Clinical Safety & Effectiveness Cohort # 21 Team 11

Improving Lung Cancer Screening

Educating for Quality Improvement & Patient Safety

The Team

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  - Kenyatta Lee, MD
  - Carlos Restrepo, MD
  - Tamara Simpson, MD
  - Lowell Glassburn
  - Shan Zhao
- Sponsor
  - Carlos Jaen, MD – Chair/Professor Department of Family & Community Medicine [2]

Smoking and Lung Cancer

United States

- Smoking causes 85% of all lung cancer
- Lung cancer is the number one cancer killer in the US
  - **Second most common cancer in men and women**
- 224,000 new cases annually
- **Approximately 160,000 deaths annually**
- Early detection increases survival to 49%

Texas

- Ranks 14th in the U.S. for cigarette smoking in adults (19.2%)
- **Leading cause of cancer death in Texas (26% of all cancer deaths)**
- **11,407 deaths expected in 2017 (up from 10,000 deaths in 2016)**

Bexar County

- Lung and bronchus cancer caused 21.5% of all cancer deaths (2007)
- **Highest age-adjusted rate of death (33.4 per 100,000) amongst all cancers from 2010 to 2014.**

American Cancer Society, 2015; Siegal, Miller, & Jemal, 2015
Cancer in Texas 2016. Texas Department of State Health Services. September 2016
Cancer in Texas 2017. Texas Department of State Health Services. September 2017;
Texas Cancer Info; 2013 Bexar County Community Health Assessment.
Cancer data have been provided by the Texas Cancer Registry, Cancer Epidemiology and Surveillance Branch, Texas Department of State Health Services, 1100 West 49th Street, Austin, TX 78756, https://www.dshs.texas.gov/tcr

Evidence for Screening with LDCT

- National Lung Screening Trial (2010)

  - **20% reduction in lung cancer mortality** in adults at high-risk for lung cancer who received 3 consecutive annual lung cancer screening examinations with low-dose computed tomography (LDCT)*

  - Compared with an equivalent group of adults randomized to receive 3 consecutive annual chest x-rays*

*LDCT = ~1.5 millisieverts (mSv) of radiation compared to ~7 mSv for a typical chest CT. (chest xray: 0.1 mSv, coast-to-coast airplane flight: 0.01-0.03 mSv)

Team TNLSTR. Reduced Lung-Cancer Mortality with Low-Dose Computed Tomographic Screening. *New England Journal of Medicine*. 2011;365(5):395-409. doi:10.1056/NEJMoa1102873.

Lung Cancer Screening Program

- Multiple components:
  - Multi-disciplinary approach and governance
  - Integrated smoking cessation programming
  - Specific policies and procedures
  - Lung nodule data collection, tracking, reporting
  - Education

An important part to any Lung Cancer Screening program will be how and when the patient's smoking history will be gathered.

Mazzone P, Powell CA, Arenberg D, Bach P, Detterbeck F, Gould MK, Jaklitsch MT, Jett J, Naidich D, Vachani A, Wiener RS, Silvestri G. Components Necessary for High-Quality Lung Cancer Screening. Chest. 2015;147(2):295-303. doi:10.1378/chest.14-2500.

U.S. Preventive Services
TASK FORCE

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Final Recommendation Statement
Lung Cancer: Screening

Recommendations made by the USPSTF are independent of the U.S. government. They should not be construed as an official position of the Agency for Healthcare Research and Quality or the U.S. Department of Health and Human Services.

