How to Use the ACR Recommendations for Incidental Findings

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Outline

- Nature of problem
- Severity and breadth of problem
- Incidental findings white papers
- Thyroid and ovarian IF recommendations
- Clinical Decision Support
  - Value of and methods to apply guidance
  - Computerizing guidance
- Evolution of CDS
Acknowledgements

- Keith Dreyer, DO, PhD
- Pari Pandharipande, MD
- Tarik Alkasab, MD
- Ben Harvey, MD
- Jonathan Berlin, MD
- Mark Baker, MD
- Many others....
Nature of Problem
The Problem

Radiologist 1
Indeterminate 3.5 cm adrenal nodule. Adrenal-mass protocol CT advised.

PCP 1
Requests adrenal-mass protocol CT.

PCP 2
Requests surgical consult.

PCP 3
No further work-up.

Radiologist 2
Indeterminate 3.5 cm adrenal nodule. Consider surgical consultation.

Courtesy Pari Pandharipande, MD
Dr. Smith: Fast, confident, but may miss subtle findings

Dr. Jones: Slow, misses less, but less definitive

For every 10K chest x-rays Dr. Smith reads, she only misses one lung cancer.

Dr. Jones’ misses ½ as many as Dr. Smith but recommends 200 chest CT’s/10K exams more than Dr. Smith for “possible nodules.”

Who is the higher quality radiologist?
Dr. Smith and Dr. Jones

- Dr. Smith is admired until she misses a subtle cancer on a chest x-ray.....then risk management is all over her case.

- Dr. Jones is insidiously despised and ridiculed by everyone as being a product of a zero-risk culture.

- Attending physicians prefer Dr. Smith for her more definitive reads.

Severity and Breadth of problem
Increased Frequency, Cost and Limited Benefit of Incidental Findings
“Each additional CT machine is associated with 2,224 additional CT scans from 1985-2005” Baker et al. Health Affairs 27(6), 1467-1478, 2008

Courtesy Jonathan Berlin, MD
Incidental Findings at CT for Hematuria

- 1295 patients at UAB: CT for hematuria
- 9% of patients had important incidental findings, but no intervention
- 2% of patients underwent major intervention

Costs of just 6 major interventions averaged over all 1295 patients: $353/patient
Inconsistency of Recommendations for Incidental Findings
Increased Recommendations

- 5.9 M studies from 1995-2008
  - Odds of recommendations decreased by 15% per decade of radiologist experience


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Inconsistent Use of Guidelines
Survey – IF Recommendations

- 27 academic radiologists, 3 institutions
- 12 hypothetical incidental findings
- Poor correlation between and even *within* institutions

Communicating Findings
Role of Radiology Specialization

- Guidelines Adherence: critical-result renal masses on CT:
  - Abdominal specialists: 93%
  - Non-abdominal specialists: 57%

- Adherence to critical-result communication policy:
  - Abdominal specialists: 84%
  - Non-abdominal specialists: 43%

What are the Medicolegal Implications?

- Guidelines used in malpractice suits
- Applying policies consistently is good defense
- All radiologists are held to a common standard-of-care regardless of their specialty orientation
- Nevertheless, malpractice risk currently very limited
Frequent detection, recommendations and increased cost

Highly inconsistent detection, recommendations, adherence to guidelines, reporting, follow-up

This level of performance is not sustainable – too many forces demanding improvement
IF White Papers
Managing Incidental Findings on Abdominal CT: White Paper of the ACR Incidental Findings Committee

Lincoln L. Berland, MD, Stuart G. Silverman, MD, Richard M. Gore, MD, William W. Mayo-Smith, MD, Alec J. Megibow, MD, MPH, Judy Yee, MD, James A. Brink, MD, Mark E. Baker, MD, Michael P. Federle, MD, W. Dennis Foley, MD, Isaac R. Francis, MD, Brian R. Herts, MD, Gary M. Israel, MD, Glenn Krinsky, MD, Joel F. Platt, MD, William P. Shurman, MD, Andrew J. Taylor, MD

