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**IMPLEMENTATION OF A PATIENT QUESTIONNAIRE TO
OPTIMIZE RECOMMENDATIONS FOR THE FOLLOW UP
OF CT DETECTED PULMONARY NODULES
USING THE FLEISCHNER SOCIETY'S GUIDELINES**



Fleischner Society

- International multidisciplinary medical society for thoracic radiology, dedicated to the diagnosis and treatment of diseases of the chest.
- 2005 - Published recommendations for the follow up of CT detected pulmonary nodules. (Radiology 2005, 237, 395-400)
- Guidelines based on published research, and prevalence, biologic characteristics, and growth rates of small lung cancers.

Follow up is based on nodule size and patient's risk status.

PULMONARY NODULE PROTOCOL

Recommendations for Follow up and Management of Pulmonary Nodules Detected Incidentally at Nonscreening CT

Based on the Fleischner Society Guidelines (Radiology 2005, 237, 395-400)

Nodule size (mm)	Low-risk patient	High-risk patient
≤ 4mm	No follow up needed.	Follow up CT at 12 months; If stable no further follow up.
> 4 – 6 mm	Follow up CT at 12 months; If stable, no further follow up.	Initial follow up CT at 6-12 months then at 18-24 if stable.
> 6 – 8 mm	Initial follow up CT at 6-12 months, then at 18-24 mo if stable.	Initial follow up CT at 3-6 months, then at 9-12 months and 24 months if stable.
>8 mm	Follow up CT at around 3, 9 and 24 months, dynamic contrast enhanced CT, PET and/or biopsy.	Same as for low risk patient.

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2005

- Fleischner Society guidelines accepted and utilized at the QE II Health Sciences Centre (a 1,100 bed teaching hospital) in Halifax, NS, Canada.
- Problems:
 1. No clear definition of what constitutes low and high risk patients.
 2. Insufficient information provided on requisitions to place patients in a risk category.

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Radiologist can determine nodule size but not patient's risk status.

Model:
Capital Health
Diagnostic Imaging Department
Consultation

Diagnostic Imaging Department (X-ray)
 Halifax Infirmary - 500 - 402-3618
 Victoria General - 500 - 424-7770
 Dartmouth General Hospital - 404-8318
 Colchester Community Health Centre - 869-6102
 Saint John's General Hospital - 725-2077
 Eastern Shore Memorial Hospital - 885-3624
 Moncton/St-Hubert Memorial Hospital - 884-2220
 New Delta Memorial Hospital - 889-2200

General X-ray Nuclear Medicine
 Mammography Ultrasound
 Computed Tomography Angiography
 MRI (see department form used for completion in Referring Physician)

Imaging Date: T O B
 Patient's Name: _____
 Sex: D O B: OYMMDDDD
 Address: _____
 Health Card #: _____
 Phone #: _____

Outpatient Inpatient Portable Outpatient Inpatient Ambulatory

INDICATION FOR EXAMINATION: Chest

Indication for Examination:
 Cough

Physician: _____
 Physician's Signature: _____
 Page #: _____ Telephone #: _____

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2005-2009 Observations

- Radiologists recommend either:
 1. Two options for follow up e.g. 6 (if high risk) or 12 months (if low risk).
 2. A single follow up between that recommended for low and high risk patients e.g. 9 months (between 6 and 12).
 3. A follow up range e.g. 6-12 months.
 4. A single follow up recommendation without using the Fleischner guidelines.
- Patients return for F/U at inappropriate intervals, either too early or too late.
- Patients are lost to follow up.

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Who is legally responsible for patients who do not get appropriate follow up?

NOVASCOTIA Booking Office
Capital Health Phone: 454-8358 Fax: 454-9010

Nova Scotia Health
Diagnostic Imaging Consultation Request
Application will be refused if the following information is not provided

EXAM REQUESTED: Nuclear Medicine General Imaging CT Scan Echo Ultrasound

Time slot: _____
For Internal Use Only: _____
For External Use Only: _____

PATIENT INFORMATION: Name: _____, DOB: _____, Sex: _____, Age: _____, Address: _____, Phone: _____

EXAMINATION REQUESTED: *low dose CT chest*

HISTORY AND PROFESSIONAL DIAGNOSIS: *6 mm nodule seen in CT from Sept 09. F/U was needed 1 year later - patient I missed this report & did not book. This report says to keep.*

RELEVANT SURGERY AND TESTS: _____
Allergy: _____
Height: _____, Weight: _____, Date of Birth: _____, Sex: _____, Race: _____

