University of Mary

Cara A. Garcia

NUR: 689

Nursing Informatics Seminar 2

Jessica Alexander

4/21/2024

University of Mary | for Life.

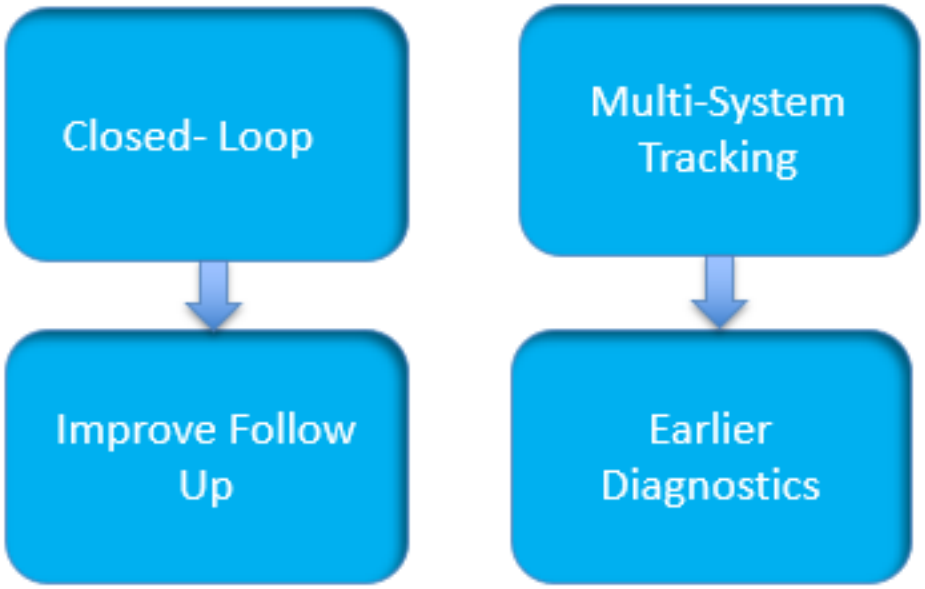
DATA ANALYSIS CAPSTONE PROJECT

University of Mary

for Life.

for Life.

PURPOSE STATEMENT



University of Mary

for Life.

ORGANIZATIONAL IMPACT

- Excited providers
- Attract new patients
- Attract new providers
- > imaging revenue
- < imaging access

University of Mary

for Life.

for Life.

IMPLEMENTATION PLAN

- Remote Settings
- So-Cal
- Waves 1-4
- Estimates millions

University of Mary

for Life.

FUM ANALYSIS

- Demographics
- AIF data
- Reco data
- Patient responses
- Outreach success
- Outreach failure

University of Mary

for Life.

Pain Points and Hurdles

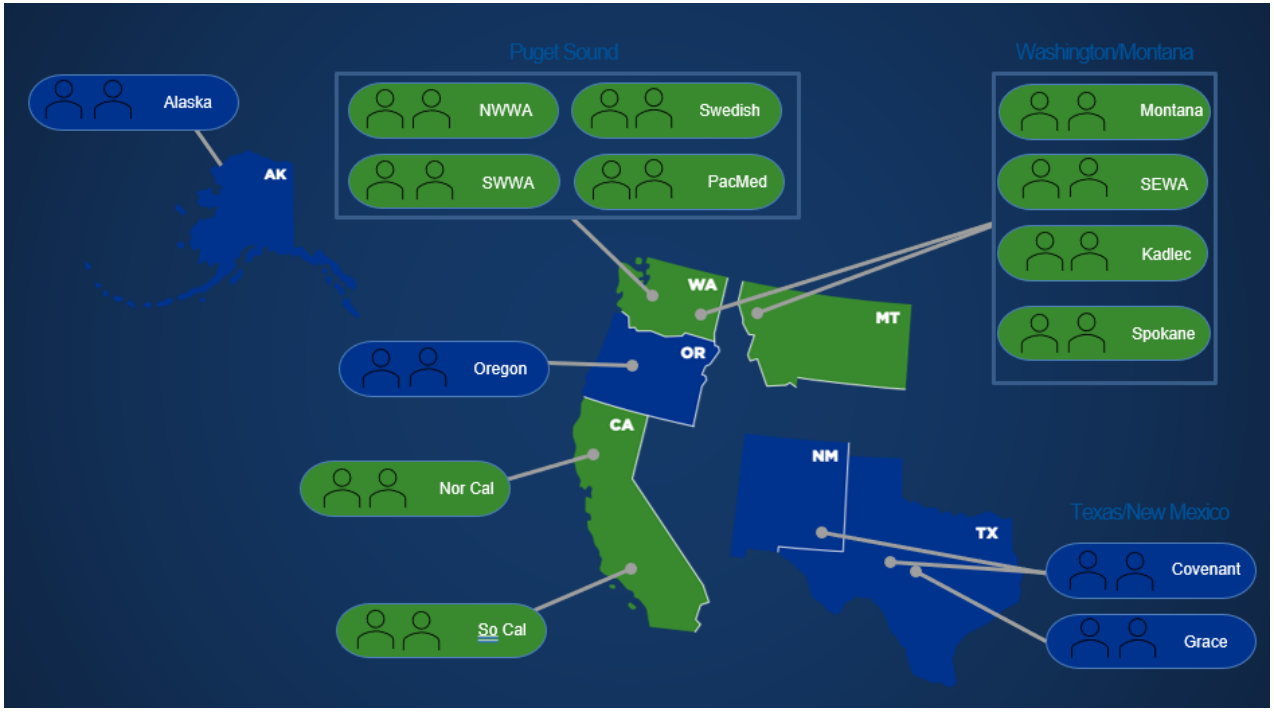
	Severity	Issue	Problem	Solution	Owner	Resolved
Week 1	1	Very few studies include follow up date	Dashboard cannot function as intended	Bring to sterring committee	Cara	Parking Lot
Week 1	3	ECHOs hitting dashboard	Inflating numbers	Remove ICD code- ECHOs	Cal F.	Week 3
Week 1	3	LCS hitting dashboard	Out of scope	NN sorts	Cal F.	Resolved week 3
Week 1	1	No priority indications on tracker	NN can't assess urgency	Verbiage change; G & E req	Cara and Cal	Week 2
Week 2	3	Many patients not in group	Inflating numbers	NN sorts	PCN	Workaround
Week 2	2	Hedging language	Inflating numbers	Educate rads	PCN	Parking Lot
Week 2	2	Confounding language	Inflating numbers	Educate rads	PCN	In progress
Week 2	2	Confound RAD guidelines	Inflating numbers	Educate rads	PCN	In progress
Week 2	1	Dashboard only allows one NN at same time	System not sustainable	Nuance Repair	Engineers	Red Status Week 4
Week 3	1	Results only route to ordering provider	May not concer ordering provider; safety	NN sorts	Cara	Workaround
Week 3	3	Superfluous inclusion criteria, i.e. "ct" & "up"	Inflating numbers	Remove superfluous search	Cara and Cal	In progress
Week 3	2	Tracking suspension verbiage inadequate	Skewing data; patient safety risk	Change verbiage	Cara and Cal	Resolved week 3
Week 3	2	Surveillance suspension verbiage inadequate	Unlear or improper documentatiom	Change verbiage	Cara and Cal	Resolved week 3
Week 4	2	Many studies with no AIF hitting dashboard	Inflating numbers	RCA	Cal F.	In progress
Week 4	3	Staging studies hitting dashboards	Inflating numbers	NN Sorts	Cara	Workaround
Week 4	2	Patients with risk for LTFU not easily ID'd	Even if low priority AIF, extra attn needed	Verbiage change; G & E req	Cara	Parking Lot
Week 5	2	Findings type dropping after editing dates	We cannot edit without losing data	Nuance Repair	Cal	In progress

for Life.