As multidetector CT has come to play a more central role in medical care and as CT image quality has improved, there has been an increase in the frequency of detecting “incidental findings,” defined as findings that are unrelated to the clinical indication for the imaging examination performed. These “incidentalomas,” as they are also called, often confound physicians and patients with how to manage them. Although it is known that most incidental findings are likely benign and often have little or no clinical significance, the inclination to evaluate them is often driven by physician and patient unwillingness to accept uncertainty, even given the rare possibility of an important diagnosis. The evaluation and surveillance of incidental findings have also been cited as among the causes for the increased utilization of cross-sectional imaging. Indeed, incidental findings may be serious, and hence, when and how to evaluate them are unclear. The workup of incidentalomas has varied widely by physician and region, and some standardization is desirable in light of the current need to limit costs and reduce risk to patients. Subjecting a patient with an incidentaloma to unnecessary testing and treatment can result in a potentially injurious and expensive cascade of tests and procedures. With the participation of other radiologic organizations listed herein, the ACR formed the Incidental Findings Committee to derive a practical and medically appropriate approach to managing incidental findings on CT scans of the abdomen and pelvis. The committee has used a consensus method based on repeated reviews and revisions of this document and a collective review and interpretation of relevant literature. This white paper provides guidance developed by this committee for addressing incidental findings in the kidneys, liver, adrenal glands, and pancreas.

Key Words: Incidental findings, incidentaloma, pancreatic cyst, renal cyst, liver lesion, adrenal nodule

Overview of White Papers of the ACR Incidental Findings Committee II on Adnexal, Vascular, Splenic, Nodal, Gallbladder, and Biliary Findings

Lincoln L. Berland, MD

Managing Incidental Findings on Abdominal and Pelvic CT and MRI, Part 1: White Paper of the ACR Incidental Findings Committee II on Adnexal Findings

Maitray D. Patel, MD, Susan M. Ascher, MD
Raj Mohan Paspuleti, MD, Alampady K. Shanbhogue, MD
Evan S. Siegelman, MD, Marjorie W. Stein, MD
Lincoln L. Berland, MD

Managing Incidental Findings on Abdominal and Pelvic CT and MRI, Part 2: White Paper of the ACR Incidental Findings Committee II on Vascular Findings

Faisal Khosa, MD, Glenn Krinsky, MD, Michael Macari, MD
E. Kent Yucel, MD, Lincoln L. Berland, MD

Managing Incidental Findings on Abdominal and Pelvic CT and MRI, Part 3: White Paper of the ACR Incidental Findings Committee II on Splenic and Nodal Findings

Matthew T. Heller, MD, Mukesh Harisinghani, MD, Jeffrey D. Nettlich, MD, Paula Yeghiayan, MD
Lincoln L. Berland, MD

Managing Incidental Findings on Abdominal and Pelvic CT and MRI, Part 4: White Paper of the ACR Incidental Findings Committee II on Gallbladder and Biliary Findings

Sunit Sebastian, MD, Cyrillo Araujo, MD, Jeffrey D. Nettlich, MD
Lincoln L. Berland, MD

Managing Incidental Thyroid Nodules Detected on Imaging: White Paper of the ACR Incidental Thyroid Findings Committee

Jenny K. Hoang, MBBS, Jill E. Langer, MD, William D. Middleton, MD
Carol C. Wu, MD, Lynwood W. Hammers, DO, John J. Cronan, MD
Franklin N. Tessler, MD, CM, Edward G. Grant, MD, Lincoln L. Berland, MD
Thyroid IF Recommendations
- Suspicious CT/MRI features include: abnormal lymph nodes and/or invasion of local tissues by the thyroid nodule. Abnormal lymph node features include: calcifications, cystic components, and/or increased enhancement. Nodal enlargement is less specific for thyroid cancer metastases, but further evaluation could be considered if an ITN has ipsilateral nodes >1.5 cm in short axis for jugulodialaeritic lymph nodes, and >1 cm for other lymph nodes.

