwelling bladder catheters will documented in the chart every 24 hrs*  Yes No NA

8 Plan for follow-up after discharge will be documented and reviewed with patient*  Yes No NA
Post-discharge
1 Documentation of smoking status at follow-up and smoking cessation counseling will be reinforced* Yes No NA
2 Pathologic Stage will be documented using the standard pathology synoptic template* Yes No NA
3 Written oncology care plan (including disease name, type, treatment rendered, and further treatment and/or surveillance recommendations) will be established and reviewed with patient and their referring physician* Yes No NA
4 Medical oncology referral will be offered to all patients Pathologic Stage II or greater* Yes No NA
Phase II Collaborative Participants

ProvenCare Lung Collaboration Participants

- American College of Surgeons Commission on Cancer
  Chicago, IL
- University of Washington
  Seattle, WA
- Geisinger Health System
  Danville, PA
- Northwestern University
  Chicago, IL
- Duke–Raleigh Hospital
  Raleigh, NC
- Bay State Medical Center
  Springfield, MA
- Sinai Hospital of Baltimore
  Baltimore, MD
- Stony Brook University Medical Center
  Stony Brook, NY
- UMass Memorial Health Care
  Worcester, MA
- NorthShore University
  Chicago, IL
- Providence Regional Medical Center (Everett)
  Everett, WA
- Providence Health and Services (Portland)
  Portland, OR

=Rural  U=Urban  S=Suburban
NorthShore University Health System

4 hospital system
  Evanston (the flagship), Glenbrook, Highland Park and Skokie hospitals (800+ beds, 80+ ICU beds, etc.)

Evanston hospital is 300+ beds, 152 Telemetry beds, 26 ICU beds, Evanston hospital is a primary teaching site for University of Chicago residents and medical students.

Fully integrated EMR for inpatient and outpatient with EPIC since 2003. NorthShore Medical Group is a 900+ multispecialty physician practice.
• The TEAM, The TEAM, the TEAM…

• -- thoracic surgeons
• -- nurses (clinic, OR, inpatient)
• -- anesthesia
• -- respiratory care
• -- quality personnel
• -- IT staff
• -- executive leadership
NorthShore Experience

• EMR enhancements:
  – MD authored templates
    » Clinic visits
    » Pre-op notes
    » Post-op notes
  – Nursing flowsheet documentation re: pain assessment
  – Respiratory Therapy flowsheet documentation re: pulmonary interventions and teaching

• Respiratory Therapy teaching for all patients
• Improved patient satisfaction with pain management
• Pathology Dept adopted standard staging template
<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
<th>Date/Action</th>
<th>Notes</th>
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<tbody>
<tr>
<td><strong>Proven Care Lung CA Proposed Evidence Elements</strong></td>
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<tr>
<td><strong>Pre-Admission Elements</strong></td>
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<td>Planned Date of Surgery?</td>
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<td>Treatment options discussed and patient preferences determined</td>
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<tr>
<td>Withhold warfarin for 5 days prior to surgery (DATE OF SURGERY)</td>
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<td>Spirometry performed within 180 days prior to surgery and surgeon documents awareness of result</td>
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<td>EKG performed within 180 days prior to surgery (if age ≥ 50 years) and surgeon documents awareness</td>
<td>10/06/2010</td>
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<td>Chest CT imaging performed within 60 days prior to surgery and surgeon documents awareness</td>
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<td>On Pocs - Chest CT</td>
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<td>PET scan imaging performed within 30 days prior to surgery and surgeon documents awareness of</td>
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<tr>
<td><strong>In-Patient Operative Elements</strong></td>
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<td>Cervical</td>
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<td>A cervical mediastinoscopy will be performed in all patients with Clinical Stage IIa (T2) or greater</td>
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<td>A CXR will be performed within 4 hours of leaving the operating room</td>
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<td>Justification for indwelling bladder catheters will be documented in the chart every 24 hrs</td>
<td>Yes</td>
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<td>Yes</td>
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<tr>
<td>Call back to referring MD with updated on POC</td>
<td>Yes</td>
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</table>
My Role in NorthShore’s Lung Cancer Program

The NorthShore University HealthSystem (NorthShore) lung cancer surgery team has your health and safety as its chief concern. That is why we established the NorthShore Lung Cancer Program. Our team is committed to providing all of the care steps necessary to ensure the highest quality care before, during and after your lung cancer operation. Your active participation is one of the most important parts of this program. Medical research has shown that the more involved you are in your own care – and the stronger the partnership between you and your caregivers – the better your results will be. We believe that you will get the best result when you, your family and your NorthShore surgery team are all active partners in your care.

I commit to:

COMMUNICATING WITH MY SURGERY TEAM
✓ I will call my surgery team when I don’t understand something, when anything worries me, or if anything unexpected occurs, knowing that my surgery team will work with me until I am satisfied.
✓ I will discuss all of my current medicines, non-prescription products, vitamins or herbs as well as all of my current and past medical problems, recognizing how important this information is in guiding my care and making me safer.

