IMPLEMENTING TI-RADS

Effect on thyroid ultrasound reporting and management practices in an academic hospital

EMILY HT PANG, MD, FRCPC
MOHAMMED BUKHARI, MBBS
ALISON C HARRIS, MBChB, FRCR, FRCPC

VANCOUVER GENERAL HOSPITAL
UNIVERSITY OF BRITISH COLUMBIA

THE UNIVERSITY OF BRITISH COLUMBIA

Vancouver CoastalHealth

BACKGROUND

Thyroid nodules are exceedingly common

- Incidence estimated at 20-78% of the adult
- Vast
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- Larg
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American College of Radiology Thyroid Imaging Reporting and Data System (TI-RADS)

White paper published in 2017
(previous lexicon published 2015)

Provides user friendly guidelines for stratifying thyroid nodules into low to high risk groups based on assigning points according to nodule imaging features. Also provides management guidelines.

Several issues were identified with regards to thyroid ultrasound in our department

1 **Quality of reporting of thyroid ultrasound is highly variable**
- Nodule features are used to stratify into benign versus suspicious patterns, however these features are not consistently described

of consistency in providing management mmendations
- Based on variations of either the 2009 (outdated) or 2015 ATA criteria
- Often no specific management suggestions given

rate of benign biopsies
- Overdiagnosis is a recognized problem – potential unnecessary cost and patient risk
- Wait-times could be in excess of 3 months

The introduction of the ACR Thyroid Imaging Reporting and Data System (TI-RADS) in 2017 provided an opportunity to overhaul the way we report thyroid ultrasound and address these issues.

AIMS

01 To increase the frequency of thorough descriptions of thyroid nodule features in reports

02 To improve consistent inclusion of management recommendations.

03 To reduce the number of benign FNA biopsies and improve diagnostic accuracy

There were also a number of secondary questions which were evaluated:

1. *What is the adoption rate of TI-RADS score reporting?*
2. *Does TI-RADS change the frequency with which we are recommending specific management?*
3. *Would wait-times and costs to the healthcare system be reduced?*

PRE TI-RADS
Feb - Mar 2017
200 consecutively assessed thyroid nodules (140 patients) evaluated with ultrasound +/- FNA

TI-RADS Implementation Program

POST TI-RADS
Feb - Mar 2018
200 consecutively assessed thyroid nodules (126 patients) evaluated with ultrasound +/- FNA

POPULATIONS ASSESSED

Maximum of 2 highest suspicion nodules recorded per patient in both groups. Exclusions: high risk patients, known thyroid cancer, previously biopsied nodules with known pathology

METHODS

Multipronged approach to implementation to ensure all stakeholders engaged

- Endocrinology/ENT
- Clerical Staff
- Ultrasound Technologists
- Radiologists/Trainees

Reporting template

TI-RADS REPORTING TEMPLATE
GLAND
Right Lobe: [ ] cm (AP) x [ ] cm (TR) x [ ] cm (CC)
Left Lobe: [ ] cm (AP) x [ ] cm (TR) x [ ] cm (CC)
Isthmus: [ ] cm
Background parenchyma: [homogenous/heterogenous/hyperemic]

NODULES
Location: [right/left] [upper/mid/lower]
Size: [ ] cm (AP) x [ ] cm (TR) x [ ] cm (CC)
Previous: [ ] cm (AP) x [ ] cm (TR) x [ ] cm (CC)

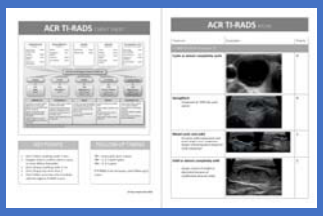
Composition: [ ]
Echogenicity: [ ]
Shape: [ ]
Margins: [ ]
Echogenic Foci: [ ]

TI-RADS Score: [ ]

LYMPH NODES: [Normal/Abnormal]