Recommendation Summary
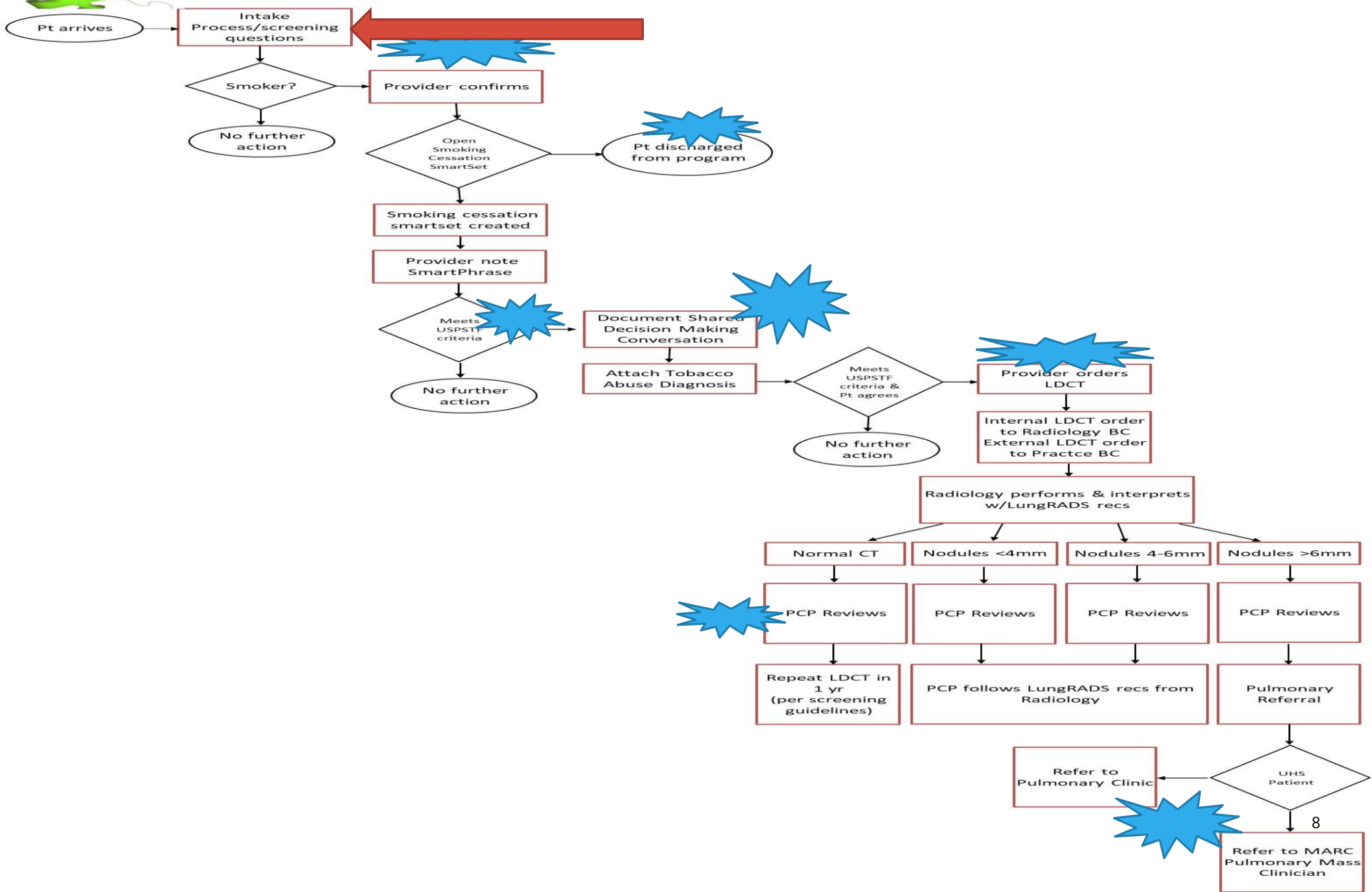
Summary of Recommendation and Evidence

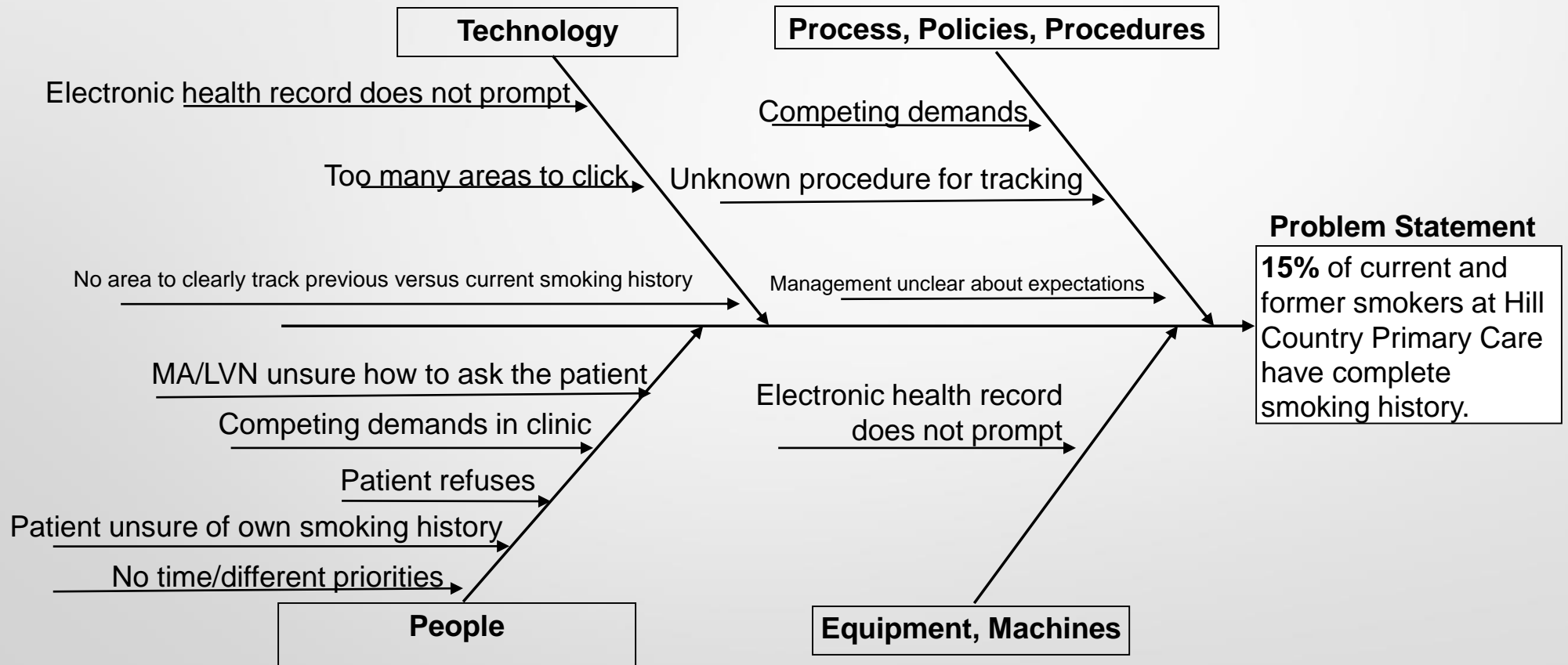| Population	Recommendation	Grade (What's This?)
Adults Aged 55-80, with a History of Smoking	The USPSTF recommends annual screening for lung cancer with low-dose computed tomography (LDCT) in adults aged 55 to 80 years who have a 30 pack-year smoking history and currently smoke or have quit within the past 15 years. Screening should be discontinued once a person has not smoked for 15 years or develops a health problem that substantially limits life expectancy or the ability or willingness to have curative lung surgery.	B

