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Filling the Void: A Low Cost, High-Yield Method to Addressing Incidental Findings in Trauma Patients

N. Sich
Abington Jefferson Health

A. Rogers
Abington Jefferson Health

D. Bertozzi
Abington Jefferson Health

P. Sabapathi
Abington Jefferson Health

L. Gartner
Abington Jefferson Health

See next page for additional authors

Authors

N. Sich, A. Rogers, D. Bertozzi, P. Sabapathi, L. Gartner, W. Alswealmeen, P. Lim, J. Sternlieb, J. Yuschak, O. Kirton, and R. Shadis

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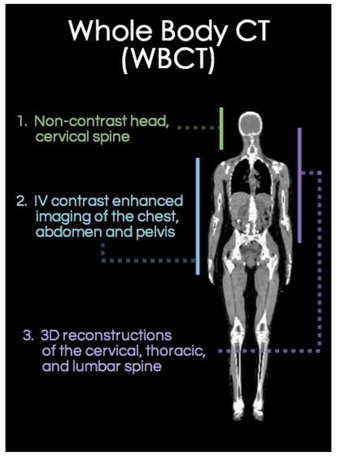
Abington-Jefferson Health, Abington PA 19090

Background



- Due to fear of a missed injury, the tendency to "Pan CT" has dramatically increased.
- This leads to a rise in incidental findings, or findings on imaging not related to the original indication of the study.
- There are few studies assessing incidentals outside of urban populations and level one trauma centers.
- There are even fewer studies attempting to address how to handle reporting incidental findings to patients, with some studies having rates as low as 10%.

In this study we:

- Report the incidence of incidental findings in a suburban trauma center treating primarily blunt and elderly trauma
- Propose simple solutions to increase the rate of disclosure to patients

Methods

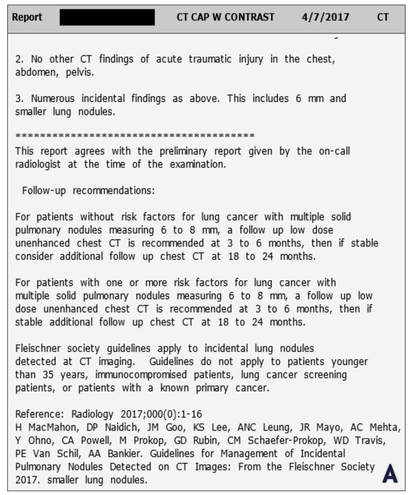
- **Pre-Intervention:**

  Retrospective chart review from Oct 1st 2015 to March 31st 2016
- All charts hand reviewed by investigators
  - Age, # of CT scans, type of CTs, # of incidental findings, category of incidental finding, if radiology recommended follow up, and if the patient was informed of the finding
- Category 1 and 2 Incidental Findings were considered significant (requiring follow up prior to discharge or interval follow up);

  Category 3 were clinically insignificant
- **Implementation of Multi-Disciplinary Systems Changes**
  - Radiology driven changes
  - Informatics driven changes
  - Standardized protocol for trauma residents/front-line providers
  - Utilization of existing work-flows for patient & primary communication
- **Post-Intervention:**

  Retrospective chart review from Sept 1st 2016 to Nov 30st 2016
  - Data collected in same fashion as pre-intervention
  - Additional stratification including follow up revenue from CMS reimbursement, if patient had known about significant incidentals, and new diagnoses of malignancy per three month period

Figures - A) Example of new Radiology Report. B) Modified Trauma H&P. C) Follow-Up Order. D) Discharge Instructions.



Report [redacted] CT CAP W CONTRAST 4/7/2017 CT

2. No other CT findings of acute traumatic injury in the chest, abdomen, pelvis.

3. Numerous incidental findings as above. This includes 6 mm and smaller lung nodules.

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This report agrees with the preliminary report given by the on-call radiologist at the time of the examination.

Follow-up recommendations:

For patients without risk factors for lung cancer with multiple solid pulmonary nodules measuring 6 to 8 mm, a follow up low dose unenhanced chest CT is recommended at 3 to 6 months, then if stable consider additional follow up chest CT at 18 to 24 months.

For patients with one or more risk factors for lung cancer with multiple solid pulmonary nodules measuring 6 to 8 mm, a follow up low dose unenhanced chest CT is recommended at 3 to 6 months, then if stable additional follow up chest CT at 18 to 24 months.

Fleischner society guidelines apply to incidental lung nodules detected at CT imaging. Guidelines do not apply to patients younger than 35 years, immunocompromised patients, lung cancer screening patients, or patients with a known primary cancer.

Reference: Radiology 2017;000(0):1-16
H MacMahon, DP Naidich, JM Goo, KS Lee, ANC Leung, JR Mayo, AC Mehta, Y Ohno, CA Powell, M Prokop, GD Rubin, CM Schaefer-Prokop, WD Travis, PE Van Schil, AA Bankier. Guidelines for Management of Incidental Pulmonary Nodules Detected on CT Images: From the Fleischner Society 2017. smaller lung nodules.

