

Workshop X: Application of Quantitative CT Imaging to Early Lung Cancer Management

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IT'S HOW MEDICINE

SHOULD BE



Disclosures 12/11

- Board of Trustees: Lung Cancer Alliance & Prevent Cancer Foundation
- Scientific Advisory Board to I-ELCAP, Roy Castle Foundation, Biodesign Institute, Arizona State U and Illinois Institute of Technology, Associate Council, U of C Inst of Translatl Med
- Chair, MD Anderson DOD External Review Committee for lung cancer research
- Member and National Steering Committee, Quantitative Biomarker Alliance, RSNA; Prevention Committee, IASLC & ASCO
- Consultant to NHRI, UK, Collaborator European Institute, Milan
- **I have no financial relationships to disclose**
- **I will discuss the following investigational use in my presentation: lung cancer screening**

Workshop X is a pre-competative forum addressing public health issues in improving lung cancer and related outcomes thru Quantitative Imaging



25 Years of progress through prevention

AND A SPECIAL THANKS ALSO GOES TO THE

WORKSHOP X SPONSOR

Carolyn R. “Bo” Aldigé

Prevent Cancer Foundation

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Measuring Progress



Why Cost Benefit Matters

- **USPSTF grades cancer screening services based on strength of evidence for clinical benefit and cost efficiency (<http://www.uspreventiveservicestaskforce.org/uspstf/grades.htm>).**
- **Only Grade A or B is reimbursed by Medicare (<http://www.healthcare.gov/law/features/rights/preventive>)**

Workshop X

- Suppose USPSTF recommend spiral CT (B recommendation)
 - are we ready for national implementation?
 - If LD CT is to be implemented, how do we optimize evaluation of nodules to reduce overdiagnosis—a role for phantoms?
- How do we optimize the yield of clinically useful information from a LD CT study?
- What can we accomplish now?
 - Role of the Two Breakout Groups
 - Policy or Imaging Considerations

Improve Diagnostic Work-up

- NELSON published diagnostic work up efficiency in NEJM and found a sensitivity of 95%, specificity of 99% using a Siemens Lung Care **volume measurement tool** to implement the nodule growth criteria proposed by I-ELCAP*
- I-ELCAP (Toronto) use a nodule growth criteria to separate clinically significant from non-malignant behaving nodules using quantitative imaging (filter for overdiagnosis)^
- RSNA (QIBA) is defining imaging protocols and QC/QS criteria to ensure robust measurements