Rounds given to staff and fellows, resident teaching

Liase with other radiology groups in the region to standardize implementation



"Cheat sheet" created as easily accessible reading room resource

[Feb 2017] Pre-TIRADS sample group

[May 2017] TI-RADS white paper published

[Nov 2017] Consultations with endocrinology, other radiology groups

[Dec 2017] Education (rounds, in-service), create documentation

[Dec 2017] TI-RADS Reporting Go-Live

[Jan 2018] Initiate wait-time solutions

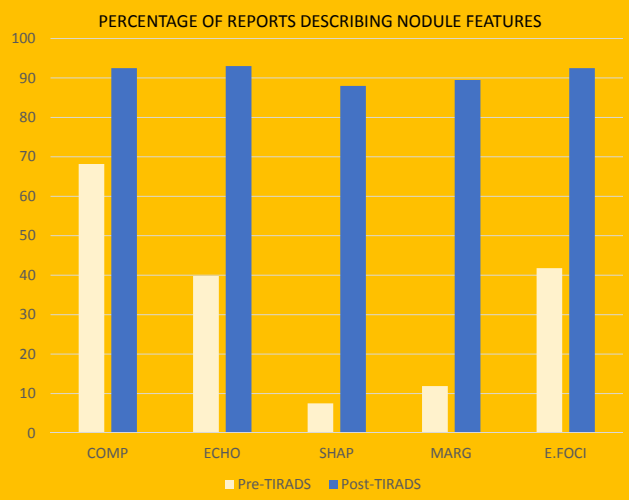
[Feb 2018] Post TI-RADS Audit

IMPLEMENTATION TIMELINE

01

RESULTS

Compare the percentage of reports which include descriptions of relevant thyroid nodule ultrasound features in the pre-TIRADS and post-TIRADS groups



Pre-TIRADS

- Defining features such as composition (68%), echogenicity (40%), and calcifications (42%) were not consistently reported
- Vascularity also relatively frequently reported but no longer felt to be a discriminating feature

Post-TIRADS

- 91% of reports assigned a TIRADS score to nodules
- Most consistently reported feature – echogenicity - mentioned in 93% of reports, others range from 88-93%
- Features more consistently reported when template used

Bottom line: Significantly more thorough nodule descriptions on reports post TI-RADS, and wide dissemination of TIRADS usage in general.

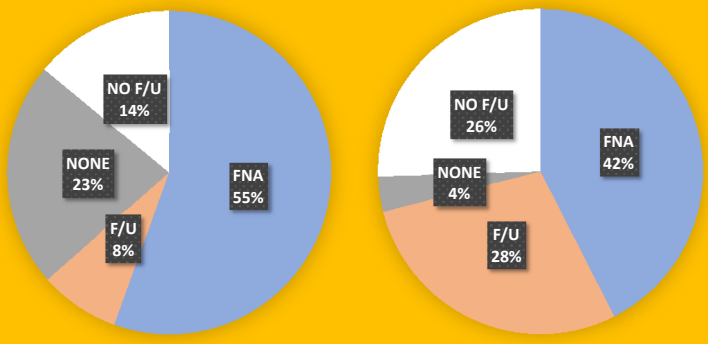
Notes: Features assessed: Composition (COMP), echogenicity (ECHO), shape (SHAP), margins (MARG), echogenic foci/calcifications (E.FOCI). Vascularity not assessed as not included in 2015 ATA or TI-RADS guidelines,

02

RESULTS

Compare the percentage of reports which include management recommendations and frequency of specific recommendations in the pre-TIRADS and post-TIRADS groups

PERCENTAGE OF SPECIFIC MANAGEMENT RECOMMENDATIONS IN REPORTS



Pre-TIRADS

Post-TIRADS

Specific management options: FNA, Follow-up ultrasound (F/U), No FNA or follow-up required (NO F/U), No specific recommendation (NONE)

Some sort of recommendation now made in the vast majority of reports

- **96% (post)** versus **78% (pre)**
- Gives clinicians some guidance as to how to proceed

Reduction in recommended FNAs

- From **55% (pre)** to **42% (post)**
- Biopsies requested but not performed in 8 (pre) and 17 (post) cases due to subthreshold nodules