AIM STATEMENT

Improve the proportion of current and former smokers at UT Health Hill Country Primary Care with full smoking history documentation from 15% to 75% by January 1, 2018.
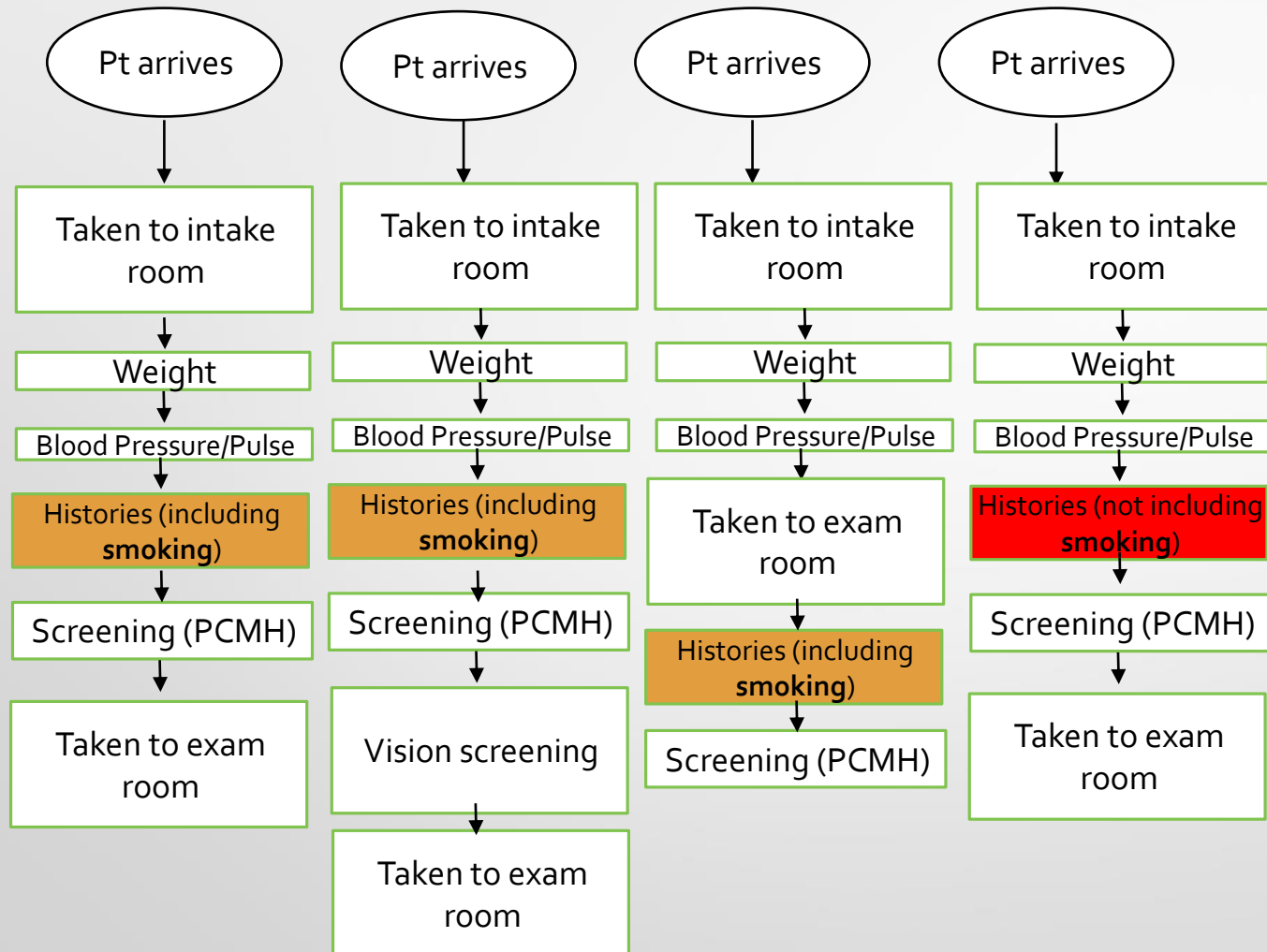
Lung Cancer Smoker Screening Flow Chart -- Current