Pain Points and Hurdles

	Severity	Issue
Week 1	1	Very few studies include follow up date
Week 1	3	ECHOs hitting dashboard
Week 1	3	LCS hitting dashboard
Week 1	1	No priority indications on tracker
Week 2	3	Many patients not in group
Week 2	2	Hedging language
Week 2	2	Confounding language
Week 2	2	Confound RAD guidelines
Week 2	1	Dashboard only allows one NN at same time
Week 3	1	Results only route to ordering provider
Week 3	3	Superfluous inclusion criteria, i.e. "ct" & "up"
Week 3	2	Tracking suspension verbiage inadequate
Week 3	2	Surveillance suspension verbiage inadequate
Week 4	2	Many studies with no AIF hitting dashboard
Week 4	3	Staging studies hitting dashboards
Week 4	2	Patients with risk for LTFU not easily ID'd

READY THE PROGRAM



University of Mary

for Life.

PROJECT OUTCOME MEASUREMENTS

- Documentation could be modified
- If modified well, instant KPI
- FUM report generation

IMPLEMENTATION

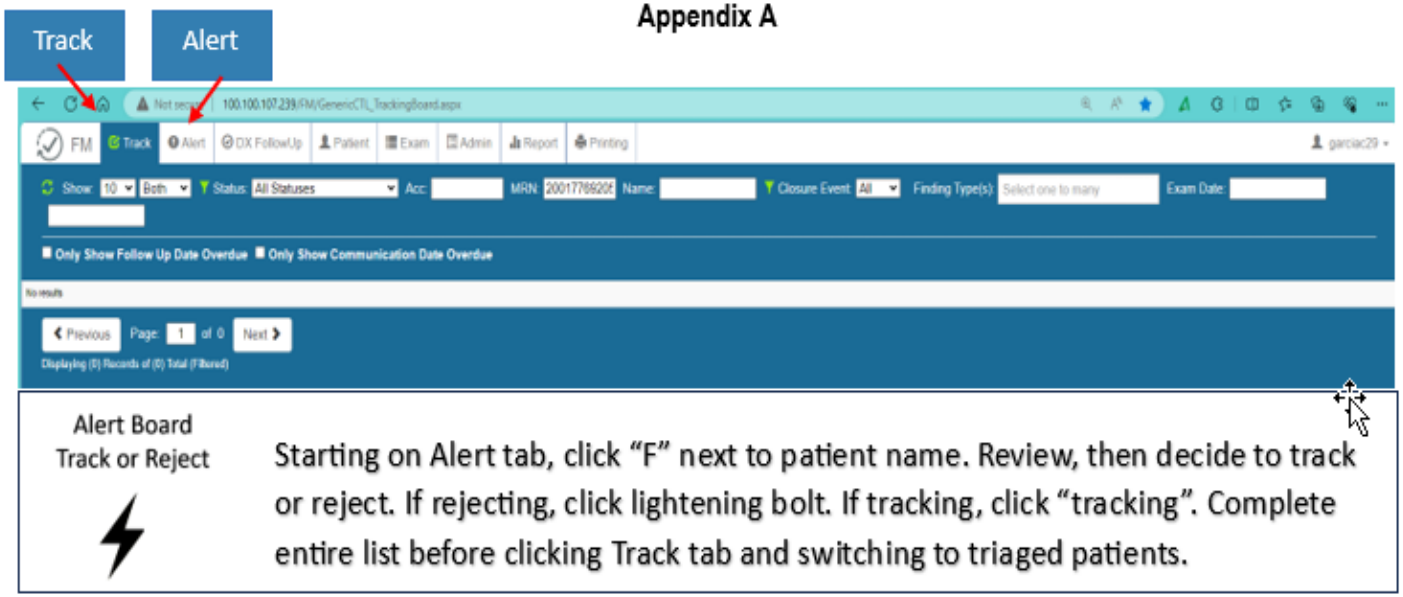
Alert Board
Track or Reject

Tracker
Monitor or Suspend

for Life.

IMPLEMENTATION

Appendix A



Alert Board
Track or Reject

Starting on Alert tab, click "F" next to patient name. Review, then decide to track or reject. If rejecting, click lightening bolt. If tracking, click "tracking". Complete entire list before clicking Track tab and switching to triaged patients.

IMPLEMENTATION

F/U Interval Given by Rad	Enter communication due date as one day after interval end
F/U Interval Not Indicated	Enter communication due date based on guide below

Priority 1- 7 days:

- Pancreatic Findings
- New lesions in patients with Hx of cancer
- Dissecting aneurysms
- Studies with “follow up urgently, immediately, short term attention”

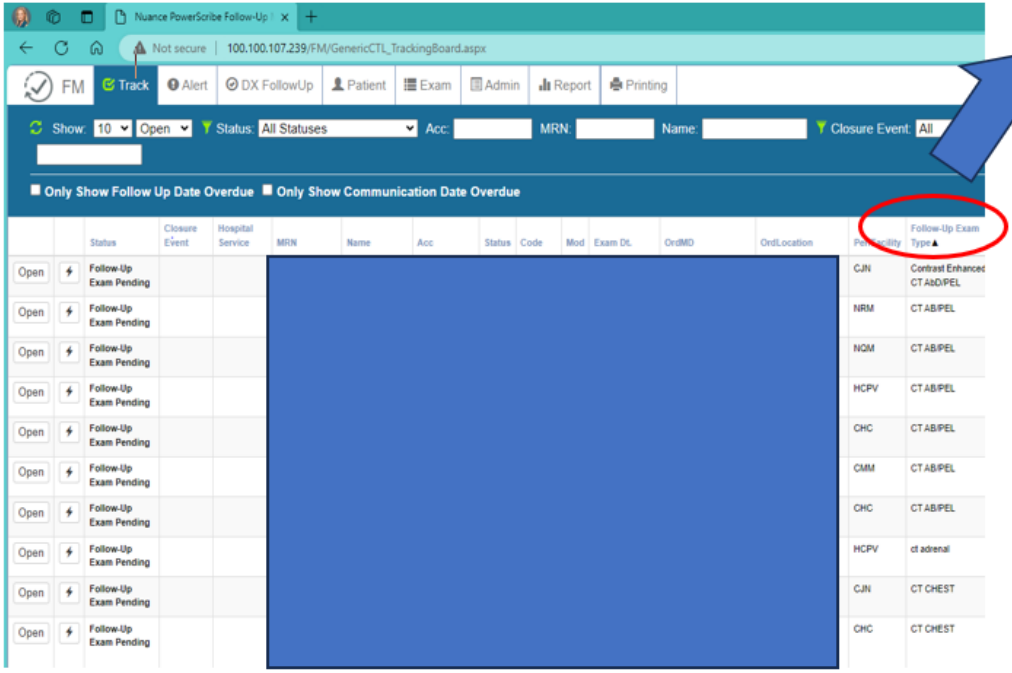
Priority 2- 14 days:

