

# **Audit of reporting of thyroid cytology specimens and their correlation with thyroid histology**

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# Background

Royal College of Pathology 2009 guidelines for the reporting of thyroid cytology specimens:

- Aim to categorise cytological findings into diagnostic groups that quantify the risk of malignancy - assists the thyroid surgeon in deciding future management.
- Histology is still regarded as the gold standard for diagnosis of thyroid nodules.

# Importance of audit

1. As the proportion of cases in each Thy category will vary, the best marker of accuracy is comparison with histology where available.
2. It is also important to have a specific value locally for the prediction of malignancy with each Thy category.

# Aims

- To review thyroid cytology and histology reports over a two year period in the ENT Department.

# Standards: RCPATH 2009 Guidelines

1. To determine in what proportion of thyroid cytology reports a “Thy” category is included as well as a prose explanation of the findings (Standard: 100%).
2. To determine the percentage of cases that fall into each Thy category.
3. To correlate the cytology with any subsequent histology (taking the latter as the “gold standard”). To determine:
  - accuracy
  - positive predictive value (PPV) of each Thy category for each of neoplasia and malignancy (case numbers in particular categories may be small, so this should be interpreted with caution).

# The RCPATH/Bethesda System for Reporting Thyroid Cytopathology equivalents with implied risk of malignancy:

- Non-diagnostic for cytological diagnosis (Thy1/Thy1c)/Unsatisfactory: 0–10%
- Non-neoplastic (Thy2/Thy2c)/Benign: 0–3%
- Neoplasm possible – atypia/non-diagnostic (Thy 3a)/Atypia of undetermined significance or follicular lesion of undetermined significance: 5–15%
- Neoplasm possible - suggesting follicular neoplasm (Thy 3f)/Follicular neoplasm or suspicious for a follicular neoplasm: 15–30%
- Suspicious of malignancy(Thy4): 60–75%
- Malignant(Thy5): 97–100%

# Methods

- Retrospective review of thyroid cytology samples requested by ENT between March 2012 and March 2014
- Patients identified using iLab
- Thyroid cytology and where available histology reports were reviewed
- Reporting standards, accuracy and positive predictive values for each Thy category were calculated. (Calculations were done for specimens rather than patients, as advised by the Royal College of Pathologists)

# Results

114 cytology reports were available for 105 patients.

Patient demographics:

- 85 women, 20 men
- Age range: 11 – 91 years, mean 53 years
- Mean age in women: 54 years, mean age in men 52 years
- 9 patients had 2 cytology samples:
  - 2 patients had two separate lesions
  - 7 patients had repeat sampling