Pt arrives → Intake Process/screening questions

Smoker? → No → No further action

Smoker? → Provider confirms

Open Smoking Cessation SmartSet → Pt discharged from program

Open Smoking Cessation SmartSet → Smoking cessation smartset created

Smoking cessation smartset created → Provider note SmartPhrase

Provider note SmartPhrase → Meets USPSTF criteria

Meets USPSTF criteria → No → No further action

Meets USPSTF criteria → Document Shared Decision Making Conversation

Document Shared Decision Making Conversation → Attach Tobacco Abuse Diagnosis

Attach Tobacco Abuse Diagnosis → Meets USPSTF criteria & Pt agrees

Meets USPSTF criteria & Pt agrees → No → No further action

Meets USPSTF criteria & Pt agrees → Provider orders LDCT

Provider orders LDCT → Internal LDCT order to Radiology BC / External LDCT order to Practce BC

Internal LDCT order to Radiology BC / External LDCT order to Practce BC → Radiology performs & interprets w/LungRADS recs

Radiology performs & interprets w/LungRADS recs → Normal CT | Nodules <4mm | Nodules 4-6mm | Nodules >6mm

Normal CT → PCP Reviews → Repeat LDCT in 1 yr (per screening guidelines)

Nodules <4mm → PCP Reviews → PCP follows LungRADS recs from Radiology

Nodules 4-6mm → PCP Reviews → PCP follows LungRADS recs from Radiology

Nodules >6mm → PCP Reviews → Pulmonary Referral

Pulmonary Referral → UHS Patient

UHS Patient → Refer to Pulmonary Clinic

UHS Patient → Refer to MARC Pulmonary Mass Clinician

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Fish-Bone Diagram

Technology

Process, Policies, Procedures

Electronic health record does not prompt

Competing demands

Too many areas to click

Unknown procedure for tracking

Problem Statement

No area to clearly track previous versus current smoking history

Management unclear about expectations

15% of current and former smokers at Hill Country Primary Care have complete smoking history.

MA/LVN unsure how to ask the patient

Electronic health record does not prompt

Competing demands in clinic

Patient refuses

Patient unsure of own smoking history

No time/different priorities

People

Equipment, Machines

Intake Process/Screening Variability

Column 1:
- (Pt arrives)
- Taken to intake room
- Weight
- Blood Pressure/Pulse
- Histories (including **smoking**)
- Screening (PCMH)
- Taken to exam room

Column 2:
- (Pt arrives)
- Taken to intake room
- Weight
- Blood Pressure/Pulse
- Histories (including **smoking**)
- Screening (PCMH)
- Vision screening
- Taken to exam room

Column 3:
- (Pt arrives)
- Taken to intake room
- Weight
- Blood Pressure/Pulse
- Taken to exam room
- Histories (including **smoking**)
- Screening (PCMH)

Column 4:
- (Pt arrives)
- Taken to intake room
- Weight
- Blood Pressure/Pulse
- Histories (not including **smoking**)
- Screening (PCMH)
- Taken to exam room

Right side text:

"Do you smoke?"
"How many packs do you smoke?"
"How many cigarettes do you smoke?"
"How much do you smoke?"
"How much do you smoke per day?"
"On average, how much do you smoke?"
"I know you smoked a lot back then and now you don't smoke so much. How much do you smoke now?"

"How long did you smoke?"
"When did you start and stop smoking?"

"How many pipes per day did you smoke?"
"I can let the doctor know that you only smoked "socially.""

"I can let the doctor know you're interested in stopping?"
"We have someone here who might be able to help."

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Variation Occurs in Gathering
and Documenting Tobacco Use History

Baseline UT Hill Country Clinic Data

Current or Former Smokers: 331

- 14.8% (49/331) with <u>full smoking history</u>

  - 22.3% (21/94) Current Smokers with full smoking history

  - 11.8% (28/237) Previous Smokers with full smoking history

Numerator: Number of current and previous smokers with full* smoking history

Denominator: Number of current and previous smokers

*Full=years smoked, average packs per day, and quit date (if former smoker)

Action Plan

Goal	Primary Drivers	Interventions	Measure	Responsible	Intervention score
Increase lung cancer screening	**Tobacco use history documentation**	• Standardize work with Medical Assistant/Licensed Vocational Nurse to correctly and consistently inquire about and document smoking history.	1. Training done/not done. 2. Proportion with complete history.	Cancino	1
		• Standardize work with providers to confirm history.	1. Training done/not done 2. Proportion with complete history.	Cancino	1
		• Identify local Staff and Clinical Champions.	1. Champions identified.	Cancino	2
		• Report data to practice regularly.	1. Weekly reporting of data.	Cancino	2
		• Outreach to patients.	TBD	TBD	1
		• Standardize EPIC documentation intervention.	TBD	Barker, Schott	2