- Lung nodules > 6 mm
- Multiple new lung nodules

Priority 3 – 30 days

- All others

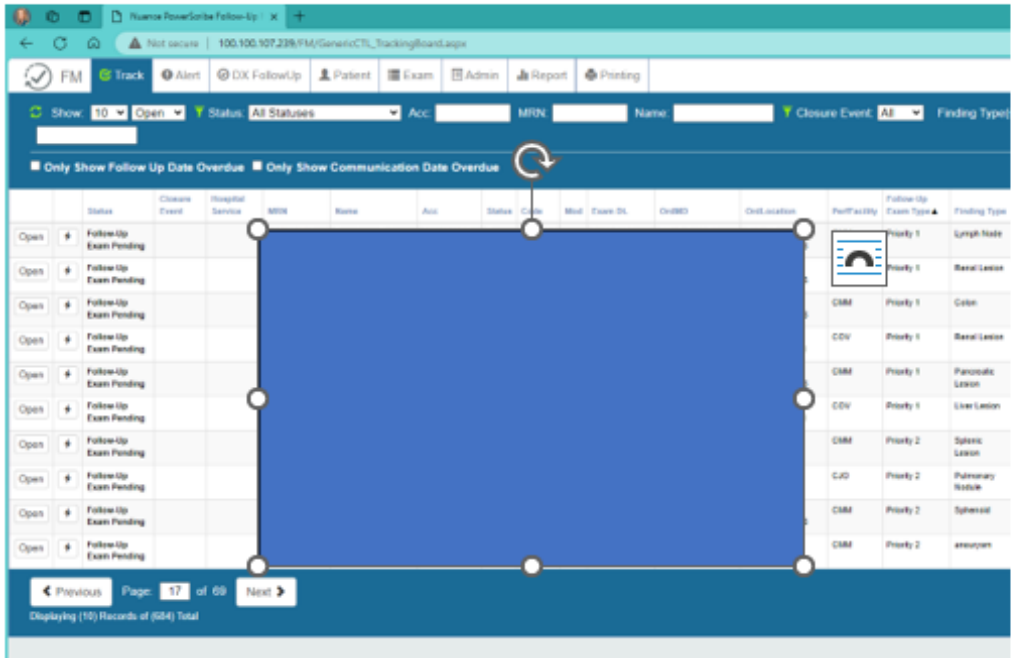
IMPLEMENTATION



Follow-Up Exam Type▲	Finding Type
Contrast Enhanced CT AbD/PEL	Lymph Node
CT AB/PEL	Liver Lesion
CT AB/PEL	Adrenal Lesion
CT AB/PEL	Adrenal Lesion
CT AB/PEL	Pancreatic Lesion
CT AB/PEL	Pancreatic Lesion
CT AB/PEL	pancrease
ct adrenal	Adrenal Lesion
CT CHEST	Pulmonary Nodule
CT CHEST	Pulmonary Nodule

for Life.

IMPLEMENTATION



Follow-Up Exam Type▲	Finding Type
Priority 1	Lymph Node
Priority 1	Renal Lesion
Priority 1	Colon
Priority 1	Renal Lesion
Priority 1	Pancreatic Lesion
Priority 1	Liver Lesion
Priority 2	Splenic Lesion
Priority 2	Pulmonary Nodule
Priority 2	Sphenoid
Priority 2	aneurysm

for Life.

IMPLEMENTATION

Free Fluid/Ascites: None .

Vascular Structures: Mild common iliac artery calcified plaquing.

Reproductive Organs: Within normal limits .

Abdominal/Pelvic Wall and Surrounding Tissues: Within normal limits .

IMPRESSION:

There is no evidence of metastatic disease to the abdomen or pelvis.

Surgical changes in the lower back with probable bilateral seromas. This could be confirmed with ultrasound scanning.

Stable probable hepatic cysts.

IMPLEMENTATION

The top 30 hedge phrases most frequently appearing in the study corpus

Hedge Phrase	Total number of Documents	Hedge Phrase	Total number of Documents
may	24,036	could be	4,739
possible*	23,002	most likely*	4,625
likely*	21,307	appear	4,301
positive	21,126	necessary	4,220
several	14,737	seems	3,882
no evidence of	13,283	probably*	3,836
evidence of	12,350	frequent*	3,580
most	12,293	never*	3,419
consistent with*	11,189	many	3,368
unremarkable	10,374	sure	3,368
few	9,769	suggest	3,328
usual	6,174	apparently	3,302
think	5,352	occasionally*	3,269
possibly*	5,350	possibility of	3,046
potential	5,116	diagnostic*	2,813

*Phrases most frequently explored in research (Hanauer et al., 2012).

IMPLEMENTATION

FINDINGS:Minimal linear atelectasis or scar right lower lung. Fatty changes seen in the liver diffusely with no definite mass in the liver, spleen and no definite pancreatic mass. There is an area of mildly prominent common bile duct in the pancreatic head of pancreas is somewhat limited by motion artifact as is the abdomen in general. Small fat-containing umbilical region hernia. NG tube is present in the stomach. Parapelvic cysts left kidney. There are no precontrast images. On bolus contrast

images, there is RAD contrast in the collecting system such that any kidney stones may be covered by this. No large exophytic renal masses seen. No lymphadenopathy is seen. Bladder RAD has contrast in it on the bolus images. Some free fluid is seen in the pelvis and there is diverticulosis of the sigmoid colon and scattered throughout the colon to lesser degree. Mild stranding seen throughout the mesentery and around the colon making it difficult to exclude mild diverticulitis or colitis but not focally intense area. A normal appendix is not definitely seen. Correlate as to appendectomy. If there is high clinical concern of appendicitis then exam with oral and IV contrast may be helpful for further evaluation given the motion. I do not see an abscess adjacent to the cecum. Stomach is decompressed but there are dilated loops of fluid in air-filled small bowel with differential air-fluid level suggesting possible small bowel obstruction seen involving the upper and mid small bowel. More distally, there are decompressed loops of small bowel that are small and this is suspicious for a mid to distal small bowel obstruction. A well-defined obstructing mass is not seen. There are arthritic changes in the hips and spine,

IMPLEMENTATION

IMPRESSION:

Extensive colonic diverticulosis. No definite colonic polyps visualized. C1.

Several subcentimeter bilateral renal stones. No hydronephrosis.

Moderate sized hiatal hernia.

Note: CT colonography has limited detection for diminutive polyps less than or equal to 5 mm in size, the presence or absence of which would likely not change the clinical management of the patient.

C0: Inadequate study. Awaiting prior comparisons, inadequate prep or insufflation, or need for comparison studies.

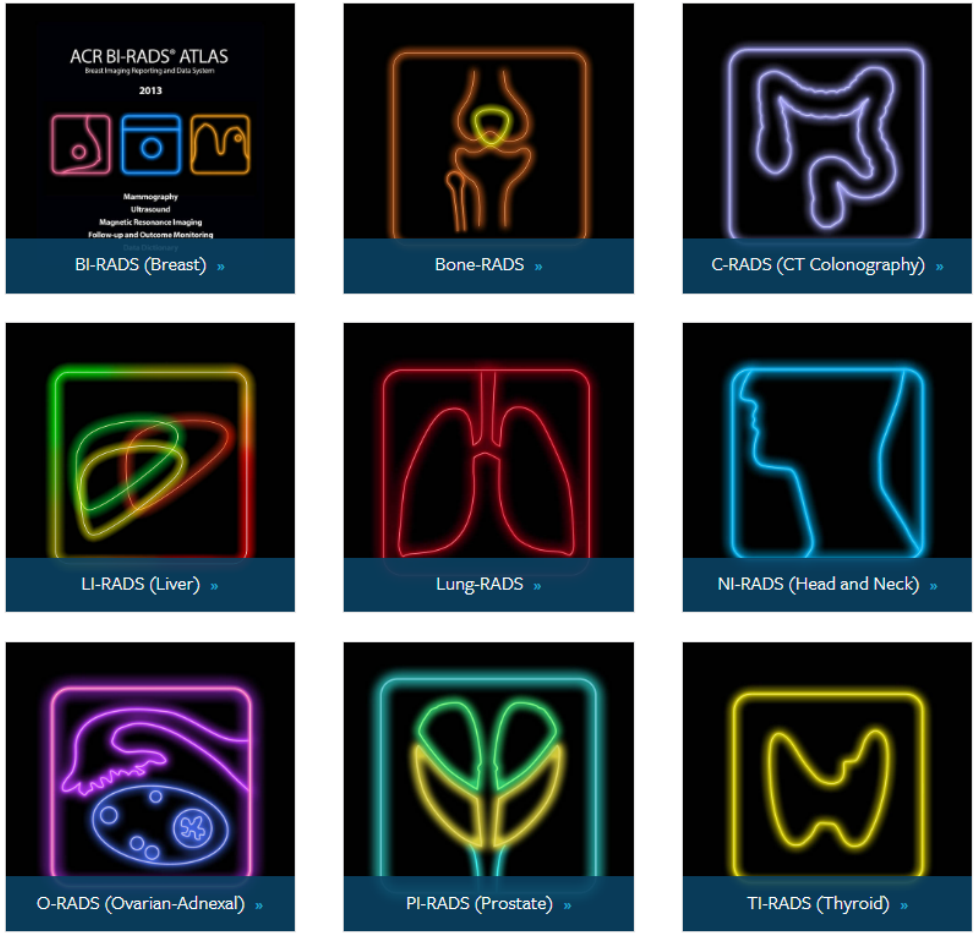
C1: Normal benign lesion, continued screening every 5-10 years. No visible abnormalities of the colon, no polyp greater than or equal to 6 mm, lipoma or inverted diverticulum, or non-neoplastic such as colonic diverticula.