INVOLVING FAMILY AND LOVED ONES
✓ I will have a trusted family member or loved-one present with me during my operation and clinic visits – to help support me during my care.
✓ I will work with my surgery team to develop a sensible plan for my transition from the hospital.

COMPLETING IMPORTANT CARE STEPS
✓ I will alert my surgery team before I stop or start any new medications so that we can discuss how any change might impact my care.
✓ I will use my spirometer and complete my breathing exercises as directed before and after surgery.
✓ I will follow my after-surgery precautions and instructions because I know that by following these I will be more likely to have a better recovery from my operation.
✓ I will work with my surgery team to develop a sensible schedule for my after-surgery care and follow-up clinic visits.

I realize that my decisions and my behavior have a significant positive impact on my recovery. Because I want to become and stay healthy, I fully accept my role as a partner in the NorthShore Lung Cancer Program.

[Patient Name]  ___________________________  Date

I commit our team to provide all of the care steps necessary to ensure the highest quality care before, during and after your lung cancer operation.

[Physician Name]  ___________________________  Rev07.19
Structured Clinical Documentation

• Creation of informatics tools allowing complete clinical documentation and consistent capture of research data with standardized and structured formats.

• Data then sent to analytic applications where performance, quality, and outcome metrics can be calculated for research purposes.

• Real-time applications in EPIC can be performed to generate clinical decision support as a quality improvement initiative.
### PROVEN CARE LUNG CA PROPOSED EVIDENCE ELEMENTS

**Pre-Admission Elements**

- **Planned Date of Surgery?** 10/11/2010
- **Treatment options discussed and patient preferences determined** Yes
- **Beta-blockers for all patients on beta-blockers will be maintained through the perioperative period**
- **Determine & document pre-operative use of ASA/dipiridamole** Yes
- **Withhold warfarin for 5 days prior to surgery (DATE OF SURGERY)** 10/6/2010
- **Spirometry performed within 180 days prior to surgery and postoperative review of results**
- **EKG performed within 180 days prior to surgery (if age > 50 years and surgery documents are obtained)**
- **Chest CT imaging performed within 60 days prior to surgery and postoperative review of results**
- **On PACs - Chest CT**
- **PET scan imaging performed within 60 days prior to surgery and postoperative review of results**
- **Brain MRI obtained for any patients Clinical Stage III-D or greater and surgery documents are obtained**
- **On PACS - Brain MRI**
- **Multidisciplinary review performed for any patients stage III-D or greater and surgery documents are obtained**
- **Clinical performance status will be measured ( Zubrod & ASA systems)**
- **Clinical disease stage is established, discussed with the patient, and documented in the medical record**
- **Patient activation (signed contract - based upon previous ProvenCare projects)**

**In-Patient Operative Elements**

- **Cervical Mediastinoscopy** will be performed in all patients with Clinical Stage IIB (T2) or greater
- **At least 1 mediastinal lymph node stations will be sampled or dissected during resection**
- **DVT prophylaxis will be accomplished pre-operatively and maintained during the peri-operative period**
- **Bronchoscopy must have been performed prior to attempted resection** Yes
- **For Stage T1b or greater (≥2 cm lesion), pulmonary resection will be accomplished in an anatomic block if a pneumonectomy is performed, surgery documents consideration of sleeve resection**

**Inpatient Postoperative Elements**

- **Although on ICU is the goal of every resection, if a pathology report reveals a positive margin then the surgery may be delayed**
- **A CXR will be performed within 4 hours of leaving the operating room** Yes
- **Justification for indwelling bladder catheters will be documented in the chart every 24 hrs**
- **Plan for follow-up after discharge will be documented and reviewed with patient**
- **Call back to referring MD with update on POC**
# Reliability: Preoperative order set

**Thoracic Surgery VATS / Thoracotomy Pre-Op CPG [508]**

## Pre-Op Orders: AM Surgery Admission Orders - Day 1

### General Orders

- **Obtain surgical consent**
- **Void on call to OR**
- **Knee High TED Hose**
- **Compression Device**
- **Implement intraoperative orders found on surgery specific preference list**
- **Weigh Patient**
- **Preop Care Protocol**

### Pre OP Labs

- **Draw Type & Screen**
- **Order Routine EKG**
- **CBC without Differential**
- **COMP METABOLIC PANEL**
- **Staph PCR**

### Diet Orders

- **NPO after Midnight**

### Medications

#### BETA BLOCKER GUIDELINES

**Beta Blocker Guidelines**

**Medication Instructions**

- **Start IV in Ambulatory Surgery/Holding Area**
- **Antibiotics must be administered in Holding Area - complete infusion 30 min prior to incision**

