

# **Errors in Non- Gynaecological Cytology: Identification and Prevention**

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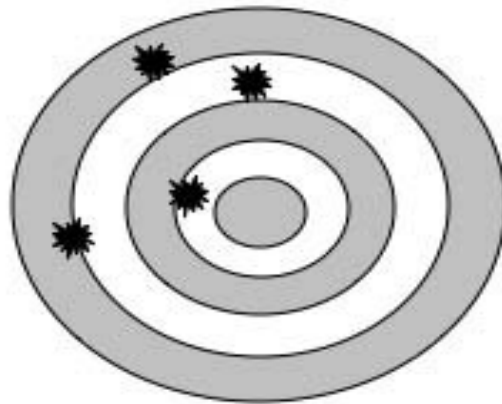
Symposium 5: Errors in Cytology and Medical-Legal Issues; 17<sup>th</sup>  
International Congress of Cytology 2010, Edinburgh  
May 19, 2010

# Definition of Error

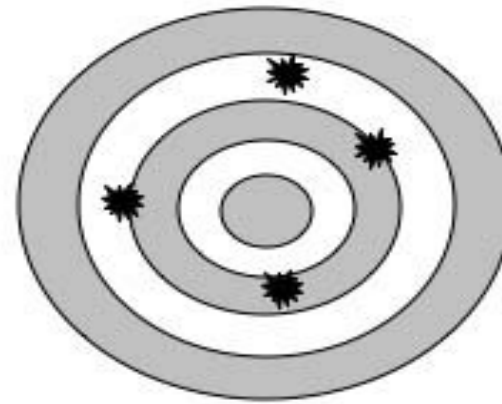
- ▶ Medical error is the failure of a planned action to be completed as intended or the use of a wrong plan to achieve an aim
- ▶ Medical errors permeate all levels of patient care

# Types of Error

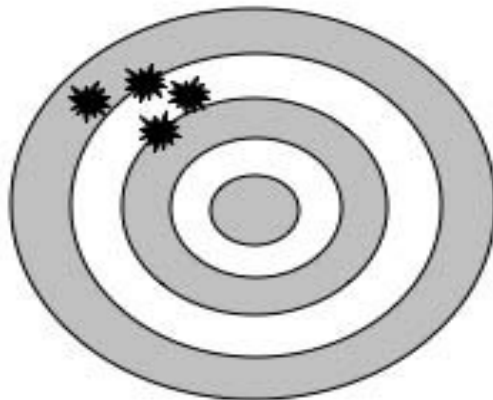
- ▶ Accuracy – comparison to the gold standard (i.e., correct diagnosis of disease or non-disease)
- ▶ Precision – closeness of repeated measures (diagnoses) to each other (i.e., variability in process)



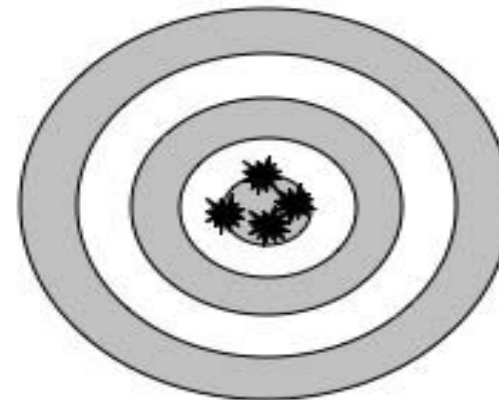
**Not Accurate  
Not Precise**



**Accurate  
Not Precise**



**Not Accurate  
Precise**



**Accurate  
Precise**

# Error Classification

- ▶ Testing phase
- ▶ Active versus passive
- ▶ Root cause
- ▶ Disease or care process (cancer or diabetes)
- ▶ Timeframe of detection (retrospective versus prospective)
- ▶ Method of detection (secondary review)
- ▶ Outcome

# Error Detection Methods

- ▶ Correlation
  - Cytologic-histologic correlation
  - Frozen (or touch preparation) versus final
- ▶ Amended report review
- ▶ Secondary review of cases
- ▶ Self-reporting
- ▶ Observation

# Frequency of non-gynecologic cytologic-histologic correlation discrepancies

Institution	Full Years Provided	Number of Discrepancies	Number of Cytology Specimen	% Discrepant
A	1998-2006	801	46083	1.74
B	2002-2003	253	16446	1.54
C	1998-2005	3526	83155	4.24
D	1998-2003	77	8114	0.95
F	2003	23	1800	1.28