FOR CONTRAST ENHANCED EXAMS: Previous allergic reaction to a dye test: Y N

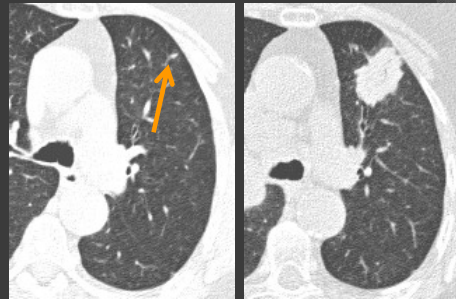
FOR INVASIVE PROCEDURES: Patient diabetic? Y N

REQUESTING PHYSICIAN: Name: _____, Signature: _____, Date: _____

RADIOLOGY INSTRUCTIONS: Urgent Stat Routine Asymptomatic

TECHNOLOGY INFORMATION: Room #: _____, Fluoro time: _____, Number of images: _____

Response Form: CDD01346_11_07
Your Health Matters Page 1 of 2



One year follow up recommended but not done.

2 years later patient presents with pain.

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Solution

- Define high and low risk categories.
- Design a questionnaire to obtain the information needed to place a patient in a high or low risk category.
- Provide one F/U recommendation in accordance with Fleischner Society guidelines.

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Questionnaire

- Designed with input from thoracic radiologists, thoracic surgeons, respirologists, and medical oncologists.


Have you ever smoked? Yes No
 If yes, how many years? _____ Average number of packs per day? _____
 Has your father, mother, brother, or sister had lung cancer? Yes No
 Have you or your spouse been exposed to asbestos in your work? Yes No
 Have you ever had a cancer? Yes No
 If yes, what type? _____
 Have you had radiation therapy to your chest? Yes No

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Questionnaire is automatically printed on the patient order form.

CT Thorax, Enhanced -CH



Exam: 2011/10/21

Additional Exams Today:		Previous Exams:	
1. CT Neck, Enhanced -VC	CT-11-0475	1. CT Neck, Enhanced -VC	2011/10/21
2.		2. XR Abdomen, Mobile 1 View -AB	2011/10/20
3.		3. XR Abdomen, Mobile 1 View -AB	2011/10/20
4.		4. XR Chest, Non Dedicated Unit -CH	2011/10/20
5.		5. CT Chest, Abd, Pelvis, Enhanced -	2011/09/26

Questionnaire

Have you ever smoked? Yes No
 If yes, how many years? _____ Average number of packs per day? _____
 Has your father, mother, brother, or sister had lung cancer? Yes No
 Have you or your spouse been exposed to asbestos in your work? Yes No
 Have you ever had a cancer? Yes No
 If yes, what type? (e.g. lung, breast, lymphoma, melanoma, etc) _____
 Have you had radiation therapy to your chest? (e.g. for lung or breast cancer, or lymphoma) Yes No

Prev. C: _____ Y N _____ Prev Contrast: Y N _____ Metformin: Y N _____
 Prev Reaction: Y N _____ Liver/Kidney Disease: Y N _____
 Diabetic: Y N _____ Creatinine: _____ Date: _____ Pumped Checked: _____
 Technologist: _____ Room: _____ LMP: _____ Fluoro time: _____
 Time: _____ Contrast: _____ Amount: _____ cc
 Radiologist: _____ Student: _____ Pt. Wt: _____ Pt. Ht: _____
 Comment: _____
 Allergies: Y N _____

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High Risk category*

- Greater than 20 pack year history of smoking.
or
- First degree family member diagnosed with lung cancer.
or
- Work related asbestos exposure for patient or spouse.

*Patients who do not meet the criteria for high risk are considered low risk. The guidelines do not apply to patients with known malignancy or age <35 years.

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When patient risk status as well as nodule size is known, a single follow up recommendation can be made, in accordance with the Fleischner Society's recommendations.

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Snowball Effect

- If a single accurate follow up time is recommended, why not provide the return appointment date and time in the report?
- If we know when the patient should return for follow up, why not inform the referring physician if the patient misses his/her return appointment?
- The Proactive booking of CTs for the follow up of pulmonary nodules pilot program was born.

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The Plan

- CT technologists administer questionnaire to all patients having thoracic CT scans.
- Questionnaire is scanned into PACS and included with images.
- Radiologist reports CT in the usual fashion but has the information required to make a single follow up recommendation.
- Standard follow up macro is inserted at the end of the report.

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Standard Macro

A FOLLOW UP LOW DOSE CT SCAN OF THE CHEST IN 6 MONTHS IS RECOMMENDED.

A FOLLOW UP APPOINTMENT FOR THE ABOVE PATIENT HAS BEEN BOOKED ON NOV 26, 2011 AT 11 AM AT THE VG SITE.