## Patients with two samples

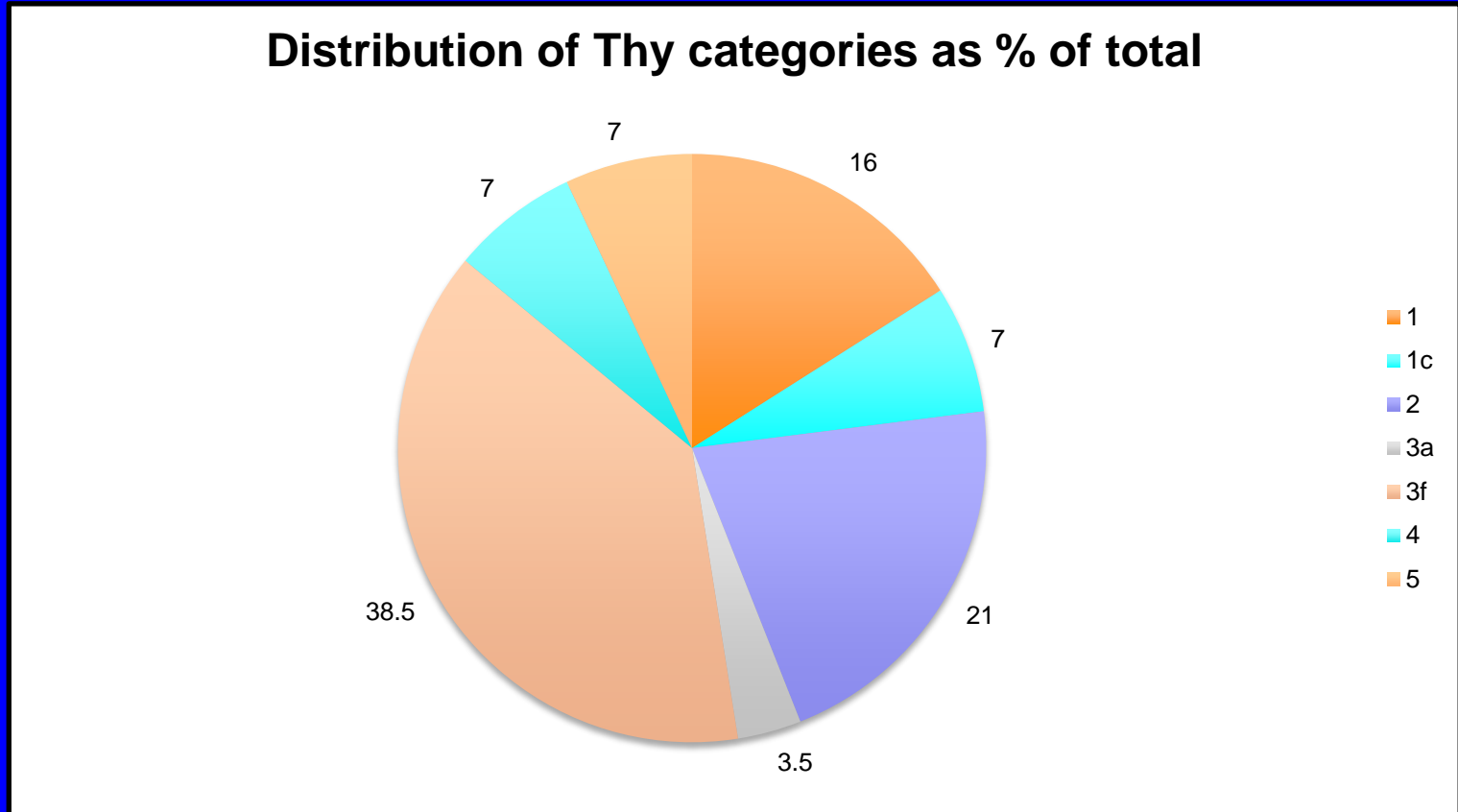
| Patient number | 1st cytology result | 2 <sup>nd</sup> cytology result | Histology           |
|----------------|---------------------|---------------------------------|---------------------|
| 1              | Thy 2               | Thy 1                           | Multinodular goiter |
| 2              | Thy 1               | Thy 1                           | Multinodular goiter |
| 3              | Thy 1c              | Thy 1c                          | No histology        |
| 4              | Thy 2               | Thy 3a                          | Follicular adenoma  |
| 5              | Thy 1               | Thy 3f                          | Multinodular goiter |
| 6              | Thy 1               | Thy 2                           | No histology        |
| 7              | Thy 1               | Thy 1                           | Multinodular goiter |

# Standard 1

- All samples should have a prose description. Compliance = 100%.
- All samples should be classified into a Thy category. Compliance = 92%.

Samples without a Thy classification were reviewed by a consultant histopathologist and categorized to allow further analysis.

# Standard 2: Determine the proportion of cases in each Thy category



## Standard 3: Cytology vs histology.

Of 114 cytology reports reviewed, histology was available for 80 samples.

| Thy category | Total no. of samples | Total no. of samples with histology | Non-neoplastic | Neoplastic benign | Neoplastic malignant | Risk of malignancy (%) | RCPATH standard (%) |
|--------------|----------------------|-------------------------------------|----------------|-------------------|----------------------|------------------------|---------------------|
| 1            | 18                   | 13                                  | 9              | 3                 | 1                    | 11%                    | 0-10%               |
| 1c           | 8                    | 3                                   | 3              | 0                 | 0                    | 0%                     | 0-10%               |
| 2            | 24                   | 8                                   | 6              | 2                 | 0                    | 0%                     | 0-3%                |
| 3a           | 4                    | 3 <sup>∞</sup>                      | 0              | 1                 | 2                    | 66%                    | 5-15%               |
| 3f           | 44                   | 38 <sup>^</sup>                     | 15             | 20                | 3                    | 8%                     | 15-30%              |
| 4            | 8                    | 8                                   | 0              | 1                 | 7                    | 87.5%                  | 60-75%              |
| 5            | 8                    | 7 <sup>*</sup>                      | 0              | 0                 | 7                    | 100%                   | 97-100%             |