C2: Intermediate polyp (6 - 9 mm, < 3 in number) or indeterminate finding. Surveillance at 3 years or colonoscopy recommended.

C3: Colonic polyp, possibly advanced adenoma, colonoscopy recommended. Colon polyp greater than or equal to 10 mm, 3 polyps each 6-9 mm.

C4: Colonic mass, likely malignant, surgical consultation recommended.

IMPLEMENTATION



American College of Radiology. (2020)

IMPLEMENTATION

IMPRESSION:

No acute pulmonary embolism.

Dilation of the main pulmonary artery can be seen in the setting of pulmonary hypertension.

Severe coronary atherosclerosis.

Possible mild pulmonary edema.

Bronchial wall thickening and mild mosaic attenuation in the bilateral lower lobes, which can be seen in the setting of small airways disease.

Solid pulmonary nodule right upper lobe measuring 4 mm (series 4, image 46). Recommend follow-up of the described nodule(s) according to the following guidelines:

Fleischner Society Recommendations 2017
MacMahon et al. Radiology 2017

Solid Nodules-Low Risk Patients:
<6 mm (single or multiple) - No routine follow-up*

Solid Nodules-High Risk Patients:
<6 mm (single or multiple) - Optional CT at 12 months*

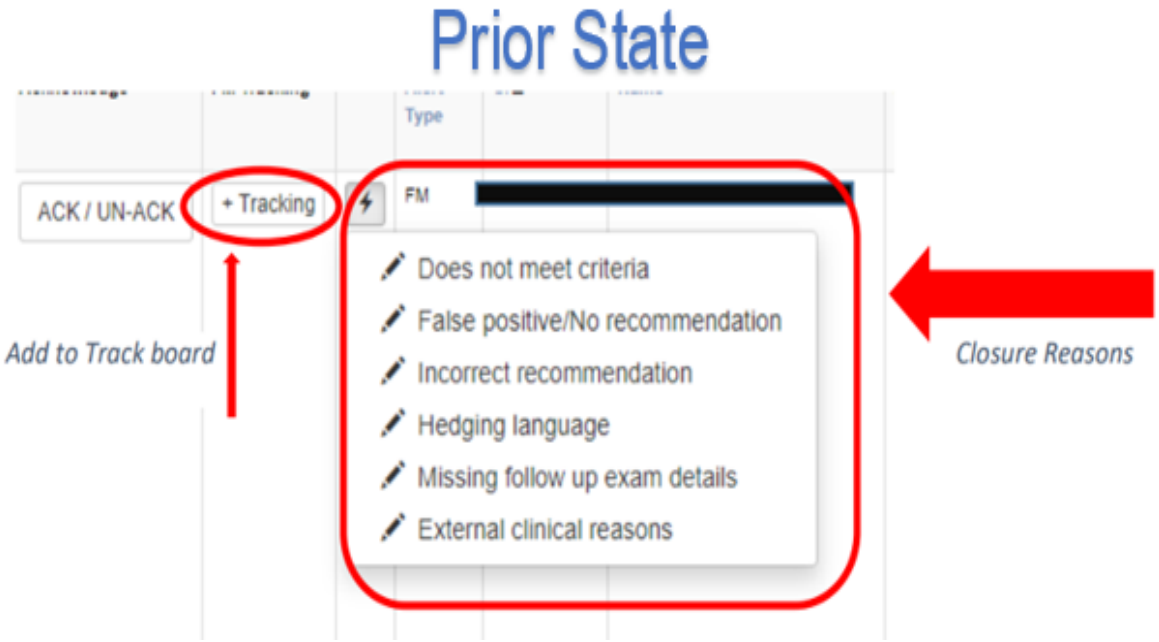
*Nodules <6 mm do not require routine follow-up, but suspicious nodule morphology, upper lobe location, or both may warrant 12 month follow-up