# Correlating case error frequency

## Error frequency

Site	Gynecologic correlating %	Non-gynecologic correlating %
A	9.49	11.03
B	1.65	5.86
C	4.72	11.72
D	3.33	6.14

# Percentage of total discrepancy by specimen type

Organ	Institution						Total
	A	B	C	D	E	F	
Lung	42%	42%	27%	32%	18%	4%	30%
Bladder	22%	31%	18%	20%	48%	52%	20%
Breast	3%	3%	7%	9%	4%	0%	6%
Thyroid	0%	2%	5%	2%	5%	0%	4%
Total	67%	78%	57%	63%	75%	56%	60%

# Variability in assessing sampling versus interpretive error

Institution

Reason	A	B	C	D	Total
Interpretation	21%	11%	65%	4%	33%
Screening	2%	8%	4%	2%	5%
Sampling	61%	73%	38%	92%	60%
Unknown	18%	9%	0	3%	6%

# Cytologic-Histologic Discrepancy Non-Gynecologic Results

- ▶ 5,169 discrepancies from 6 project sites (discrepancies recorded from mid-1997 to early-2007)
- ▶ Higher discrepancy rates in the following organ types:
  - Lung – 30.2% of all discrepancies (~ 35% interp)
  - Bladder – 20% of all discrepancies (~ 41% interp)
  - Breast – 6.3% of all discrepancies (~ 35% interp)
  - Thyroid – 3.8% of all discrepancies (~ 31% interp)

# Root cause analysis

- ▶ Correlation
- ▶ Toyota 5 why's
- ▶ Modified Eindhoven

Part A.