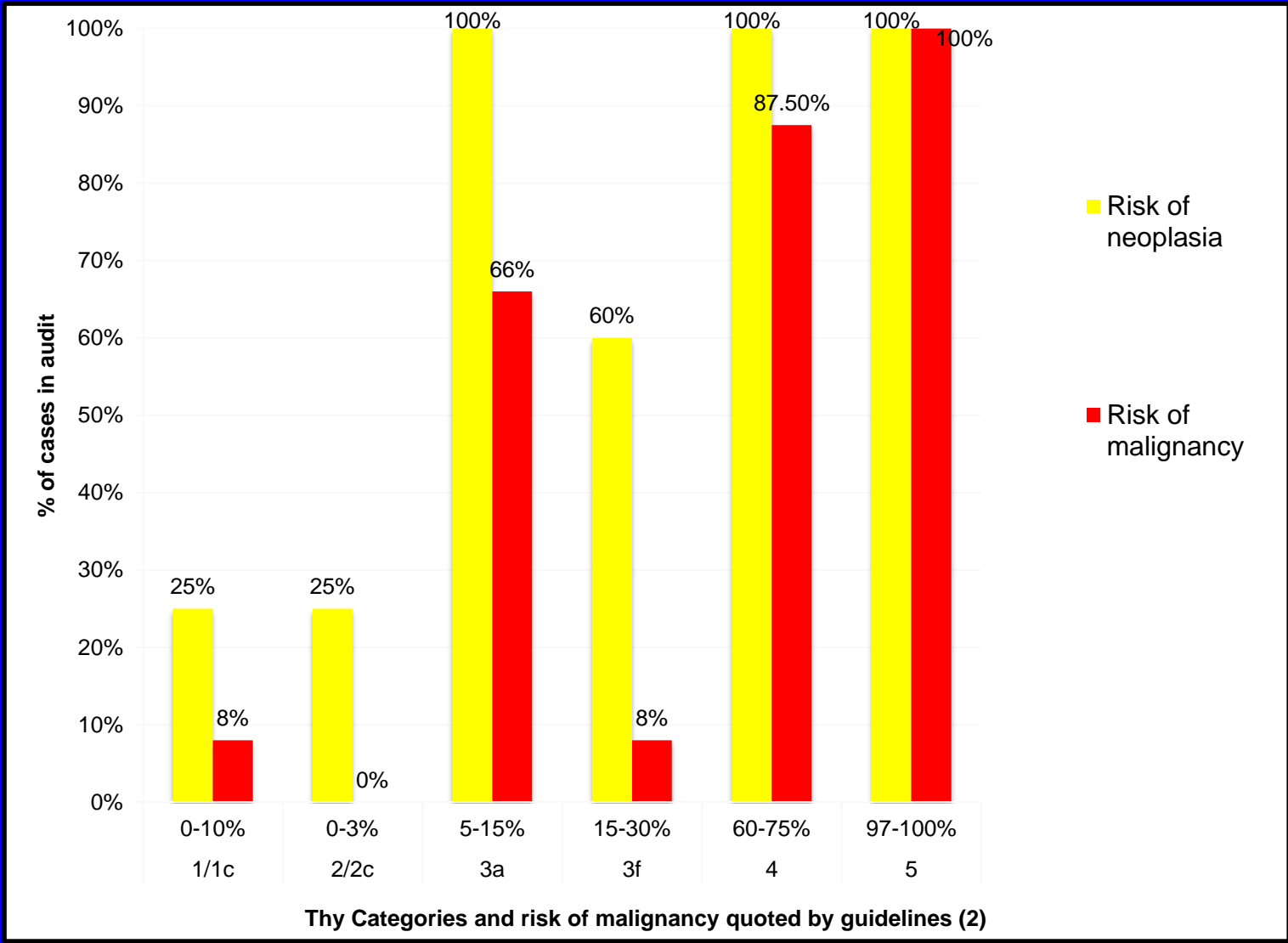
# Notes for table:

∞ 1 patient with a Thy 3a lesion was found to have a toxic thyroid nodule on scintigraphy and did not have histology performed at Derriford Hospital.

^6 patients with Thy 3f had no histology available. Medical notes reviewed:

- Medically unfit for surgery – n=2
- Patient choice – n=3
- Benign appearance on USS therefore interval USS performed with no change – n=1.

\*A 91 year old patient with a cytology result of Thy 5 had appearances suggestive of anaplastic carcinoma on cytology therefore no histology was obtained.



# Positive predictive values

PPV for neoplasia:

- Thy 5: 100%
- Thy 4: 100%
- Thy 3f: 60%
- Thy 3a: 100%

PPV for malignancy:

- Thy 5: 100%
- Thy 4: 87.5%
- Thy 3f: 7.9%
- Thy 3a: 66.6%

Thy 2 false negative rate: 0 / 8

# Conclusions

- Histology is still regarded as the gold standard for diagnosis of thyroid nodules.
- Accurate and appropriate use of thyroid cytology can be very helpful for the thyroid surgeon.
- We have achieved excellent positive predictive values for malignancy with low false negative rates.
- Cytology is reliable when used in conjunction with other diagnostic information and multidisciplinary discussion.