MEASUREMENT PLAN

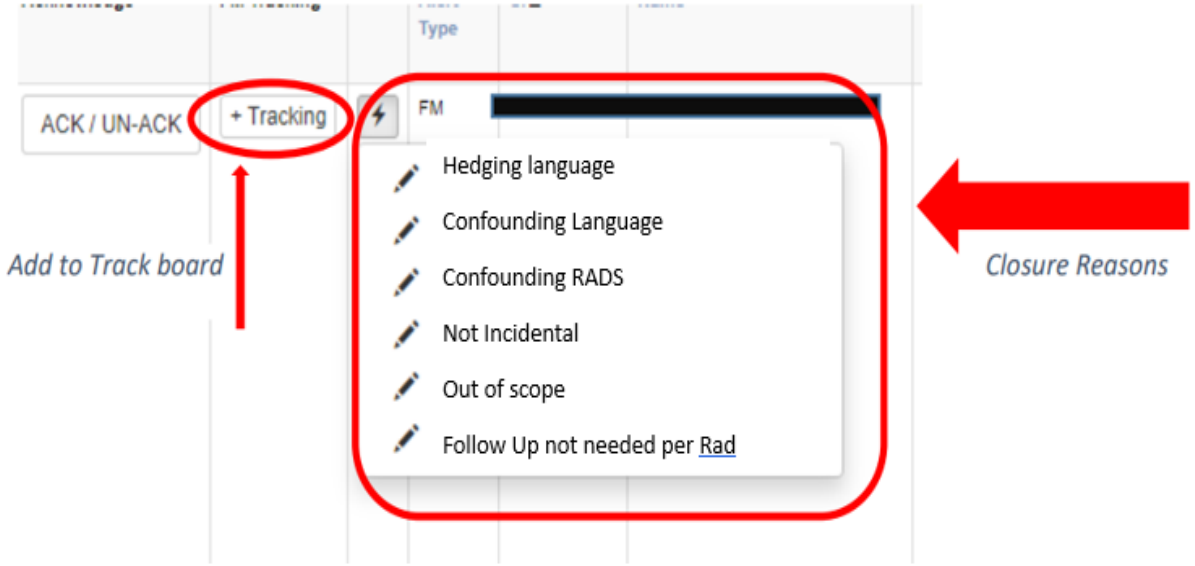
- Post review
- Closed- loop
- Analysis

University of Mary

MEASUREMENT PLAN

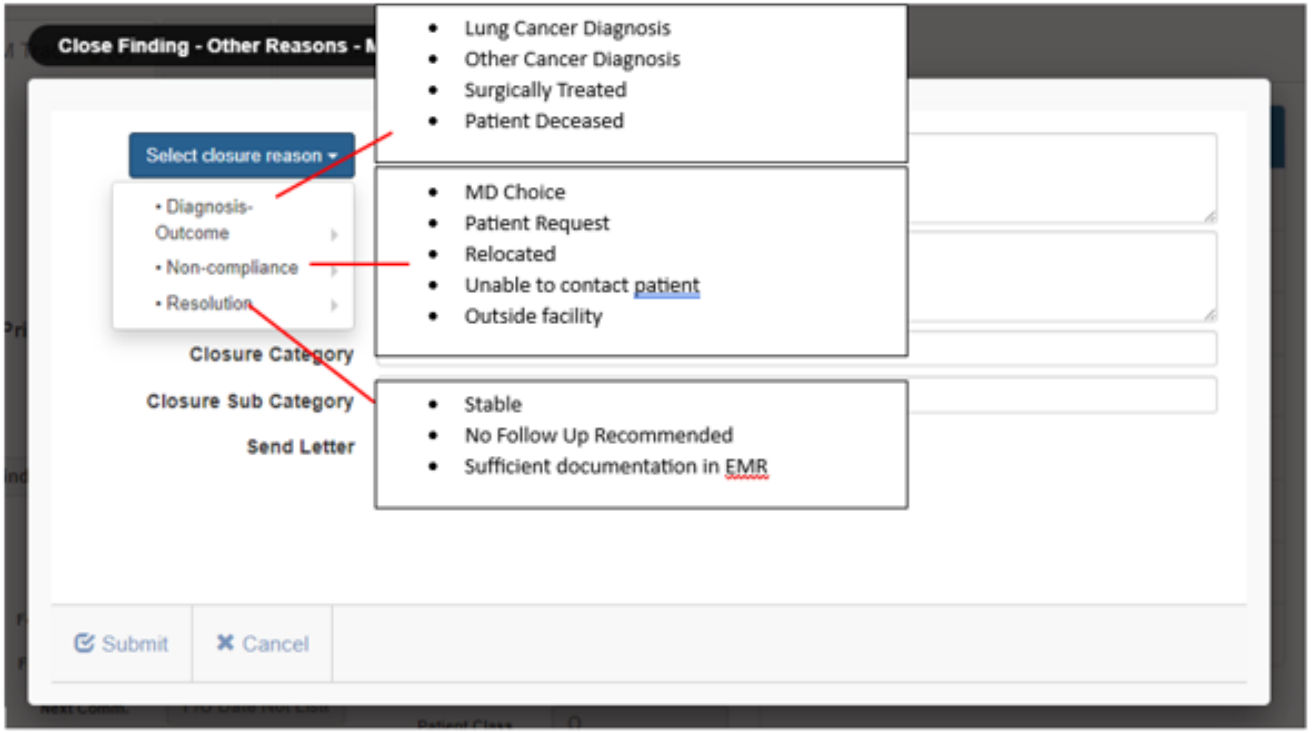


MEASUREMENT PLAN



MEASUREMENT PLAN

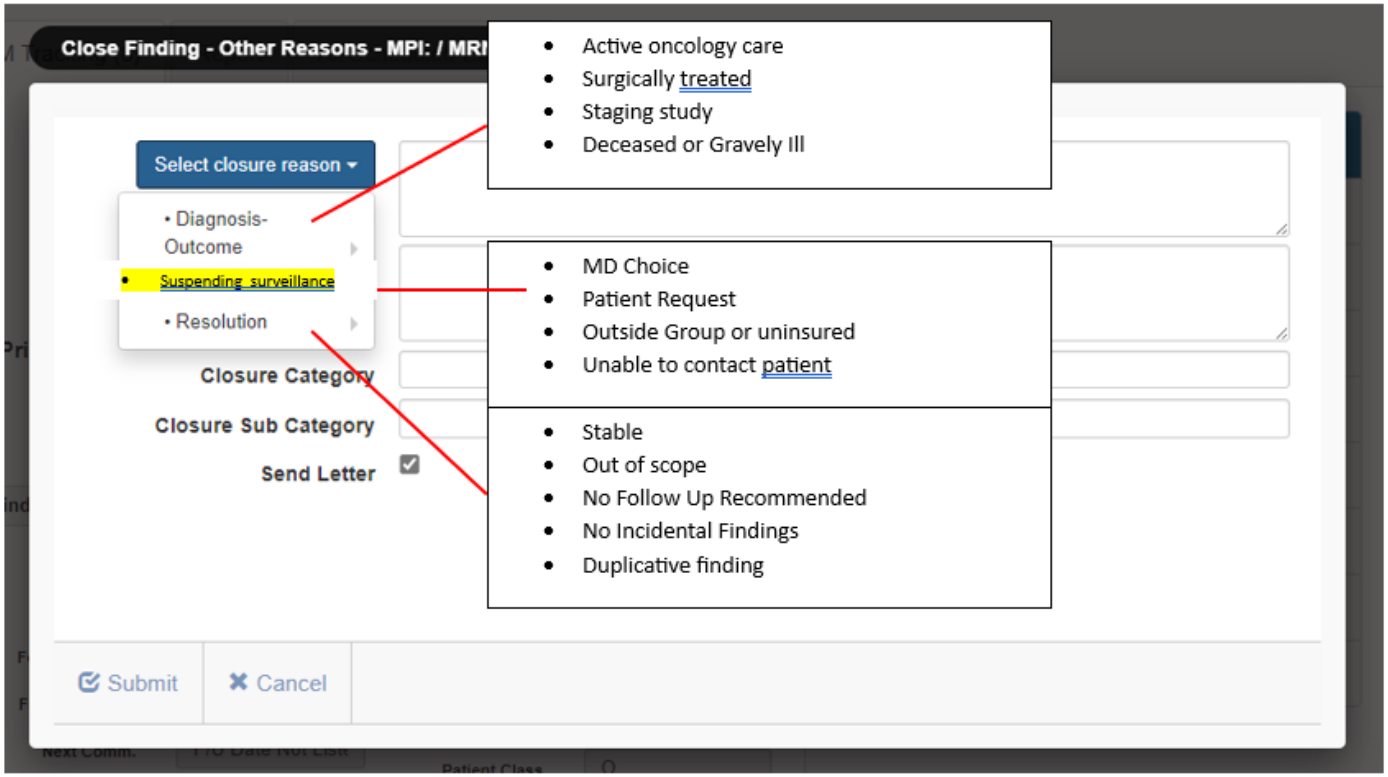
Prior State



for Life.

MEASUREMENT PLAN

Current State



for Life.

MEASUREMENT PLAN

Table 1

Studies sent to Follow Up Manager alert board December 2023 through January 2024- Incidental findings by age range.

0-10	2
11-20	6
21-30	17
31-40	39
41-50	98
51-60	180
61-70	366
71-80	391
81-90	228
91-100	34
Blank	32

Total: 1399

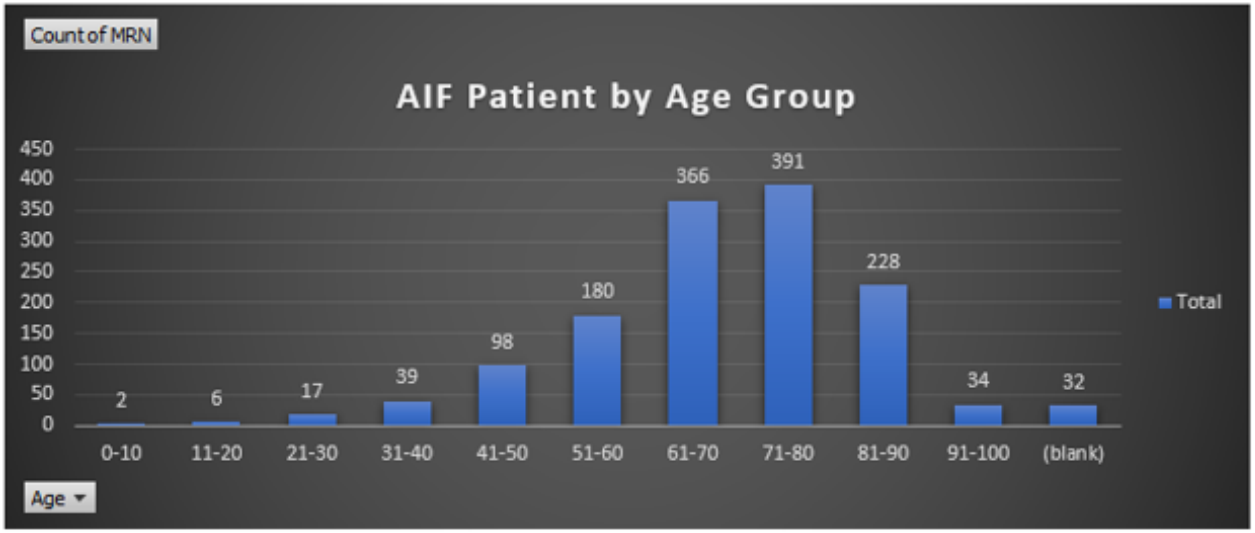
University of Mary

for Life.