PDSA #1 (10/23/2017)

<u>Week 1</u>

Introduce project at

- Morning Huddle
- Staff/Faculty Meeting

Developed standard work for tobacco use history collecting and documentation

- Medical Assistant
- Physician/NP
- Medical Director/Practice Manager

New Standard Workflow

```
        ( Pt arrives )
              |
              v
   [ Taken to intake room ]
              |
              v
   [       Weight        ]
              |
              v
   [ Blood Pressure/Pulse ]
              |
              v
   [ Histories (including smoking) ]
              |
              v
   [  Screening (PCMH)  ]
              |
              v
   [   Taken to exam
          room        ]
```
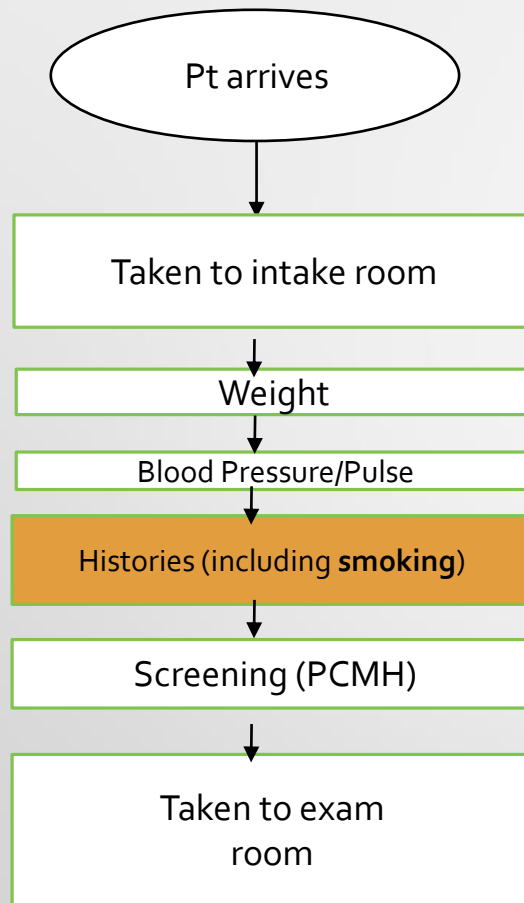
PDSA #2 (12/04/2017)

- Re-Train New Medical Assistant
- Script Training
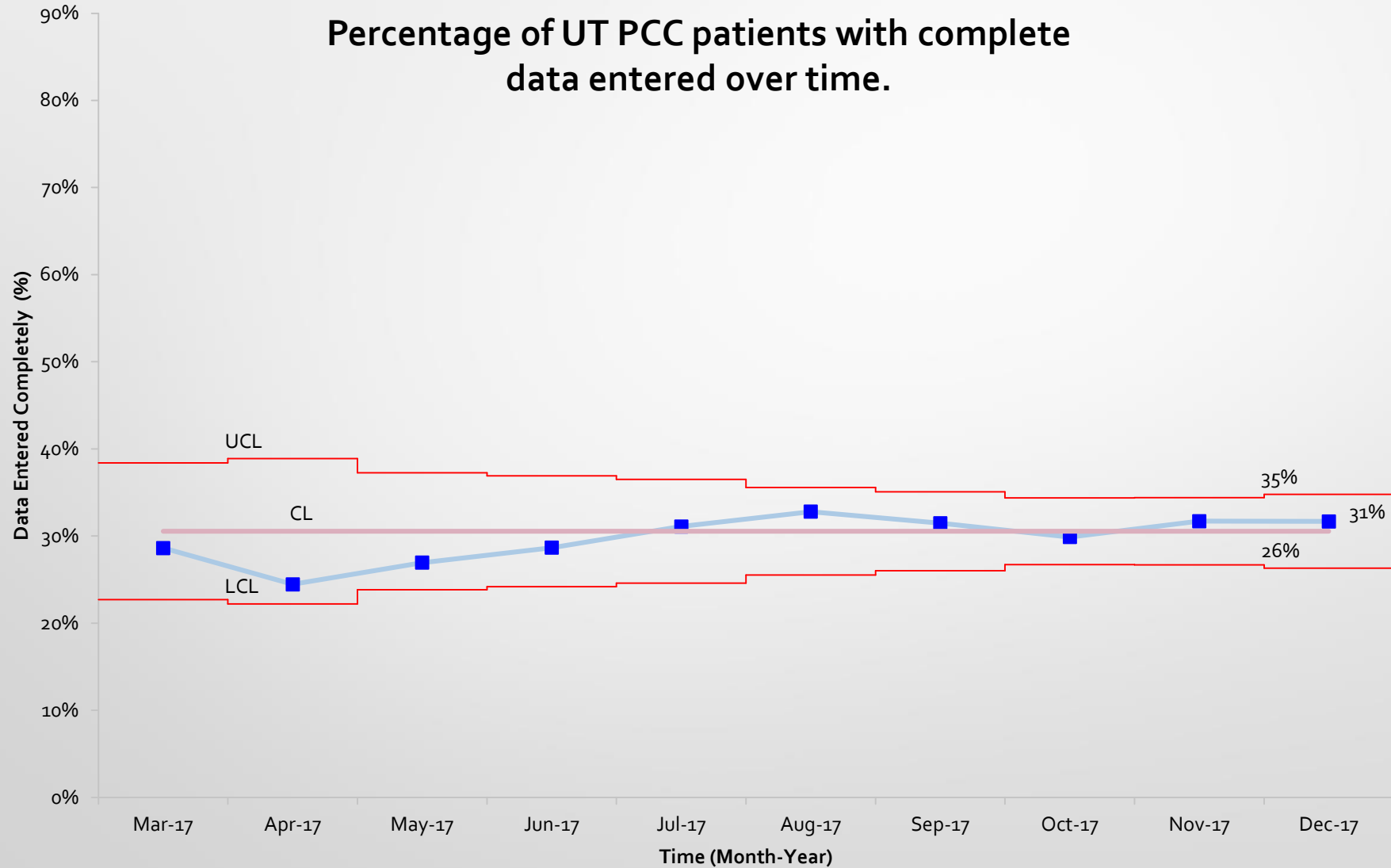- Update Training Checklist for all staff