#### Standard Antibiotic

- **Cefazolin 2g IV to be administered in holding area**
- **Vancomycin 1g IV PB q12h x 1 (IF PCN Allergic and patient weight is greater than 50 kg)**
- **Vancomycin 750mg IV PB q12h x 1 dose (IF PCN allergic and patient weight is less than 50 kg)**

**URL:** [http://pulse/ClinicalResources/Departments/PerioperativeServices/Documents/Anesthesiology/GUIDELINE%20FOR%20PERIOPERATIVE%20BETA%20BLOCKERS.doc](http://pulse/ClinicalResources/Departments/PerioperativeServices/Documents/Anesthesiology/GUIDELINE%20FOR%20PERIOPERATIVE%20BETA%20BLOCKERS.doc)
## Post-Op Orders

### General Orders

- **Critical Pathway Guidelines**
- **Admit to Telemetry**
- **Critical Care Consult**
- **Telemetry Monitoring**
- **Vital Signs - Q 4 hours x 24 hours**
- **Continuous Pulse Oximetry**
- **Strict I & O and record**
- **Nasogastric Tube**
- **OCCUPATIONAL THERAPY CONSULT**
- **PHYSICAL THERAPY CONSULT**
- **Activity:** Out of bed to chair POD #1
- **WEIGHT BEARING:** Full weight bearing (FWB)
- **Chest tube orders 10cm wall suction**

### Diet

- **NPO**
- **ADVANCE DIET AS TOLERATED TO GENERAL**
- **CLEAR LIQUID DIET PRN**
- **SOFT DIET PRN**
- **GENERAL DIET**
- **Fluid restriction**

### Respiratory Therapy

- **Cough, deep breath q2h while awake**
- **RESPSITYORY CONSULT**
- **Incentive spirometer to bedside, encourage 10x q1h**
- **ACAPELLA Autclave PPP O2 to bedside, encourage 3-4 x daily**
- **SMOKING CESSATION EDUCATION**
- **May wean P02 in increments of 10% (see comments)**
- **Oxygen High Humidity Face Mask**
- **Oxygen by Nasal Cannula**

### Medications

- **Medication Instructions**
  - **On Q pain pump**
  - **Epidural analgesia**
  - **Heplink IV when tolerating**

### IV Fluids

- **IV MAINTENANCE**

### Anticoagulants

- **Heparin 5000U/ml Subcutaneous**
  - 5,000 Units, Subcutaneous, NOW THEN Q8HR
<table>
<thead>
<tr>
<th>Done?</th>
<th>Pulmonary Regimen</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre Op assessment for Referral to Pulmonary Rehab</td>
<td>Designed to help patients improve their endurance and tolerance of exercise and daily activities through education, exercise and counseling. Please see yellow box for list of appropriate patients; patients listed who do not receive a referral or have documentation in the record as to why the referral was not appropriate would be a &quot;not met&quot;.</td>
</tr>
<tr>
<td></td>
<td>Smoking Cessation Education</td>
<td>Pre admission, inpatient and post discharge documentation of ongoing education. Respiratory Therapy consult order will include: Evaluation and education on incentive spirometry and acapella and a second inpatient visit.</td>
</tr>
<tr>
<td></td>
<td>Respiratory Therapy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ambulation</td>
<td>OOB to chair POD#1 then OOB 4xday</td>
</tr>
<tr>
<td></td>
<td>Chest Xray</td>
<td>Ordered in PACU (to be done within 4 hours post op)</td>
</tr>
<tr>
<td></td>
<td>Chest Tube</td>
<td>Negative 10cm suction post op; to water seal at 6am POD#1</td>
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<tr>
<td></td>
<td>PT and OT Consults</td>
<td>Energy conservation and ADL. &quot;Met&quot; would be consult ordered and patient evaluated for need of service during inpatient visit.</td>
</tr>
</tbody>
</table>

For patients that are appropriate: Pulmonary rehab tune up before surgery and then post op visits. Appropriate patients would include: Smoking, Severe COPD (FEV1 less than 50% and DLCO less than 50%)

Acapella: 4x daily
Incentive Spirometer: 10x hour
Benefits

Office visits more productive; less delay in getting patient to OR / obtaining diagnosis

Pre-op appointment with Nurse Navigator / PA
   Patients have extra time to ask questions / have questions answered
   Financial Resources handout
   Benefits of pulmonary toilet

ProvenCare® Patient Compact
   Engages patient and their family in their care
Why Clinical Standardization?