MEASUREMENT PLAN

Figure 1

Graphical representation of incidental findings by age table



Note. 32 studies were left "Blank" as they were duplicative studies. 32 duplicative studies, as well as studies of minors, were removed before calculating Table 2.

University of Mary

for Life.

MEASUREMENT PLAN

Table 2

Follow up recommendations for all incidental findings December 2023 through January 2024

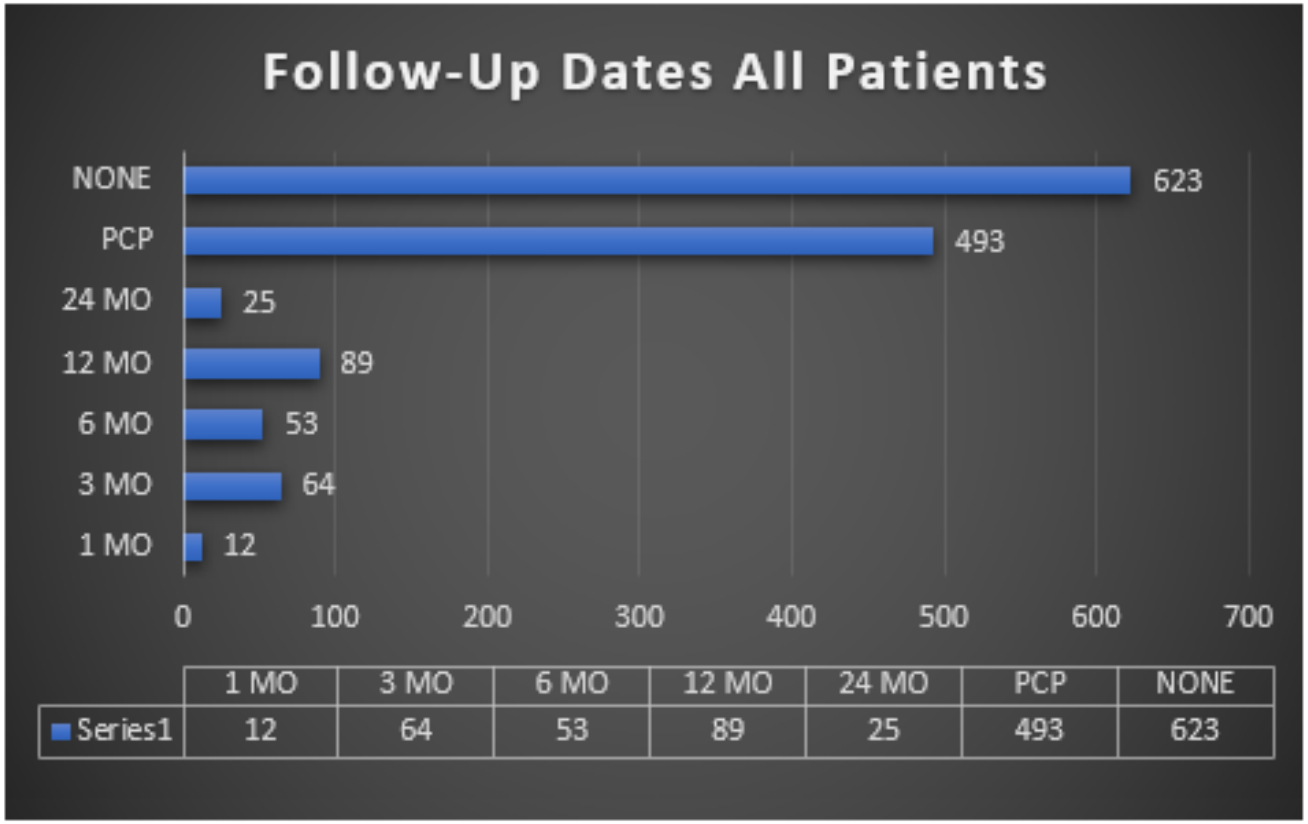
1 MO	12
3 MO	64
6 MO	53
12 MO	89
24 MO	25
PCP	493
None	623 = 1359

Note. 1359 patients after removal of minors and duplicative studies.

University of Mary

for Life.

MEASUREMENT PLAN



UNIVERSITY of MARY

for Life.

MEASUREMENT PLAN

Table 3

Studies sent to Follow Up Manager alert board December 2023 through January 2024

Total Studies Explored		1399
Removal reasons:	Not Pulmonary Finding	-1125
	Duplicate Findings	-32
	Minor	-8
Studies remaining		234

Table 4

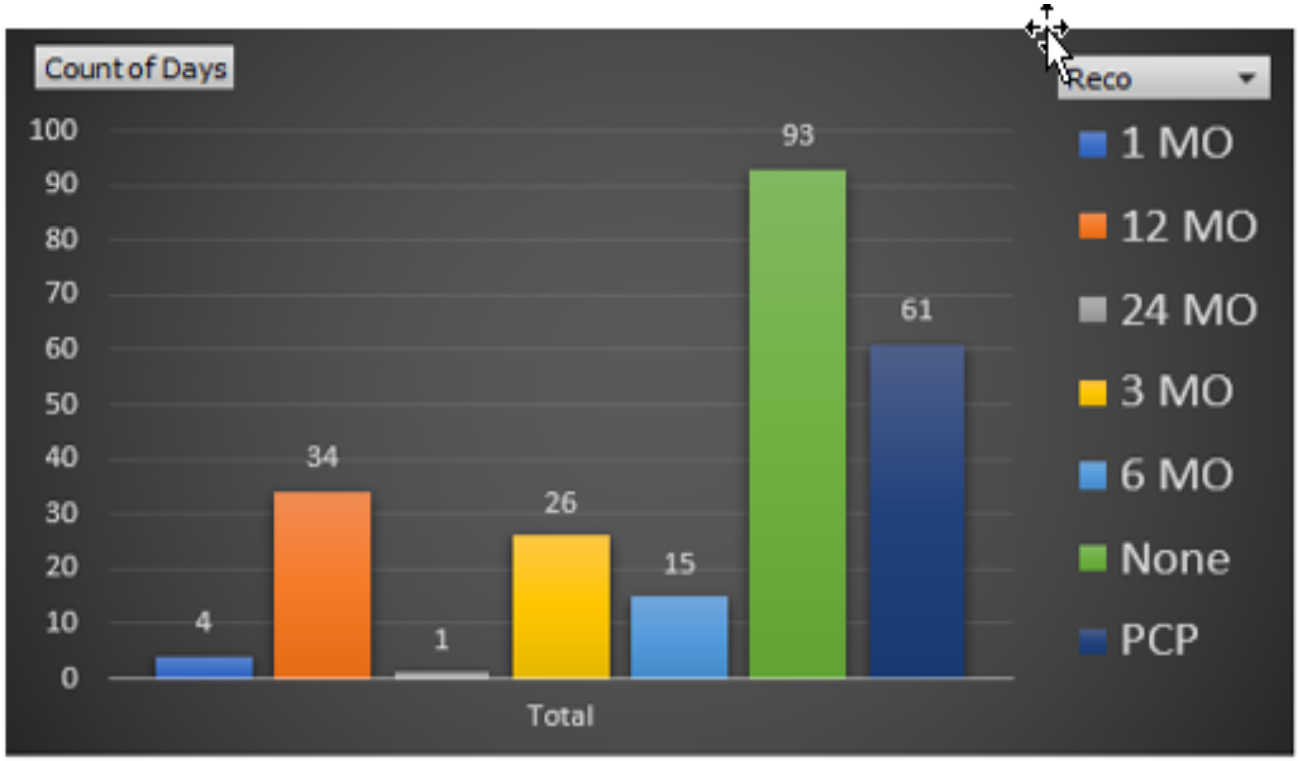
Follow up recommendations for pulmonary incidental findings December 2023 through January 2024

1 MO	4
3 MO	26
6 MO	15
12 MO	34
24 MO	1
PCP	61
None	93 = 234

University of Mary

for Life.