Quality of specimen

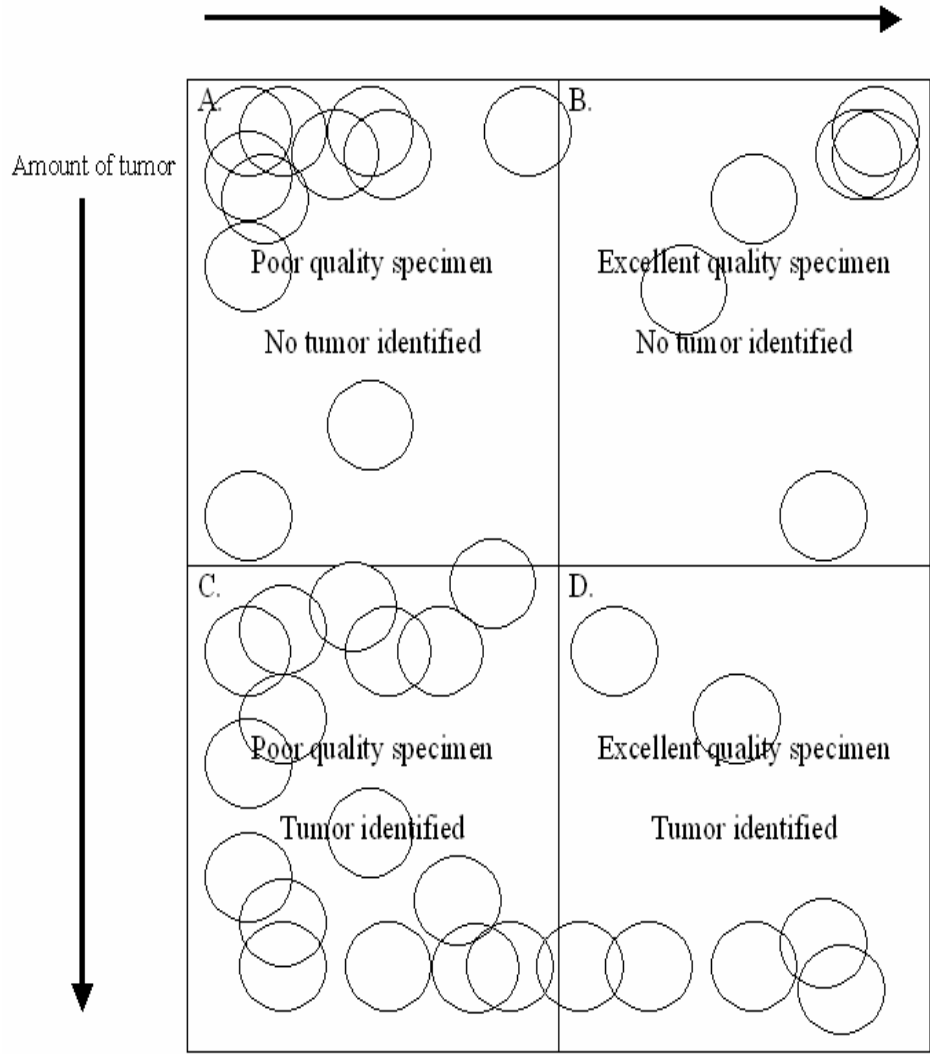


Amount of tumor

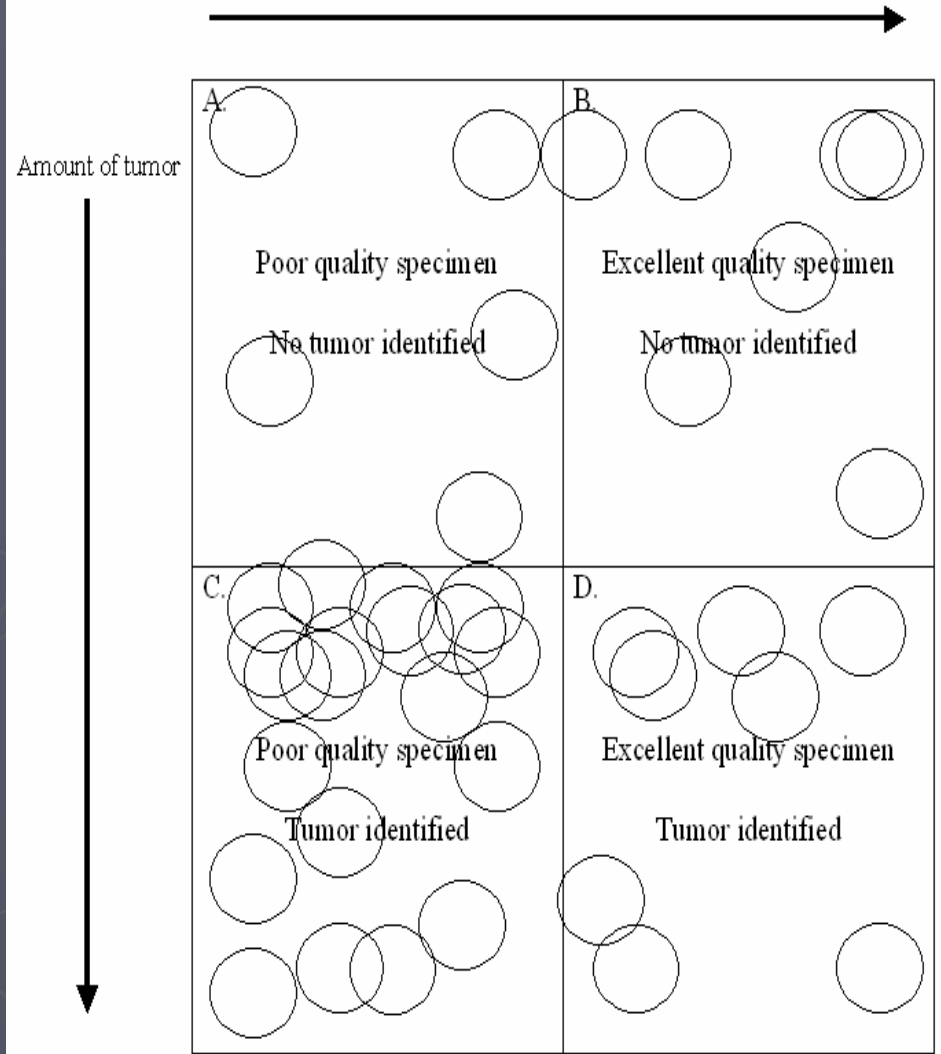


A.  Poor quality specimen  No tumor identified	B.  Excellent quality specimen  No tumor identified
C.  Poor quality specimen  Tumor identified	D.  Excellent quality specimen  Tumor identified