- Limited life expectancy and comorbidities that increase the risk of treatment or are more likely to cause morbidity and mortality than the thyroid cancer itself, given the nodule size; see text for details. Patients with comorbidities or limited life expectancy should not have further evaluation of the ITN, unless it is warranted clinically, or specifically requested by the patient or referring physician.

- Further management of the ITN after thyroid ultrasound, including fine needle aspiration, should be based on ultrasound findings.
Incidental Thyroid Nodule Detected on \textsuperscript{18}FDG-PET and Other Nuclear Medicine Scans\textsuperscript{1}

- Focal activity\textsuperscript{2}
  - Limited life expectancy and comorbidities\textsuperscript{3}
    - No further evaluation
  - General population
    - Evaluate with thyroid ultrasound\textsuperscript{4}

- ITN on accompanying PET/CT or PET/MRI without metabolic activity
  - Refer to Recommendations for ITN on CT and MRI
Flowchart for incidental thyroid nodules (ITNs) detected on 18FDG-PET and other nuclear medicine studies.

- Focal uptake may include one or more sites. Diffuse uptake in the thyroid without a corresponding mass is not considered to be focal.

- Limited life expectancy and comorbidities that increase the risk of treatment or are more likely to cause morbidity and mortality than the thyroid cancer itself, given the nodule size; see text for details. Patients with comorbidities or limited life expectancy should not have further evaluation of the ITN, unless it is warranted clinically, or specifically requested by the patient or referring physician.

- Further management of the ITN after thyroid ultrasound should include fine-needle aspiration for PET-avid ITN regardless of the ultrasound findings; see text for details. Avid nodules on other nuclear medicine scans can have ultrasound with the decision to perform FNA based on findings seen on the dedicated thyroid ultrasound.
Ovarian IF Recommendations
Management of Asymptomatic Ovarian and Other Adnexal Cysts Imaged at US: Society of Radiologists in Ultrasound Consensus Conference Statement

The Society of Radiologists in Ultrasound convened a panel of specialists from gynecology, radiology, and pathology to arrive at a consensus regarding the management of ovarian and other adnexal cysts imaged sonographically in asymptomatic women. The panel met in Chicago, Ill, on October 27–28, 2009, and drafted this consensus statement. The recommendations in this statement are based on analysis of current literature and common practice strategies, and are thought to represent a reasonable approach to asymptomatic ovarian and other adnexal cysts imaged at ultrasonography.

© RSNA, 2010
- These may appear similar on CT
ACR Adnexal Algorithm – Three Factors

- All incidental, post-menarchal and non-pregnant
- Appearance-features:
  - Benign-appearing, probably benign, other
- Timing relative to menopause:
  - Pre-, early-post, late-post
- Size:
  - 1, 3, 5 cm thresholds
SRU Consensus (Simplified)

- **Pre-menopausal:**
  - <3 cm: Ignore
  - 3-5 cm: Describe, but benign, no FU
  - 5-7 cm: Yearly FU
  - >7 cm: MRI or surgical evaluation

- **Post-menopausal:**
  - <1 cm: Ignore
  - May choose up to 3 cm to ignore
  - 1-7 or 3-7 cm: US FU yearly, depending on change
  - >7 cm: MRI or surgical evaluation
SRU Consensus Criteria (Simplified)

- Remaining cystic lesion management based on US findings not seen on CT or MRI
- Pre-menopausal hemorrhagic cysts:
  - Up to 5 cm: no FU
  - >5 cm: FU in 6-12 weeks
- Early post-menopausal hemorrhagic cysts:
  - US FU in 6-12 weeks
- Late post-menopausal:
  - Surgical evaluation
Benign-appearing cyst

Pre-menopausal

- ≤5 cm
  - Benign, no follow-up
- >5 cm
  - US follow-up at 6-12 wk

Early post-menopausal

- ≤3 cm
  - Benign, no follow-up
- >3 cm, ≤5 cm
  - US follow-up at 6-12 mo
- >5 cm
  - Ultrasound