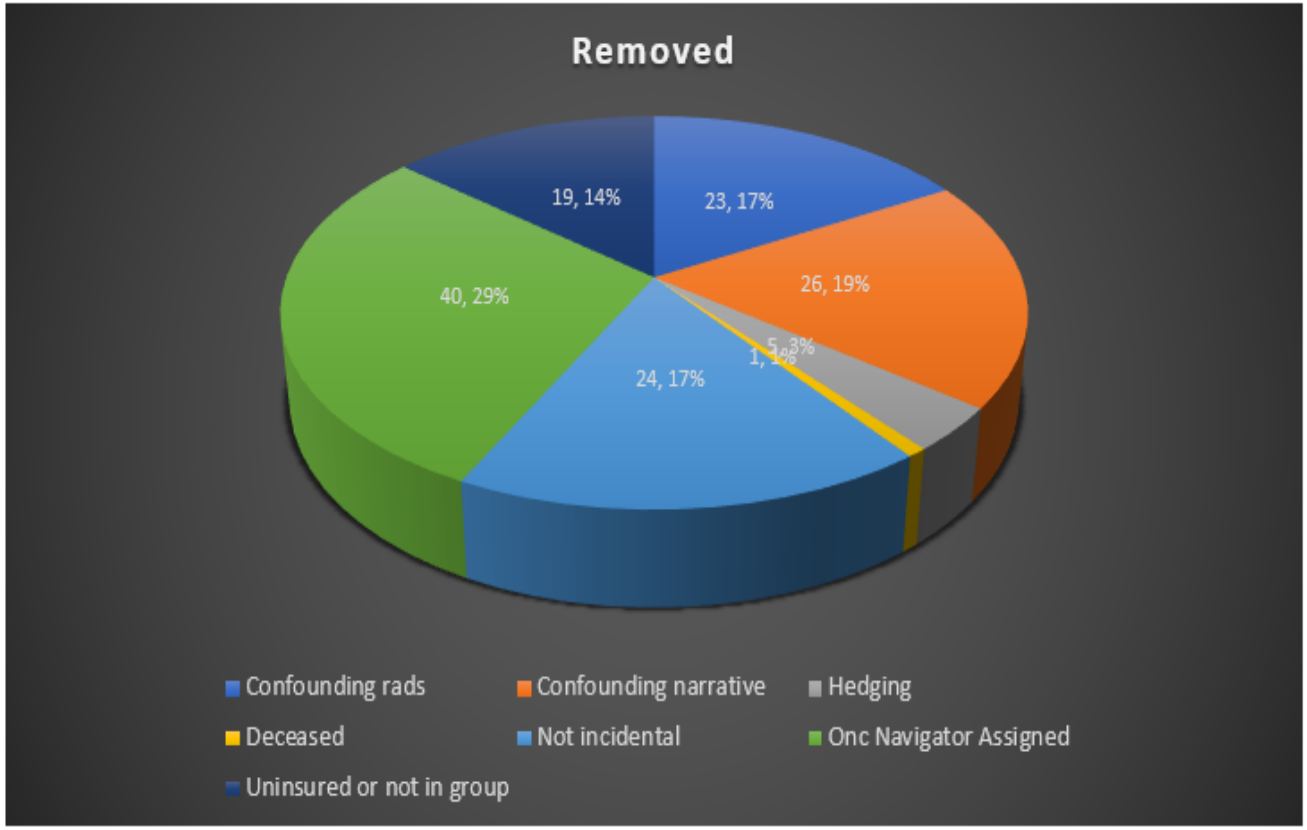
MEASUREMENT PLAN



University of Mary

for Life.

MEASUREMENT PLAN



University of Mary

for Life.

MEASUREMENT PLAN

Table 5

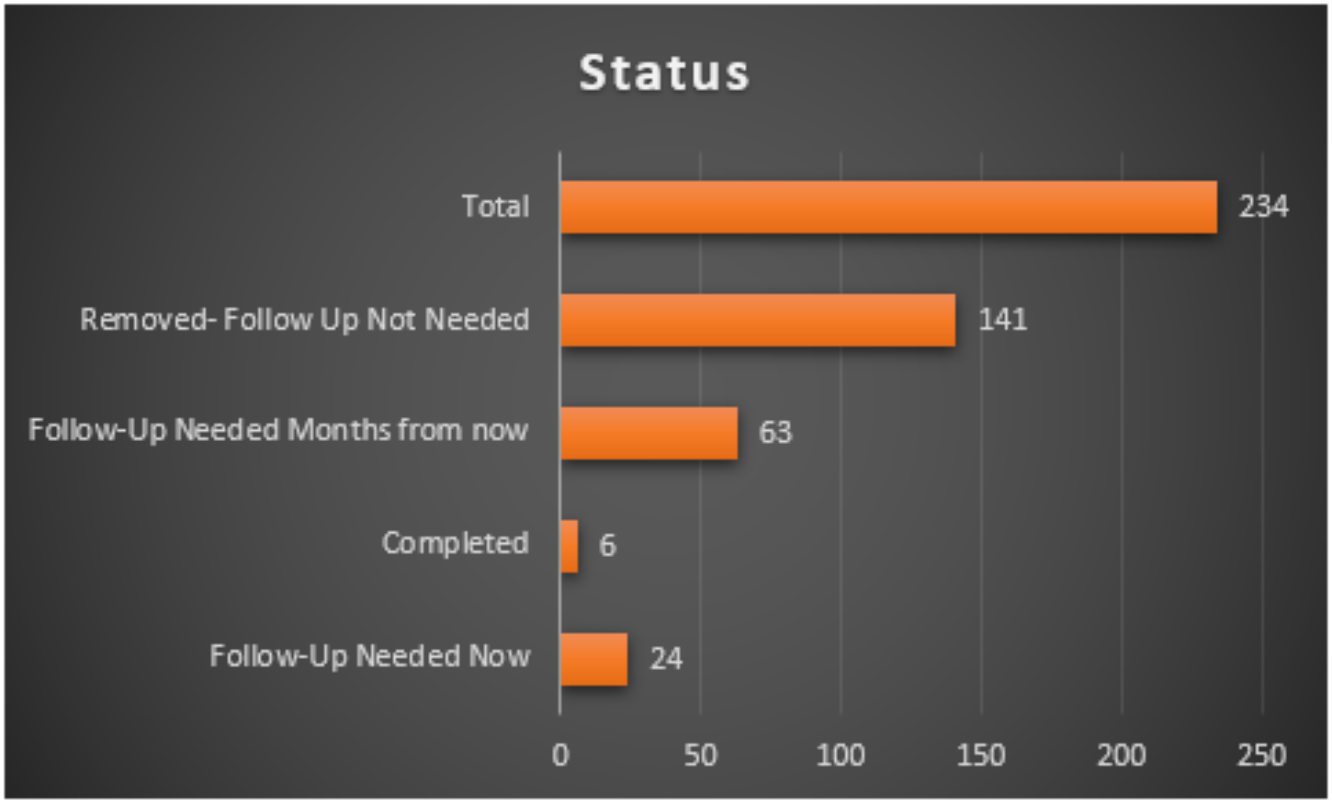
Pulmonary findings studies were analyzed for their actionable relevance. If findings are not actionable, they do not meet criteria for being added to the alert board, and should be removed

Completed	6
Follow-Up Needed Now	23
Follow-Up Needed Months from Now	36
Removed- Follow-Up Not Needed	142
Total	

University of Mary

for Life.