Part D. Quality of specimen



Part C. Quality of specimen



Category	Description	Code
<i>Latent errors</i>	Errors that result from underlying system failures	
Technical	Errors in physical items, such as equipment, physical installations, software, materials, labels and forms	
External	Technical failures beyond the control and responsibility of the investigating organization	TEX
Design	Failures due to poor design of equipment, software, labels, or forms	TD
Construction	Correct design was not followed accurately during construction	TC
Materials	Material defects not classified under TD or TC	TM
Organizational		
External	Failures at an organizational level beyond the control and responsibility of the investigating organization	OEX
Transfer of knowledge	Failures resulting from inadequate measures taken to ensure that situational or domain-specific knowledge or information is transferred to all new or inexperienced staff	OK
Protocols/procedures	Failures related to the quality and availability of the protocols within the department (too complicated, inaccurate, unrealistic, absent, or poorly presented)	OP
Management priorities	Internal management decisions in which safety is relegated to an inferior position in the face of conflicting demands or objectives. This error results from a conflict between production needs and safety (e.g. decisions about staffing levels)	OM
Culture	Failures resulting from collective approach to risk and attendant modes of behaviour in the investigating organization	OC
<i>Active errors (human)</i>	Errors or failures resulting from human behaviour	
External	Human failures originating beyond the control and responsibility of the investigating organization	HEX
Knowledge-based behaviours/ knowledge-based errors	Inability of an individual to apply existing knowledge to a novel situation	HKK
Rule-based behaviours		
Qualifications	Incorrect fit between an individual's qualifications, training, or education and a particular task	HRQ
Coordination	Lack of task coordination within a healthcare team in an organization	HRC
Verification	Failures in the correct and complete assessment of a situation, including relevant patient conditions and materials to be used before the intervention	HRV
Intervention	Failures that result from faulty task planning (selecting the wrong protocol) and/or execution (selecting the right protocol but carrying it out incorrectly)	HRI
Monitoring	Failures during monitoring of process or patient status during or after intervention	HRM
Skill-based behaviours		
Slips	Failures in performance of fine motor skills	HSS
Tripping	Failures in whole-body movements	HST
Other		
Patient-related factor	Failures related to patient characteristics or conditions that influence treatment and are beyond the control of staff	PRF
Unclassifiable	Failures that cannot be classified in any other category	X

Patients with a non-neoplastic thyroid gland nodule that is interpreted as neoplastic or non-definitive

Unsatisfactory Sample

Adequate Sample

extremely busy service

lack of immediate interpretation service

patient related factors

overinterpretation of specimen as neoplastic instead of unsatisfactory

interpretation of specimen as neoplastic

overinterpretation of specimen as neoplastic instead of unsatisfactory

overinterpretation of specimen as neoplastic instead of unsatisfactory

overinterpretation of specimen as neoplastic instead of unsatisfactory

rule-based or knowledge based error

rule-based or knowledge based error

clinician pressure to diagnosis as adequate

clinician pressure to diagnosis as adequate

lack of experience of cytologist

HRQ or HKK

HRQ or HKK

OM

OC

PRF and OK

# A3 Wiki

Title: Outside and Consult Slide Tracking Date: 2/18/09

Anatomical Path Area: Support / Office

Prepared by: Deb Driver: Soni

## Problem/Improvement Opportunity:

Accessioning outside slide cases:

- Information is not recorded in the consultation screen. (# slides, blocks, etc)
- Wrong addresses are typed into the gross dictation, which leads to slides sent to the wrong facility and then must be returned to us creating additional work.

Target Condition/Ideal State: Outside slides: the correct information is always recorded in Cortex. The correct information is typed into the gross dictation.

## Current Condition

Noted Errors- Outside Cases	
Timeframe	#
10/23/08- 1/16/09	44
Approximately	15 errors/month

### 5 Whys – Root Cause Analysis

Why is

Why

Why

Why

Why

**Impact Area (circle):** Cy Prep, Cy Screen, GR, Hist, Trans, Billing,

Cy Fac/Res, SP Fac/Res, Autopsy, IT

**Impact (circle):** Activities, Connections, Pathways

## Action Plan

Action	Responsibility	Deadline

## Experiment includes Metrics



Improvement Opportunity



# A3 Wiki

**Title:** Reduce delays in ordering special stains **Date:** 10/2/08  
in cytology

**Prepared by:** Barb P. and Jaime

## Problem/Improvement Opportunity

Special stains slides for cytology cases can be delayed.