Compliance

Compliance increased from 20.6 to 47.7

Percentage of UT Health Hill Country patients with complete data entered over time.
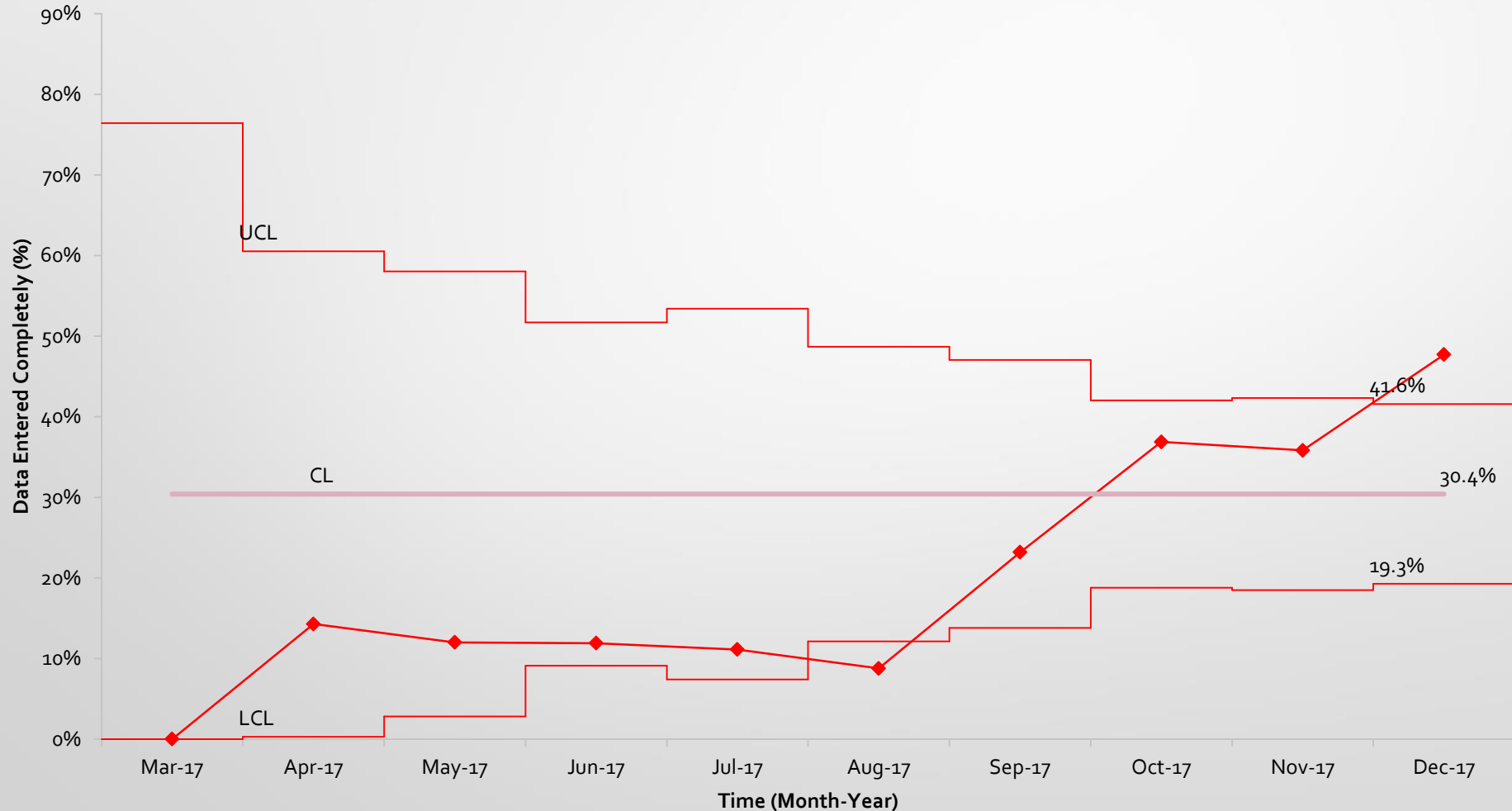
Other PCC clinics showed no change over same time period

Percentage of UT PCC patients with complete data entered over time.