Late post-menopausal

- ≤3 cm
  - Benign, no follow-up
- >3 cm
  - Ultrasound
- Benign-appearing. No follow-up.
Pre-Menopausal 3.8 cm Cyst with Artifact

- Artifact, but no suspicious features. No FU
Benign-appearing cyst

- Premenopausal
  - ≤5 cm
    - Benign, no follow-up
  - >5 cm
    - US follow-up at 6-12 wk

- Early postmenopausal
  - ≤3 cm
    - Benign, no follow-up
  - >3 cm, ≤5 cm
  - >5 cm
    - US follow-up at 6-12 mo

- Late postmenopausal
  - ≤3 cm
    - Benign, no follow-up
  - >3 cm
    - Ultrasound
Early Post-Menopausal 4.7 cm Cyst

- Resolved on follow-up ultrasound
Clinical Decision Support
Importance and Value of Using Guidelines and Recommendations
Consistent processes are most important determinant of quality

Already beginning to be rewarded in $ for good quality and penalized for “poor” quality

New payment models (MIPS/APM) incentivizing limitations on imaging
I would like to have evidence-based guidelines integrated into my reporting workflow. (April, 2015, n = 2,586)

Courtesy Keith Dreyer, DO, PhD
Radiology reports and recommendations need to be more standardized. (April, 2015, n = 2,586)
Each radiology report should be individually dictated in free text vs. a standard template. (April, 2015, n = 2,586)

Courtesy Keith Dreyer, DO, PhD
Effect of BI-RADS on Report IQ

- Creates a quality threshold by structuring essential information.

Courtesy Keith Dreyer, DO, PhD
Then, Why Don’t Radiologists Want to Use Guidance when Reporting?
Complaints about IF Recommendations

- The recommendations are:
  - Sometimes/often wrong, outdated
  - Not clinically relevant, built without clinical input
- Flowcharts are confusing
- Not risk-stratified
  - Age, gender, co-morbid conditions
- Based on consensus, weak or non-existent data (not evidence-based)
Conformity to Other Specialty Guidelines

- ACR Adrenal IF recommendations do not conform to:
  - American Association of Clinical Endocrinologists (AACE) guidelines
  - American Association of Endocrine Surgeons (AAES) guidelines
  - Endocrine Practice 15 (Suppl 1) Aug, 2009

- ACR Pancreatic cysts recommendations do not conform to:
  - ACG, ACS guidelines
Other Psychosocial Obstacles

- Too busy to look up
- Out of sight, out of mind
- Not my problem
- It’s not the way we do it or way we were trained
- I won’t get sued anyway
- Low- vs. high-risk tolerance personality

Courtesy Mark Baker, MD
Methods to Apply Medical Evidence to Radiology Reporting
Traditional Ways Towards Quality

- Original journal articles
  - Our white papers are among these traditional methods
- Review, pictorial articles
- Books
- Educational digests
- Online resources – Google, Journals, etc.
Survey of ACR about White Paper
Have You Read White Paper?

<table>
<thead>
<tr>
<th>Response</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes, I have read the white paper</td>
<td>37.9%</td>
</tr>
<tr>
<td>Yes, I am aware of the white paper but have not read it</td>
<td>30.4%</td>
</tr>
<tr>
<td>No, I am not aware of the white paper</td>
<td>31.6%</td>
</tr>
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### Changing Recommendations (Read Paper)

<table>
<thead>
<tr>
<th>Response</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>I recommend additional tests more often</td>
<td>3.1%</td>
</tr>
<tr>
<td>I recommend additional tests less often</td>
<td>50.6%</td>
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<tr>
<td>I have not changed how often I recommend additional tests</td>
<td>37.6%</td>
</tr>
<tr>
<td>Not sure</td>
<td>8.7%</td>
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When you encounter a 1 cm low attenuating lesion… with no history of malignancy and no prior studies, …how you would report it?