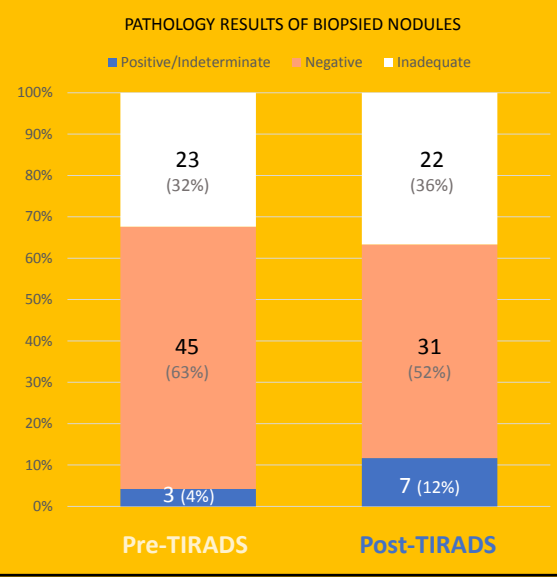
Now recommending more follow-up ultrasounds but also more nodules not requiring any follow-up

- Follow up: **8% (pre)** vs **28% (post)**
- No follow-up: **14% (pre)** vs **26% (post)**

03

RESULTS

Does usage of TI-RADS decrease the number of unnecessary biopsies and improve accuracy?



Two ways of looking at this:

1. Of the thyroid nodules in the pre and post TIRADS group that were biopsied (71 and 60 respectively), what was the rate of positive biopsies?

Pre-TIRADS, **4%** of satisfactory FNAs yielded a positive or indeterminate result for malignancy, increasing to **12%** post TIRADS.

03

RESULTS

Does usage of TI-RADS decrease the number of unnecessary biopsies and improve accuracy?

198 nodules

A group of consecutively biopsied, path proven nodules in pre-TIRADS period (Feb to Mar 2017, overlaps with pre-TIRADS group on the previous slides)

FNAs were recommended as per local practice guidelines

Nodules re-reviewed and TI-RADS applied

127 (64%) FNA

96 benign
17 indeterminate
14 malignant

35 (18%) Follow-up

31 benign
3 indeterminate
1 malignant

36 (18%) No FNA or follow-up

35 benign
1 indeterminate

Two ways of looking at this:

2. Evaluate 198 consecutively FNA'ed thyroid nodules from the pre TI-RADS period that have pathology available and re-score these nodules using TI-RADS. How many would

Findings suggest that positive biopsy rate and diagnostic accuracy improves after TI-RADS implementation.

- 4 indeterminate nodules missed - 3 of which would be followed up; 1 cancer would not have been biopsied but would have been followed up (TR4 but did not meet size criteria)
- Positive rate (including indeterminate lesions) in this population theoretically improves from 18.6 to 24.4%, diagnostic accuracy from 15.7% to 35.4% (sensitivity 97.2%, specificity 21.6%).

ADDITIONAL RESULTS

ESTIMATED COSTS TO HEALTHCARE SYSTEM

Estimated costs of the management recommendations for the 200 nodules in each of the pre and post TIRADS groups:

Pre-TIRADS
$17929.71 CAD

Post-TIRADS
$16576.04 CAD

TI-RADS implementation resulted in modest cost savings

Assumptions:
**Based on the British Columbia Medical Services Plan Fee Guide*
**Approximately 50% of nodules for which no specific follow-up recommendation was given in the pre-TIRADS group underwent follow-up ultrasounds anyway, the estimated costs of these follow-up ultrasound was included.*
**Pre TIRADS costs likely underestimated – pathologists salaried thus difficult to estimate cytopathology costs and were not included*

WAIT TIMES

Thyroid FNA wait-times not significantly changed: 73 days (pre-TIRADS) versus 70 days (post-TIRADS).

In part because it is too early to tell during the period assessed as backlog was still being cleared. Anecdotally however, current wait-times have not significantly decreased - in large part due to increased demand.

LIMITATIONS

- Limited sample size and relatively low incidence of thyroid malignancy
- Several factors not taken into account which could affect management recommendations (i.e. previous follow-up duration, patient and MD preference)
- Image review based on still images, variability among ultrasound vendors (esp. with microcalcs)

CONCLUSIONS

TIRADS implementation improved report quality by encouraging more descriptive reports.

More reports included management recommendations. Additionally, fewer FNAs and more follow-up ultrasounds are being recommended with modest cost reduction.

TIRADS shows promise in reducing unnecessary FNAs while improving diagnostic accuracy, thus contributing to decreasing overdiagnosis.

More work still needs to be done, including ongoing auditing and particularly with regards to wait times.

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