Return On Investment

- Increasing screening for high-risk current and former smokers may lead to increased CT scans.

- There is a difference in reimbursement for LDCT done currently and those done in the context of a Lung Cancer Screening Program.

Proposed Market Size

- Over 405,000 between 55-79

- 16.2% smoking rate for Bexar County

  - Over 65,000 of that age group are likely smokers

  - 1% - 650 people

  - 5% - 3280 people

Census Data (Bexar County)
Open Data

Potential Revenue Loss

- Non Contrast Chest CT (71250): $172.33
- LCS LDCT (G0297): $240.48

  Per Case Loss   ($68.15)

	Reason	N	Reimbursement	Total Reimbursement
Non Contrast Chest CT	Lung Cancer Screening	53	$172.33	9133.49
LDCT	Lung Cancer Screening	53	$240.48	12,745.44
Aggregated Loss				(3611.95)

Possible Impact from PCC Patients at 13%* Growth

	Year 0	Year 1	Year 2
Eligible	247	279	315
Follow Up Imaging	48	55	62
Procedure	8	9	10
Cancer	2	3	3
Positive	60	68	76
False +	58	65	73

*13% growth derived from 1) 170 new smokers aged 55-77 in PCC 2017 and 2) CDC states 19% of population eligible for LDCT

Potential Growth of New Smokers

- Patients advised by physicians to quit are 1.6 times more likely to quit.

- Medicare reimbursement for smoking cessation counseling longer than 10 minutes of counseling is $27.93. 3 to 10 minute counseling code reimburses $14.32.

- UTH PCC:

  - 2192 current smokers first visit   x $27.93 $61,222.56
  - 2192 follow up   x $14.32 $31,389.44

*13% growth derived from 1) 170 new smokers aged 55-77 in PCC 2017 and 2) CDC states 19% of population eligible for LDCT

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Caplan L, Stout C, Blumenthal DS. Training Physicians to Do Office-based Smoking Cessation Increases Adherence to PHS Guidelines. *J Community Health.* 2011;36(2):238-243. doi:10.1007/s10900-010-9303-0.

Maintain Gains

- Continue to review and report data

- Meeting with PCC Medical Directors regarding project expansion

- Work with EPIC IT Committee on adding functionality to enhance workflow and reporting

- Develop education plan and materials for staff, faculty, and patients

- Identifying resources for smoking cessation planning (*QUITXT*)

Next Steps

- Initiated LDCT screening protocol in radiology
  - Educate technologist about Low Dose CT
    - To differentiate between Low Dose screening CT and non –contrast CT chest
    - To convert non – contrast CT chest to Low Dose screening CT whenever appropriate as the later is the recommended and has significant lower dose of radiation exposure for patient
  - Standardize lung nodule identification, classification, and reporting system
- Ensure appropriate recommendations are followed.
- **Educate physicians about process to order LDCT and discuss plans for follow-up**

Barriers to Next Steps

- Gathering tobacco use history
  - Monitor action plan
  - Better understand provider role in confirming during shared-decision making conversation
  - Expand to other PCC locations

- <u>Screening itself does not promote cessation</u>

- Education (faculty, staff, and patients)

- Utilization

- QALY

- Funding

Modin HE, Fathi JT, Gilbert CR, Wilshire CL, Wilson AK, Aye RW, Farivar AS, Louie BE, Vallières E, Gorden JA. Pack-Year Cigarette Smoking History for Determination of Lung Cancer Screening Eligibility. Comparison of the Electronic Medical Record versus a Shared Decision-making Conversation. Annals of the American Thoracic Society. 2017;14(8):1320-1325. doi:10.1513/AnnalsATS.201612-984OC.

Park ER, Gareen IF, Japuntich S, Lennes I, Hyland K, DeMello S, Sicks JD, Rigotti NA. Primary Care Provider-Delivered Smoking Cessation Interventions and Smoking Cessation Among Participants in the National Lung Screening Trial. JAMA Intern Med. 2015;175(9):1509-1516. doi:10.1001/jamainternmed.2015.2391.

- Team Hill Country

- Radiology Department

- Pulmonology Department

- Yvonne Davila, RN (Facilitator)

New Research

- Risk-Targeted Lung Cancer Screening: A Cost-Effectiveness Analysis

    - The incremental cost-effectiveness ratios (ICERs) were similar across risk deciles ($75 000 per QALY in the lowest risk decile to $53 000 per QALY in the highest risk decile). Payers willing to pay $100 000 per QALY would pay for LDCT screening for all decile groups.

    - Although risk targeting may improve screening efficiency in terms of early lung cancer mortality per person screened, the gains in efficiency are attenuated and modest in terms of life-years, QALYs, and cost-effectiveness.