MEASUREMENT PLAN



University of Mary

for Life.

MEASUREMENT PLAN

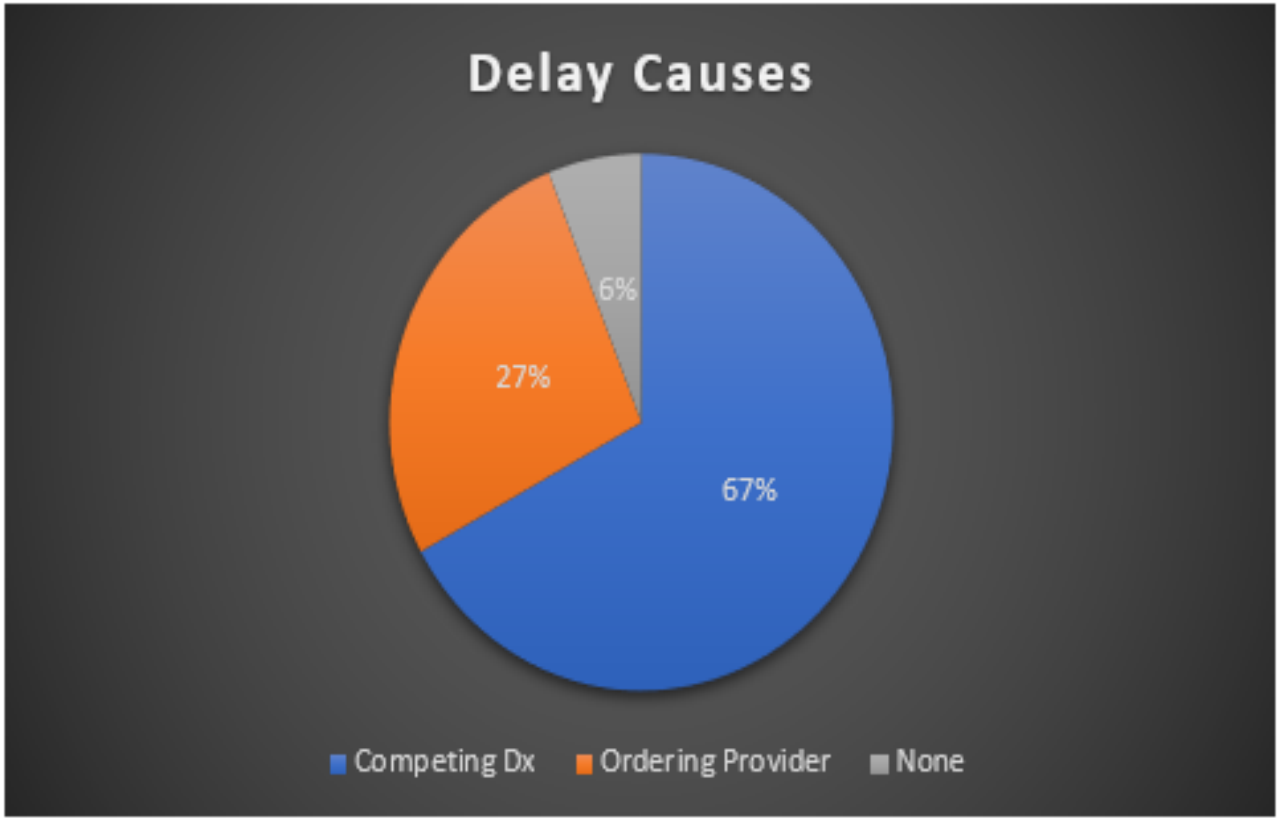
Table 6

Days Taken for Patient to be Notified and Potential Causes

Days Until Notified	Competing Diagnosis	OPA	None
1			
2			
3			
4			
6	3		
7	1		1
8	1		
9		2	
10	3		
14		2	
20	1		
30	1		

University of Mary

MEASUREMENT PLAN



University of Mary

for Life.

HANDOFF PLAN

- Video-supported slide deck
- Workflow guide.
- Imaging leadership deck
- Guide on running metrics

University of Mary

for Life.

HANDOFF PLAN

University of Mary

for Life.

American Hospital Association. (n.d.).

CONCLUSION

- Capstone refresh
- Problem
- Purpose
- Tools created
- Project issues
- Enhancements
- Data Analysis
- Measurement
- Hand off

QUESTIONS?

REFERENCES

American College of Radiology (ACR). (2020). ACR practice guideline for communication of diagnostic imaging findings. https://www.acr.org/-/media/acr/files/practice-parameters/communicationdiag.pdf

American Hospital Association. (n.d.). Handoff: Use a handoff tool for optimal patients transition of care. Center for Health Innovation. https://www.aha.org/center/project-firstline/teamstepps-video-toolkit/handoff

Cyphers, E., Krishnasamy, V., & Weintraub, J. (2023). AI and incidental findings. *Voices in Bioethics, 9*. https://doi.org/10.52214/vib.v9i.10629

Hammer, M. M., Kapoor, N., Desai, S. P., Sivashanker, K. S., Lacson, R., Demers, J. P., & Khorasani, R. (2019). Adoption of a closed-loop communication tool to establish and execute a collaborative follow-up plan for incidental pulmonary nodules. *AJR. American Journal of Roentgenology, 212*(5), 1077–108. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7528936/

Kadom, N., Venkatesh, A. K., Shugarman, S. A., Burleson, J. H., Moore, C. L., & Seidenwurm, D. (2022). Novel quality measure set: Closing the completion loop on radiology follow-up recommendations for noncritical actionable incidental findings. *Journal of the American College of Radiology: JACR, 19*(7), 881–890. https://www.acr.org/-/media/ACR/Files/Quality-Programs/Measures-Under-Development/JACR-Publication.pdf

Kwan, J. L., & Singh, H. (2017). Assigning responsibility to close the loop on radiology test results. *Diagnosis (Berlin, Germany), 4*(3), 173–177. https://doi.org/10.1515/dx-2017-0019

Liang, C. H., Liu, Y. C., Wu, M. T., Garcia-Castro, F., Alberich-Bayarri, A., & Wu, F. Z. (2020). Identifying pulmonary nodules or masses on chest radiography using deep learning: External validation and strategies to improve clinical practice. *Clinical Radiology, 75*(1), 38–45. https://umary.illiad.oclc.org/illiad/illiad.dll?Action=10&Form=75&Value=178981

Mabotuwana, T., Hall, C. S., Tieder, J., & Gunn, M. L. (2018). Improving quality of follow-up imaging recommendations in radiology. *AMIA Symposium, 2017*, 1196–1204. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5977608/pdf/2731307.pdf

Makeeva, V., Schofield, K., Davis, M., & Kadom, N. (2021). Managing incidental findings. *Applied Radiology, 50*(6), 22. https://appliedradiology.com/articles/managing-incidental-findings

Mannix, J., LaVoye, J., Wasserman, M., Lada, N. E., Onoue, K., Hassan, K., Sarangi, R., Haroon, S., Gaffar, A., Qureshi, M. M., & Gupta, A. (2021). Notification system for overdue radiology recommendations improves rates of follow-up and diagnosis. *AJR. American Journal of Roentgenology, 217*(2), 515–520. https://www.ajronline.org/doi/10.2214/AJR.20.23173

Zaki-Metias, K. M., MacLean, J. J., Satei, A. M., Medvedev, S., Wang, H., Zarour, C. C., & Arpasi, P. J. (2023). The FIND program: Improving follow-up of incidental imaging findings. *Journal of Digital Imaging, 36*(3), 804–811. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10287591/pdf/10278_2023_Article_780.pdf