## Current Condition

The resident will order stains by calling the cytolab or writing the order on the special stain sheet in the cytolab. Cytolab enters the request into Cortex. Delays can occur if the tech does not know of the phone call or entry on the stain order sheet.

5 Whys – Root Cause Analysis **Why are there delays in special stain slides?**

Why ? The order is not placed in time for the designated special stain run in Histology.  
Why? Cytology is the coordinator of the ordering of stains but is not the supplier of the special stains and does not have control on the special stain runs.

Why? Phone call is made to cyto. lab and lab does not get message in time for stain run in histology

Why ? Cyto lab does not get stain order into PC in time for special stain run in histology

Why? The order is place to cytology and not directly on line in Cortex.  
Why? The on-line stain ordering is not accessible to residents.  
Why? There is a problem with the on-line order system.

**Impact (circle):** Activities, Connections, Pathways

**Anatomical Path Area:** cytology

## Target Condition/Ideal State

Until the online stain order system works for resident, the resident and attending order special stains on line in cortex while reviewing slides. The ordering process can take place under the attending login. For delivery of slides to the resident enter "Give to resident" in the comment section

## Action Plan

Action	Responsibility	Deadline
Determine plan for instructing residents and attending pathologists on the cyto on-line stain ordering system	Barb Pope	10/06/08
Implement plan	Barb Pope	10/06/2008

## Experiment includes Metrics

# stains ordered via cyto stain order sheet should decrease

# Quality Improvement

- ▶ Systems
  - Lean
  - Six Sigma
  - Other
- ▶ Methods versus culture
- ▶ Academic development
  - Health services research
  - Grant funding
- ▶ Business development

# Approaching the problem

- ▶ Most errors have multiple causes and methods of improvement are meant to be tried and modified
- ▶ Choose to investigate and solve single problem
- ▶ Choose to redesign entire process
- ▶ Choose a mix

# Thyroid gland fine needle aspiration: current condition

- ▶ In the United States, over 300,000 FNAs are performed annually to rule out thyroid gland cancer
- ▶ Performance metrics (from literature)
  - Sensitivity: 57%-99%
  - Specificity: 90%-99%
- ▶ Despite high variability, thyroid gland FNA still is the primary diagnostic test for most cold nodules

# Thyroid gland FNA error

- ▶ Performed 2-year review of cytologic-histologic correlation error data from 1 institution
- ▶ The number of 2-step cytologic-histologic discrepant case pairs excluding and including the atypical diagnoses was 89 (24.5%) and 121 (33.3%), respectively
- ▶ By including the atypical diagnoses, 85 (23.4%) patients had a diagnostic undercall and 36 (9.9%) patients had a diagnostic overcall

# Thyroid gland FNA error

## ► Root cause analysis:

- Specimens are limited by a large amount of blood obscuring follicular cells and colloid
- Unsatisfactory specimens diagnosed as benign
- Little clinician-pathologist communication
- Variable use of diagnostic categories

# Process improvement

## ▶ Proposals:

- Create a criteria list for specific diagnoses
  - ▶ Ensure cytopathologists have the same meaning for each diagnosis
- Create a specimen adequacy scale
  - ▶ Create a *non-specific* category for interpretation (i.e., a poor interpretability category)
- Immediate interpretation
  - ▶ Improve radiologist and cytopathologist feedback

# Number of FNAs in pre and post-interventions categories

	Intervention			
	Standardization		Immediate interpretation	
	Pre	Post	No	Yes
Unsatisfactory	89	78	67	11
Non-specific	0	155	143	12
Benign	1,130	744	523	221
Atypical	126	43	37	6
Neoplasm	133	90	67	23
Malignant	46	49	33	16

# FNA performance characteristics in pre and post-interventions categories

	Intervention			
	Standardization		Immediate interpretation	
	Pre	Post	No	Yes
Sensitivity	70.2%	90.6%	90.0%	92.3%
Specificity	67.0%	55.1%	55.8%	52.9%
Non-interp	5.8%	19.8%	23.8%	7.8%
Surgery	23.6%	19.9%	20.8%	17.3%
Repeat FNA	12.7%	7.7%	9.5%	3.7%
Atypical	8.2%	3.7%	4.2%	2.0%

# Questions