➢ Success factors

• Involve all stakeholders (MD, RN, Pharm.D, therapists, dietitians, equipment suppliers, administration)
• Strong clinical leadership / ownership
• Sufficient resources
• Targeted education, feedback loop
• Mechanism to discourage individual variation
ProvenCare Lung Cancer: A Multi-Institutional Improvement Collaborative

Mark R. Katlic, MD, MMM1; Matthew A. Facktor, MD2; Scott A. Berry, MS3; Karen E. McKinley, RN, MBA4; Albert Bothe, Jr, MD5; Glenn D. Steele, Jr, MD, PhD6

Abstract

Geisinger’s ProvenCare™ Program (for elective coronary artery bypass surgery, total hip replacement, and others) has shown that the principles of reliability science, facilitated by a robust electronic health record and institutional commitment, allow the re-engineering of complicated clinical processes. This eliminates unwarranted variation and promotes the completion of evidence-based elements of care. It has not been established that ProvenCare can be generalized to other institutions. Now, under the auspices of the American College of Surgeons Commission on Cancer, ProvenCare has been adapted to a multi-institutional collaborative for the care of the patient with resectable lung cancer. CA Cancer J Clin 2011;61:382-396. © 2011 American Cancer Society, Inc.

Introduction

The Institute of Medicine has defined quality as “the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge.”1 Implied in this statement is that professionals will provide the right care: not too much care (eg, providing unnecessary tests, medication, and procedures, with associated risks and side effects), not too little care (eg, not providing an indicated diagnostic test or a life-saving surgical procedure), and not the wrong care (eg, prescribing medicines that should not be given together, using faulty surgical technique).2

Few would disagree that cancer demands quality care. This is particularly true for lung cancer.
ProvenCare® Lung: A Multi-institutional Collaborative

1. Integration of 38 Evidence Based Practice standards linked to improved outcomes
2. “All or nothing” compliance rating
3. Initially 6 participating organizations, now 12
4. Spans the continuum:
   - Preadmission assessment, education, patient buy in, Surgical admission,
   - Post-discharge follow-up
Next Steps

- Obtain / analyze national outcomes data
  - STS General Thoracic Surgery Database
  - Duke Clinical Research Institute (DCRI)
  - Shared costs (CoC, STS, and GHS)
  - Awaiting STS/DCRI legal agreement
Next Steps

• The Multidisciplinary Lung Cancer Collaborative with ProvenCare®
  • Medical oncology
  • Radiation oncology
  • Thoracic surgery
Gaps in Guideline-Concordant Use of Diagnostic Tests Among Lung Cancer Patients


Department of Surgery, University of Washington; and Surgical Outcomes Research Center, University of Washington, Seattle, Washington

**Background.** Practice guidelines recommend routine use of pulmonary function tests (PFTs), computed tomography (CT), and positron emission tomography (PET) for the workup of resectable lung cancer patients. Little is known about the frequency of guideline concordance in routine practice.

**Methods.** A cohort study (2007 to 2013) of 15,951 lung cancer patients undergoing lobectomy or pneumonectomy was conducted with MarketScan, a claims database of individuals with employer-provided health insurance. Guideline concordance was defined by claims for PFT within 180 days of resection and for CT and PET within 90 days of resection. Generalized linear models were used to evaluate temporal trends, patient characteristics, and costs associated with guideline-concordant care.

**Results.** Overall, 61% of patients received guideline-concordant care, increasing from 57% in 2007 to 66% in 2013 ($p < 0.001$). Compared with patients who received guideline-discordant care, patients with guideline-concordant care more frequently underwent repeat testing (PFT: 21% versus 12%, $p < 0.001$; CT: 46% versus 22%, $p < 0.001$; PET: 2.3% versus 1.1%, $p < 0.001$). Health plan–adjusted mean total test-related costs were higher among guideline-concordant patients who underwent repeat testing than patients who did not ($4,304 versus $3,454, $p < 0.001$).

**Conclusions.** Forty percent of lung cancer patients treated with surgical procedures did not receive recommended noninvasive cancer staging and physiologic assessment before resection. Guideline concordance was associated with repeat testing, and repeat testing was associated with higher costs. These findings support the need for quality improvement interventions that can increase guideline concordance while curbing potential excess use of diagnostic tests.
14K Mountains in Colorado
RESPECT PRIVATE PROPERTY

Much of the area you are entering is private property.
Stay on the signed trail.
If you leave the trail, you will be trespassing and may be prosecuted.

MINES ARE DANGEROUS

Stay alive - Stay out.
Abandoned mine dangers include, but are not limited to, unsafe shafts and highwalls, deadly gas and lack of oxygen, unsafe ladders, unstable explosives, and deep pools of water.
Hidden shafts and adits can collapse at any time, Do not travel off-trail.

Mt. Bross is CLOSED

The summit of Mt. Bross is closed to public access. Public right-of-way has not been secured. Do not jeopardize the possibility of gaining legal access to Mt. Bross. Stay on the "Bross Bypass Trail" to descend to Kite Lake.

"Those who contemplate the beauty of the earth find reserves of strength that will endure as long as life lasts"
Rachel Carson
Questions?