*van Klaveren RJ et al NEJM, 2009

^Wagnetz et al AJR, 2012

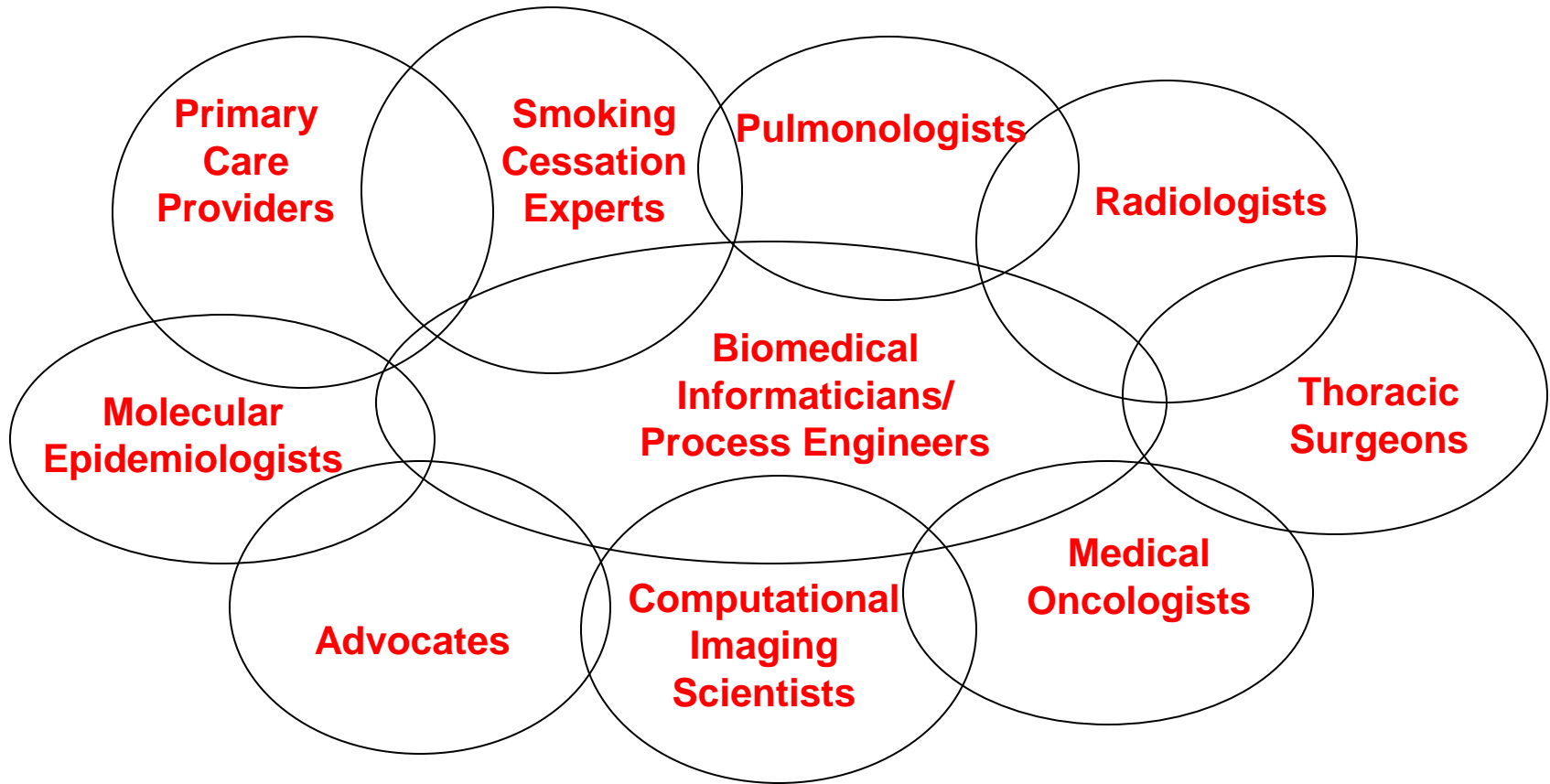
Moving To Rapid Learning

- Institute of Medicine (IOM) Roundtable suggested that a new clinical paradigm be developed that takes better advantage of data generated in the course of healthcare delivery which would speed and improve the development of evidence for real-world decision making for complex management processes

Conclusion:

- Congruence on refining components of the screening process could accelerate progress with improving screening management outcomes

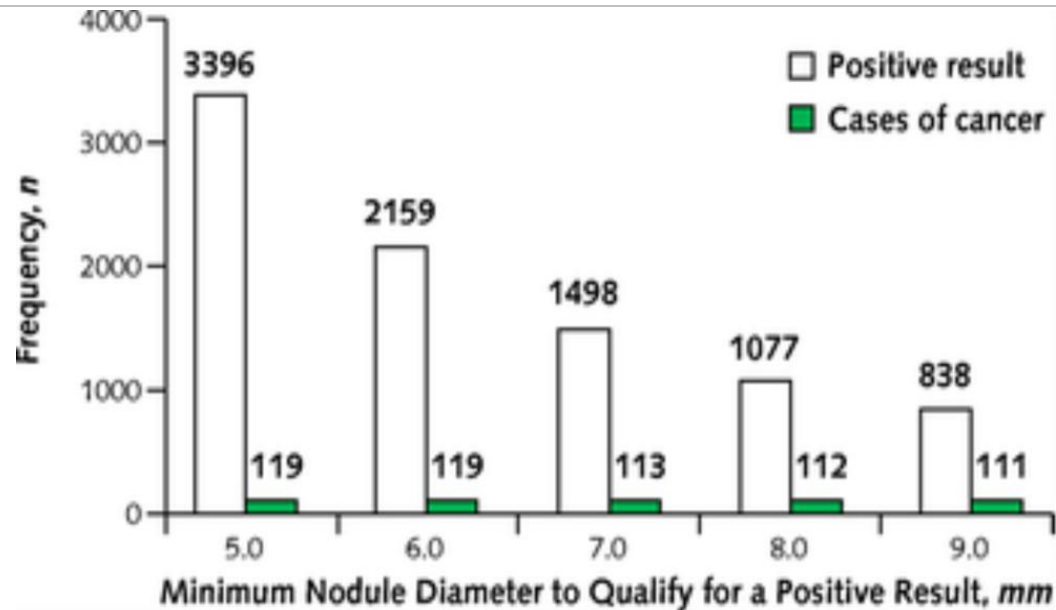
Chain of Care & Research as a Rapid Learning Matrix



