# Compliance with Recommended Follow-up for Incidental Pulmonary Nodules Found on CT Chest Studies

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# Disclosure

I do not have an affiliation, financial or otherwise, with a pharmaceutical company, medical device or communication organization.

# Background

- Up to 51% of smokers aged >50 have incidental pulmonary nodules on CT chest studies

- Follow-up of nodules is widely recommended
  - Most commonly using the guidelines published by the Fleischner Society
    - Nodules greater than 6 mm in size
    - Higher risk populations such as smokers

# Background

- In a study from 2013, 51% of patient discharge instructions failed to note follow-up imaging recommendations on studies performed in the emergency department

- No prior studies have been performed at our institution to assess adequacy of follow-up for incidental pulmonary nodules

# Aim

To determine if follow-up studies are being performed for incidental pulmonary nodules as recommended on CT chest studies

# Standard

- No published standard is available

- Follow-up studies for incidental pulmonary nodules should be performed within +/- 1 month as recommended on the initial CT chest study as per Fleischner Society 2005 guidelines

| Nodule Size (mm)* | Low-Risk Patient† | High-Risk Patient‡ |
|---|---|---|
| ≤4 | No follow-up needed§ | Follow-up CT at 12 mo; if unchanged, no further follow-up‖ |
| >4–6 | Follow-up CT at 12 mo; if unchanged, no further follow-up‖ | Initial follow-up CT at 6–12 mo then at 18–24 mo if no change‖ |
| >6–8 | Initial follow-up CT at 6–12 mo then at 18–24 mo if no change | Initial follow-up CT at 3–6 mo then at 9–12 and 24 mo if no change |
| >8 | Follow-up CT at around 3, 9, and 24 mo, dynamic contrast-enhanced CT, PET, and/or biopsy | Same as for low-risk patient |

MacMahon et al. 2005.

# Target

The standard should be performed in 100% of the cases

# Methods

- CT chest studies at 5 hospital in Edmonton performed between May and July 2014 were compiled and reviewed
- 52 of those studies demonstrated incidental pulmonary nodules for which follow-up was recommended
- Patient's follow-up imaging record was reviewed to determine whether or not a follow-up study had been performed

# Results – Cycle 1

- Follow-up studies for incidental pulmonary nodules were performed in 32/52 (62%) of cases
- Of these, 24/52 cases were performed within +/- 1 month of the recommended timeline (46%)
- The target was not achieved

# Action Plan

- Since March 2016, radiologists at 5 hospitals in Edmonton have been requested to insert a large font bold paragraph at the start of the impression portion of their report

  - **ATTENTION: ACTION REQUIRED. THIS PATIENT REQUIRES FOLLOWUP AS ADVISED BELOW.**

# Results – Cycle 2

- From March 2016 – March 2017 across 5 hospitals in Edmonton, the bolded macro was used appropriately in 134 CT chest studies that required incidental pulmonary nodule follow-up

- 58/134 studies should have had follow-up at the time of data collection

# Results – Cycle 2

- Follow-up studies for incidental pulmonary nodules were performed in 40/58 (69%) of cases
- Of these, 31/58 (53%) cases were performed within +/- 1 month of the recommended timeline
- The target was not achieved

# Results – Comparison of Cycles 1 and 2

| | Cycle 1 | Cycle 2 |
|---|---|---|
| **Follow-up studies for incidental pulmonary nodules performed** | 32/52 (62%) | 40/58 (69%) |
| **Follow-up studies performed within +/- 1 month of the recommended timeline** | 24/52 (46%) | 31/58 (53%) |

# Discussion

- Target not met pre-and-post intervention
    - No change in clinical management
    - Referring physician non-compliance
    - Patient non-compliance
    - Radiologist non-compliance and lack of knowledge of audit
    - Small sample size

# Discussion

- Possible future interventions
  - Flagging of studies requiring follow-up (Alberta Thoracic Oncology Program)
    - Telephone reminder
    - Automatic booking of patients for repeat CT
  - Highlight importance of follow-up to referring/emergency physicians

- Poster placement around radiology department to increase awareness of audit project

# Discussion

- New 2017 Fleischner Society guidelines
  - Radiologist and referring physician awareness
  - Possibly fewer patients requiring follow-up

**A: Solid Nodules***

| Nodule Type | Size: <6 mm (<100 mm³) | 6–8 mm (100–250 mm³) | >8 mm (>250 mm³) | Comments |
|---|---|---|---|---|
| Single | | | | |
| Low risk† | No routine follow-up | CT at 6–12 months, then consider CT at 18–24 months | Consider CT at 3 months, PET/CT, or tissue sampling | Nodules <6 mm do not require routine follow-up, but certain patients at high risk with suspicious nodule morphology, upper lobe location, or both may warrant 12-month follow-up (recommendation 1A). |
| High risk† | Optional CT at 12 months | CT at 6–12 months, then CT at 18–24 months | Consider CT at 3 months, PET/CT, or tissue sampling | Nodules <6 mm do not require routine follow-up, but certain patients at high risk with suspicious nodule morphology, upper lobe location, or both may warrant 12-month follow-up (recommendation 1A). |
| Multiple | | | | |
| Low risk† | No routine follow-up | CT at 3–6 months, then consider CT at 18–24 months | CT at 3–6 months, then consider CT at 18–24 months | Use most suspicious nodule as guide to management. Follow-up intervals may vary according to size and risk (recommendation 2A). |
| High risk† | Optional CT at 12 months | CT at 3–6 months, then at 18–24 months | CT at 3–6 months, then at 18–24 months | Use most suspicious nodule as guide to management. Follow-up intervals may vary according to size and risk (recommendation 2A). |

**B: Subsolid Nodules***

| Nodule Type | Size: <6 mm (<100 mm³) | ≥6 mm (>100 mm³) | Comments |
|---|---|---|---|
| Single | | | |
| Ground glass | No routine follow-up | CT at 6–12 months to confirm persistence, then CT every 2 years until 5 years | In certain suspicious nodules < 6 mm, consider follow-up at 2 and 4 years. If solid component(s) or growth develops, consider resection. (Recommendations 3A and 4A). |
| Part solid | No routine follow-up | CT at 3–6 months to confirm persistence. If unchanged and solid component remains <6 mm, annual CT should be performed for 5 years. | In practice, part-solid nodules cannot be defined as such until ≥6 mm, and nodules <6 mm do not usually require follow-up. Persistent part-solid nodules with solid components ≥6 mm should be considered highly suspicious (recommendations 4A-4C) |
| Multiple | CT at 3–6 months. If stable, consider CT at 2 and 4 years. | CT at 3–6 months. Subsequent management based on the most suspicious nodule(s). | Multiple <6 mm pure ground-glass nodules are usually benign, but consider follow-up in selected patients at high risk at 2 and 4 years (recommendation 5A). |

MacMahon et al. 2017.

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# References


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# THANK YOU!

Questions/Comments