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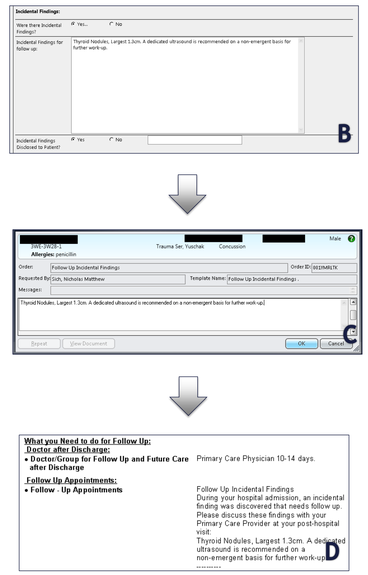

Results

Table 1 – Patients, CTs, and Incidental Findings in the Pre-Intervention Arm Stratified by Age.

	# of Patients	# of CTs	# of Incidental Findings	# of Patients with Incidental Findings	Mean # of Incidentals per Patient	# of Patients with Significant Incidental
Total	674	2533	1273	456 (70%)	1.9/patient	246 (36%)
<65	292 (43%)	1104	304	156 (53%)	1.0/patient	70 (24%)
>65	382 (57%)	1429	969	300 (79%)	2.5/patient	176 (46%)

Table 2 – Categorized Significant Incidental Findings

Type of SIF	# of Incidentals Pre	% of Total Incidentals Pre	# of Incidentals Post	% of Total Incidentals Post
Lung Nodules, Lesions, Masses	90	23%	72	22%
Thyroid Nodules, Thyromegaly	53	13%	52	16%
Lymphadenopathy (Cervical, Chest, Abd)	39	10%	16	5%
Aortic Aneurysms (Thoracic, Abdominal)	31	8%	18	5%
Renal Nodules, Lesions, Masses	25	6%	25	8%
Adrenal Nodules, Lesions, Masses	22	6%	20	6%
Liver Nodules, Lesions, Masses	18	5%	20	6%
Other Suspicious Masses	18	5%	13	4%
Adnexal Cyst, Lesions, Masses	12	3%	15	5%
Pancreatic Lesions, Mass, Dilation, Cyst	12	3%	15	5%
Brain Lesions (Meningioma, NPH)	11	3%	13	4%
Bone Lesions (Destructive, Sclerotic)	10	3%	13	4%
Bladder Thickening, Mass, Hydronephrosis	9	2%	8	2%
Other (Breast, Soft Tissue, Misc. Facial)	54	14%	49	15%

Table 3 – Follow Up Recs and Documented Disclosure Pre- and Post- Intervention (p<0.00001).

	# of Patients with SIF	# of SIF	Radiologist Provided F/U Recommendations	Documented that SIF was Disclosed	Radiologist Provided F/U and Documented Disclosure
Pre-	246	396	86 (22%)	105 (27%)	28 (7%)
Post-	225	352	225 (68%)	281 (85%)	133 (59%)

Table 4 – Follow Up Imaging, Specialists, Procedures for SIFs.

Required F/U Modality	# of Patients	Example	Specialist for F/U	# of Patients	Example
CT Thorax	42	Pulmonary Nodule	CT Surgery	10	Thoracic Aneurysm
CT Abd/Pelvis	8	Adrenal Nodule	ENT	1	Thyroglossal Cyst
US Thyroid	32	Thyroid Nodule	Gastroenterology	11	Biliary Dilation
US Pelvis	16	Adnexal Cyst	Gen Surgery	2	Incarcerated Hernia
US Retroperit	12	Renal Mass	Gynecology	4	Adnexal Mass
MRI Abd	34	Pancreatic Cyst	Neurosurgery	3	NPH
MRI Brain	4	Brain Mass	Neurovascular	1	Berry Aneurysm
MRI Spine	5	Sclerotic Lesion	Oncology	8	New Metastasis
Pet CT	8	Pulmonary Nodule	Ophthalmology	1	Orbital Mass
Other Imaging	10	RUQ/Carotid US	Rad/Onc	1	New Metastasis
Endoscopy	7	GI Mass	Urology	12	Hydronephrosis
Other Proc	7	IR Bx, FNA	Vascular Surgery	9	Iliac Aneurysm, AAA

Revenue Generated in F/U Imaging:
$37,119 for three months, or approximately $150,000/yr for Trauma

New Malignancies Detected:
20 new malignancies and 5 new metastasis, or approximately 100 patients/yr (4%)

Conclusion

- Previous studies in urban trauma populations demonstrated a rate of incidental findings from 15-50%. This study shows that this is a significant underestimation and is not likely reflective of the vast majority of trauma centers that treat primarily blunt/elderly trauma.
- Simple systems based changes can be implemented with minimum amount of resources and effort. These changes will not only have a profound impact on improving reporting of incidentals to patients, but also generate additional hospital revenue, protect providers from medico-legal ramifications of failing to disclose, and most importantly **improve patient care.** This method is not limited to trauma surgery and can be applied to any service.
- Further iterations and innovations are needed to refine this process and define the most cost-efficient method of ensuring patients are aware of incidental findings in their imaging studies.

Acknowledgements / Select References

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