I-ELCAP
73 Institutions
with
60,869 Participants
and
131,942 CT scans



From: Definition of a Positive Test Result in Computed Tomography Screening for Lung Cancer: A Cohort Study



Frequency of a positive result and cases of lung cancer diagnosed within 12 mo of baseline enrollment.

Ann Intern Med. 2013;158(4):246-252

Improving Public Policy

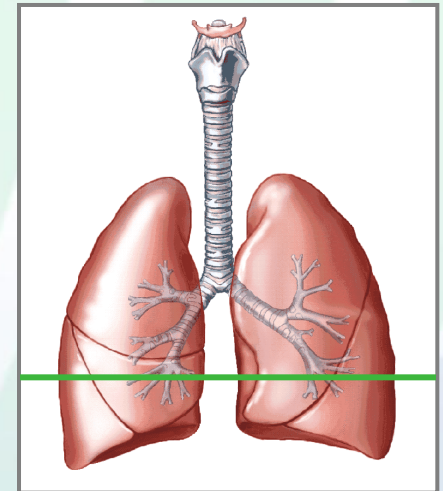
- **Challenge with over reliance on RCT**
 - **Concern with external validity—evidence from “there, then applied over “here”**
 - **methodological conclusions from evidence-based clearing house difficult to apply in real world settings**
- **Challenges in communicating academic concepts through the filter of the political process**
- **Suggests better characterization of the provenance of the data in justifying a policy recommendation**
- **Tension between science and politics in defining health policy**

Brian Baird, Book Review, Science 340:432-3, 2013

COPD and Lung Cancer

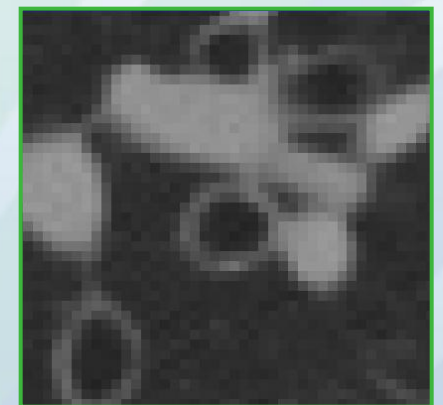
- Common Technical Challenges

- Gathering Large Clinical Datasets
 - Open image archives
 - Along with additional metadata
- Common Data and Analysis Methods
 - High resolution CT
 - Spirometry (LC Risk)
- Common Phantom Goals
 - Image Acquisition Quality and Repeatability



- How can we leverage the common work we are doing?

- Imaging Datasets
- Source Code
- Anatomical Models
- Phantoms & Findings



If Lung CA Saves Lives, What Next?

- NLST reported a **20.3%** reduction compared to CXR arm (NCI website)
- Long-term follow up from NY-ELCAP associated with a **36%, 64%** mortality reduction compared to CPS or CARET outcomes (Henschke et al Cancer, 2011)
- CISNET Modeling of NY-ELCAP outcomes suggested **46%** mortality (Foy et al Cancer, 2011)
- USPSTF is proposing to use modeling to develop their LD CT recommendation

How to responsibly move from research to public health?

Consider

- Implement screening such as proposed by the Screening “Framework”
- Use optimized imaging protocol for LDCT”
 - “Rapid Learn” COPD in standardized pilot
 - “Rapid Learn” Calcium scores in standardized pilot
 - Consider piloting thoracic spine density and adiposity measure
- Evaluate new disease site screening by rapid learning principles to provide evidence for eventual inclusion as clinically actionable data

Further Consider

- In post ACA world of capitated care, why is LDCT not developed as a normative health evaluation tool at least in tobacco smoke-exposed populations
- Preventive care for major chronic diseases in this population is anchored by dynamic changes in serial data provided by integrated quantitative assessment of periodic CT screening data
- This periodic health encounter bundles coaching on smoking cessation along with other health and wellness information into an efficient ambulatory encounter