Joy Borgaonkar MD FRCPC
Daria Manos MD FRCPC
Robert Miller MD FRCPC

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)

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

Borgaonkar RSNA 2011

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.

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

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

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.
Questionnaire

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

Have you ever smoked?  
If yes, how many years?  Average number of packs per day?  
Has your father, mother, brother, or sister had lung cancer?  
Have you or your spouse been exposed to asbestos in your work?  
Have you ever had a cancer?  If yes, what type?  
Have you had radiation therapy to your chest?

Questionnaire is automatically printed on the patient order form.
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.

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.
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.

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.
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).

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.
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.

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.
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.

Analysis of impact

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

* Patients with known malignancy or age <35 years do not qualify.
** Testing null hypothesis of equality of Pre and Post proportions.
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.

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.
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.

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.
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.

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.
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.

Acknowledgements

- Dr. David Barnes, Professor and Head, Department of Radiology, Dalhousie University, Halifax, NS
- QE II HSC DI IT Department – Dorrell Metcalfe, Debbie Arsenault, and Nina Reddick
- Jonathan Gale, Research Assistant Extraordinaire
- Prof. Mohamed Abdoell, P. Stat.