<table>
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<th>Option</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>I would not report such a finding</td>
<td>0.8%</td>
</tr>
<tr>
<td>“Lesion too small to characterize”</td>
<td>22.3%</td>
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<tr>
<td>“1 cm lesion, likely benign”</td>
<td>34.8%</td>
</tr>
<tr>
<td>“Recommend characterization [with another imaging modality]”</td>
<td>30.4%</td>
</tr>
<tr>
<td>“Recommend follow-up in 6-12 months”</td>
<td>11.7%</td>
</tr>
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</table>
When you encounter a 1 cm low attenuating lesion… with no history of malignancy and no prior studies, …how you would report it?

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<tbody>
<tr>
<td>I would not report such a finding</td>
<td>0.8%</td>
</tr>
<tr>
<td>“Lesion too small to characterize”</td>
<td>20.7%</td>
</tr>
<tr>
<td>“1 cm lesion, likely benign”</td>
<td>58.5%</td>
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<tr>
<td>“Recommend characterization [with another imaging modality]”</td>
<td>9.5%</td>
</tr>
<tr>
<td>“Recommend follow-up in 6-12 months”</td>
<td>10.4%</td>
</tr>
</tbody>
</table>
Consistently Applying Guidelines

- Educational programs within your practice
- Print copies of algorithms and papers and place in folder at workstations
- Place online in secure intranet site
- Google, Bing, etc. and download
- Write macros for common recommendations
Education Programs

- Quality initiative to decrease physiologic/benign adnexal lesions referred for follow-up

- Formal education, charts and guidelines placed electronically on workstation desktop

- Recommendations decreased 58%, increase in the proportion called physiologic/benign

Hui JS, Kramer DJ, Blackmore CC, Hashimoto BE, Coy DL. A Quality Improvement Initiative to Reduce Unnecessary Follow-up Imaging for Adnexal Lesions. JACR 2014; 11:373-377
48 radiology residents provided decision-support (DS) tool from web or through direct PACS access

- Integrated access group: 3X higher use
- Use of the integrated DS jumped by an order of magnitude after second month

Computerized CDS
Choose the appropriate option that is lowest down on the list for each question. Options that don't affect outcome will become disabled. You can just skip those and move on to the next applicable option. To change a selection, just unselect your previous selection first.

**Size**
- ○ <2 cm
- ○ 2-3 cm
- ○ >3 cm

**Character**
- ○ No characterizable study available.
- ○ Uncharacterizable Cystic Mass or any OTHER cystic neoplasm
- ○ BD-IPMn
- ○ Serous Cystadenoma

**Change Over Time**
- ○ No Prior
- ○ Stable
- ○ Growth

Aspirate cyst and consider resection depending on comorbidities and risk.

DONE
Computerizing CDS:
ACR Common, ACR Assist
The ACR radiological terminology of common:

- Procedures, indications, findings, recommendations
- Provides integration to EHR and ACR services

Current Contents:

- +1,000 Imaging procedures
- +1,200 Clinical indications
- +100 Clinical Findings (Actionable findings, BI-RADS, Incidental findings)

Courtesy Keith Dreyer, DO, PhD
ACR Common – EHR Messaging

Courtesy Keith Dreyer, DO, PhD
With what would a system that improves Report IQ assist the radiologist?

- Detection of Findings
- Interpretation/Classification of Disease
- Recommendation of Actions
- Communication of all the Above

Think BI-RADS for the rest of radiology reporting

Point-of-care

Courtesy Keith Dreyer, DO, PhD
Content Sources for ACR Assist

**X-RADS (e.g. LI-RADS, PI-RADS, TI-RADS, etc.)**

**ACR actionable findings white paper**

**Others: e.g. organ injury classification**
Computer Assisted Reporting Guidance Objects (CARGO)

Making Guidelines Computer Readable

Courtesy Keith Dreyer, DO, PhD
Reporting Driven by Definition

Radiologist

Definition
Interface
Report

Courtesy Keith Dreyer, DO, PhD
Patient: 74F
Exam: CTABPW
Completed: 2013-12-02

**Adrenal Nodule**

**Size:** 12 mm

**Side:** Right

**Previously characterized:** Adenoma on CT

**Diagnostic feature:** Adenoma on MRI

**Hx malignancy:** No

**Changed size:** No

**Body:**
In the right adrenal gland (series 2, image 12), a 12 mm lesion does not have specifically benign imaging features.