IT IS YOUR RESPONSIBILITY TO INFORM THE PATIENT OF THIS APPOINTMENT. PLEASE CANCEL THE APPOINTMENT IF YOU OR THE PATIENT DO NOT WISH TO KEEP IT FOR CLINICAL OR OTHER REASONS. IT IS YOUR RESPONSIBILITY TO REBOOK A CANCELLED APPOINTMENT. IF YOU WILL NOT BE THE PHYSICIAN FOLLOWING THIS PATIENT FOR THEIR PULMONARY NODULES, PLEASE CALL WITH THE NAME OF THE PHYSICIAN TO WHOM FURTHER REPORTS SHOULD BE SENT. ANY OTHER STUDIES RECOMMENDED IN THE ABOVE REPORT (OTHER THAN FOR FOLLOW UP OF PULMONARY NODULES) MUST BE BOOKED SEPARATELY BY YOUR OFFICE (CT BOOKINGS 555-5555)

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The Plan

- Preliminary report is printed in CT bookings office.
- Bookings clerk treats report as a requisition, books follow up study, and inserts return appointment time into the report.
- Report can then be verified by the radiologist.
- No show lists are compiled and referring physicians are notified if their patient misses a return appointment.

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Program Goals – Start Date Sept. 2009

- Ensure that patients are imaged at appropriate intervals.
- Ensure patients are not lost to follow up.
- Facilitate booking of follow up studies for referring physicians.
- Develop a program which can function using existing resources.

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Implementation

- All referring physicians in the district were informed of the new measures and the goals of the program.
- All referring physicians were provided with a copy of the Fleischner Society's recommendations.

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Pilot Program Assessment

- Thoracic CTs performed from April 1 – June 30, 2008 (prior to implementation of the questionnaire) and April 1 – June 30, 2010 (6 months after implementation of the questionnaire) were reviewed.
- The subset which recommended follow up of nonspecific pulmonary nodules was analyzed.

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Analysis of impact

	Pre Program N (%)	Post Program N (%)	P value**
Thoracic CTs performed	1558	1504	
Reports identifying at least one nodule requiring follow up as per Fleischner Guidelines*	238	187	
Single recommendation for follow up	187(78.6%)	177 (94.7%)	p<0.0001
Patients returned at recommended interval (+/- 30 days)	119 (54.8%)	139 (74.3%)	p<0.0001
Patients lost to follow up	58 (26.7%)	29 (15.5%)	p=0.0089

* Patients with known malignancy or age <35 years do not qualify.

** Testing null hypothesis of equality of Pre and Post proportions.

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Single Follow Up Recommendations

- Single follow up recommendations (made in accordance with the Fleischner Society's guidelines) were significantly increased in the post program group.
- Possible Reasons:
 1. Radiologists have the information needed to place patient in a risk category.
 2. The program increased awareness of the Fleischner Guidelines.

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Appropriate interval

- Patients returned for follow up at the recommended time significantly more often in the post program group.
- Possible reasons:
 1. A single clear recommendation is more likely to be accepted and followed.
 2. Return appointment times were provided in the CT report.
 3. All referring physicians in the district received a copy of the Fleischner Guidelines.

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Lost to follow up

- Significantly fewer patients were lost to follow up in the post program group.
- Possible reasons:
 1. Return appointment times were provided in the CT report.
 2. Referring physicians were notified of their patient's missed appointments.
 3. All referring physicians in the district received a copy of the Fleischner Guidelines.

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Program Utilization

- In the post implementation period, radiologists used the program in 74.3%, 95% CI (67.4% - 80.4), of qualifying reports.
- The most common reasons for not using the program were:
 - Critically ill patients unable to answer questionnaire.
 - Patients referred to thoracic surgery, for biopsy or for PET.
 - Patients with presumed active infection.

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Observations

- Very positive feedback about the program from referring physicians.
- In the 3 month period of analysis we did not observe any increase in the number of CTs performed for nodule follow up.
- Radiologists noted that the questionnaire often revealed a history of cancer not provided on the imaging requisition. Even for patients without lung nodules, this information was found to be helpful for evaluation of other findings.

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Conclusions

- Implementation of a patient questionnaire to assign risk status for development of thoracic malignancy increases the likelihood that the radiologist will provide a single follow up recommendation in accordance with the Fleischner Society's guidelines.
- Proactive booking of follow up CTs reduces the number of patients imaged at inappropriate intervals and reduces the number of patients lost to follow up.
- This pilot program has been well received by the CT technologists, the radiologists and the referring physicians.
- The program was implemented using existing resources. No additional funding was required.

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The Future

- The program will be used in all hospitals within our district.
- No show lists will be computer generated and referring physicians notified of their patient's missed appointments.
- Expansion of system will be considered to proactively book other follow up studies e.g. ground glass lung nodules, ultrasound for ovarian cysts.

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