Vaibhav Kumar, Joshua T. Cohen, David van Klaveren, Djøra I. Soeteman, John B. Wong, Peter J. Neumann, et al. Risk-Targeted Lung Cancer Screening: A Cost-Effectiveness Analysis. Ann Intern Med. [Epub ahead of print 2 January 2018] doi: 10.7326/M17-1401

New Research

- Preventing Lung Cancer Mortality by Computed Tomography Screening: The Effect of Risk-Based Versus U.S. Preventive Services Task Force Eligibility Criteria, 2005–2015

- The number of screening-eligible ever-smokers by any eligibility criteria increased between 2005 and 2010 but decreased between 2010 and 2015.

  - The number of persons eligible for screening according to USPSTF criteria increased from 8.7 million (24.6% of U.S. ever-smokers aged 50 to 80 years) in 2005 to 9.5 million (22.8% of U.S. ever-smokers aged 50 to 80 years) in 2010 but decreased substantially to 8.0 million (18.4% of U.S. ever-smokers aged 50 to 80 years) in 2015.

- The decreases in screening eligibility between 2010 and 2015 were more modest for risk-based criteria.

  - U.S. smokers with a 5-year lung cancer risk of at least 2.0% decreased by only 0.8 million between 2010 and 2015 (from 9.4 to 8.6 million), one half the decrease based on USPSTF criteria (P = 0.048).

  - The decreases between 2010 and 2015 in the number of persons eligible for screening based on having a 5-year lung cancer risk of at least 1.5% and 2.5% were only 0.7 and 0.8 million, respectively.

- Lung cancer remains the most deadly type of cancer in the United States, and low-dose CT screening offers a potentially effective means to improve on that fact. Although risk-based identification of persons who should be offered screening is empirically superior to using the current cutoffs, the more pressing concern is why people, regardless of how their eligibility is defined, are not receiving the test.

Li C. Cheung, Hormuzd A. Katki, Anil K. Chaturvedi, Ahmedin Jemal, Christine D. Berg. Preventing Lung Cancer Mortality by Computed Tomography Screening: The Effect of Risk-Based Versus U.S. Preventive Services Task Force Eligibility Criteria, 2005–2015. Ann Intern Med. [Epub ahead of print 2 January 2018] doi: 10.7326/M17-2067

Other tools for screening

- Lung Cancer Risk Assessment Tool

- Lung Cancer Death Risk Assessment Tool

- Covariates included age; education; sex; race; smoking intensity, duration, and quit-years; body mass index; family history of lung cancer; and self-reported emphysema.

Quality of Life
Return On Investment for Existing Patients

- Patients advised by physicians to quit are 1.6 times more likely to quit

- Three to 10 minute counseling code reimburses $14.32

- Medicare reimbursement for smoking cessation counseling code longer than 10 minutes of counseling is $27.93

- UTH Hill Country PCC:

    - 134 current smokers first visit: x $27.93 $3,742.62

    - 134 follow up: x $14.32 $1,918.88

Caplan L, Stout C, Blumenthal DS. Training Physicians to Do Office-based Smoking Cessation Increases Adherence to PHS Guidelines. *J Community Health*. 2011;36(2):238-243. doi:10.1007/s10900-010-9303-0.

Invivo

- Cost $148,500 (CAD + LCS)

- Cost $93,100

- For a 5 year Break Even:

  - 729 scans per year

  - 61 scans per month

  - A navigator would require an additional 44 scans each month

Goal	Primary Drivers	Interventions	Measure	Responsible	Intervention score
Increase lung cancer screening	Smoking history documentation			Cancino	1
	Identification of high risk patient	EPIC Best Practice Alert	TBD	Barker	1
	Shared decision making activity	Standardized text/script	TBD	Simpson	1
	LDCT Order	MD Education, EPIC decision support	TBD		2
	LDCT Attendance	TBD	TBD	TBD	1
	Correct Study Done	Audit Radiation Dose given	TBD	Baxi	1

Possible Impact from PCC Patients at 13%* Growth

	Year 0	Year 1	Year 2	Formula
Eligible	247	279	315	x
Follow Up Imaging	48	55	62	(x*.242)*.811
Procedure	8	9	10	(x*.242)*.131
Cancer	2	3	3	(x*.242)*.038
Positive	60	68	76	X*.242
False +	58	65	73	(x*.242)*.964

*13% growth derived from 1) 170 new smokers aged 55-77 in PCC 2017 and 2) CDC states 19% of population eligible for LDCT

Predicted Volume

	Year 0	Year 1	Year 2	Year 0	Year 1 (170 new smokers age 55-77 and per CDC 6.8 of 36.5 eligible = estimate 19% qualify, 19% of 170)	Year 2
Eligible	247	247 + x	247 + x + y	247	279	311
Follow Up Imaging				48.476714	54.757098	61.03748
Procedure				7.830394	8.844858	9.859322
Cancer				2.271412	2.565684	2.859956
True Positive				59.774	67.518	75.262
False Positives				57.622136	65.087352	72.55257