**Impression:**
Indeterminate 12 mm right adrenal nodule does not have the typical characteristics of a benign adenoma, although most such lesions will ultimately prove to be benign.

**Recommendations:**
- Adrenal mass protocol CT in 6 months.
In the right adrenal gland (series 2, image 12), a 12 mm lesion is unchanged in size for at least six months.

**Impression**

Stable 12 mm right adrenal nodule. Radiologic findings are most consistent with a benign adrenal adenoma.

**Recommendation**

Scans were continued into the pelvis to evaluate the entire GI tract.

**COMPARISON:** 9/15/2012

**FINDINGS:**

**LOWER THORAX:** Lung bases are clear.

**HEPATOBILIARY:** No focal hepatic lesions. No biliary ductal dilatation.

**SPLEEN:** No splenomegaly.

**PANCREAS:** No focal masses or ductal dilatation.

**ADRENALS:**

In the right adrenal gland (series 2, image 12), a 12 mm lesion is unchanged in size for at least six months.

**KIDNEYS/URETERS:** No hydronephrosis, stones, or solid mass lesions.

**PELVIC ORGANS/BLADDER:** Unremarkable.

**PERITONEUM / RETROPERITONEUM:** No free air or fluid.

**LYMPH NODES:** No lymphadenopathy.

**VESSELS:** Unremarkable.

**GI TRACT:** No distention or wall thickening.

**BONES AND SOFT TISSUES:** Unremarkable.

**IMPRESSION:**

Stable 12 mm right adrenal nodule. Radiologic findings are most consistent with a benign adrenal adenoma.

**RECOMMENDATION:**

Improving Report Quality

- Abdominal CT incidental pulmonary nodule

Real-time access to guidelines improves compliance from 45% to 95%

No CT when indicated
Follow-up CT too late
Follow-up CT too early
CT when not indicated
Concordant

Courtesy Keith Dreyer, DO, PhD
Tarik Alkasab, MD

M T Lu, MD, Boston, MA; D A Rosman, MD; C C Wu, MD; T K Alkasab, MD, PhD; J O Shepard, MD; G W Boland, MD; et al. Impact of a Point-of-Care Electronic Clinical Decision Support (CDS) Tool on Adherence to Departmental Guidelines for Follow-up of Incidental Pulmonary Nodules on Abdominal CT. RSNA 2013
Future Goals: NGC Criteria

- Meet same target criteria for external review as Appropriateness Criteria (AC) panels
  - Merit posting by National Guideline Clearinghouse (NGC) of the AHRQ
    - Documentation of literature searches
    - Evidence linkages and scores
    - Involvement of non-radiology experts
    - Transparent consensus processes
Future Goals: New Themes

- Are some IFs actually normal (e.g. small renal cysts)?
  - Implications for reporting, recommendations
- Can risk thresholds be normalized across findings?
  - Establish risk concepts that can apply to work-up of incidental findings across organ systems and types of findings
  - Broaden these concepts beyond IFs to, e.g. LI-RADS, Lung-RADS, other medical decision making
Clinical decision support methods will evolve and become:

- More accurate, more useful, more efficient
- Essential

Please encourage your IT vendors to develop and improve such systems.
Take-Home Messages

- Reaching an inflection point
  - Too much information for us to remember
- Radiology reporting is an open-“book” test
  - Support should be available at the point of interpretation
- Current level of performance is not sustainable
  - Too many forces demanding improvement:
    - Economic, regulatory, medicolegal
“If you don’t like change, you’ll like irrelevance even less”

Eric Shinseki