



Original article

Demographic and practice characteristics of pathologists who enjoy breast tissue interpretation



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ABSTRACT

Physician attributes, job satisfaction and confidence in clinical skills are associated with enhanced performance and better patient outcomes. We surveyed 252 pathologists to evaluate associations between enjoyment of breast pathology, demographic/clinical characteristics and diagnostic performance. Diagnostic performance was determined by comparing pathologist assessments of a set of 60 cases with consensus assessments of the same cases made by a panel of experienced pathologists. Eighty-three percent of study participants reported enjoying breast pathology. Pathologists who enjoy breast interpretation were more likely to review ≥ 10 cases/week ($p = 0.003$), report breast interpretation expertise ($p = 0.013$) and have high levels of confidence interpreting breast pathology ($p < 0.001$). These pathologists were less likely to report that the field was challenging ($p < 0.001$) and that breast cases make them more nervous than other types of pathology ($p < 0.001$). Enjoyment was not associated with diagnostic performance. Millions of women undergo breast biopsy annually, thus it is reassuring that although nearly a fifth of practicing pathologists who interpret breast tissue report not enjoying the field, precision is not impacted.

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Introduction

Research in many medical specialties has shown correlations between physician attributes, including job satisfaction and confidence in clinical skills, and better patient outcomes. For example, career satisfaction among physicians is associated with better adherence to medical treatments among their patients [1] and to higher patient satisfaction [2]. Radiologists who report high confidence in their ability to interpret mammograms have higher positive predictive values for diagnosing cancer compared to radiologists with lower confidence in their diagnostic abilities [3]. Conversely, a study among medical residency programs reported that depressed physicians had a medication error rate six times higher than their

non-depressed peers [4], while physicians with low career satisfaction report more difficulties in caring for patients [5].

Prior studies have not examined the relationship between pathologists' enjoyment of interpreting breast pathology and diagnostic precision. Diagnostic variation among individual pathologists has been clearly documented [6–8], but little is understood about sources of this variability. Because of the importance that pathologic diagnosis has on treatment decisions and patient outcomes, further investigation into potential causes for diagnostic variation is critical. An estimated 1.6 million breast biopsies are performed annually in the United States [9,10] heightening the importance of understanding variability. In this study we explored associations between enjoyment of breast interpretation, pathologists' demographic and clinical characteristics, and diagnostic performance using a sample of test set cases from actual patient breast biopsies. We hypothesized that pathologists who enjoy interpreting breast pathology will have higher diagnostic acumen compared to those who do not enjoy breast interpretation.

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Methods and materials

Human subjects protections

The Institutional Review Boards at the University of Washington, Dartmouth College, the University of Vermont, Fred Hutchinson Cancer Research Center, and Providence Health & Services of Oregon approved all study activities. We also obtained a study-specific Certificate of Confidentiality to protect study findings from forced disclosure of identifiable information. All procedures were HIPAA compliant and the two BCSC registries that provided tissue samples have a Federal Certificate of Confidentiality and a Memorandum of Understanding to protect the identities of women, physicians, and facilities contributing data to the Breast Cancer Surveillance Consortium (BCSC) [11,12]. Women enrolled in the registries provided prior consent allowing use of their archived tissue samples in clinical studies and research programs [11,13,15].

Study population

We invited a geographically diverse sample of pathologists who interpret breast tissue and practice in Alaska, Maine, Minnesota, New Hampshire, New Mexico, Vermont, Oregon and Washington to participate in the study. All pathologists practicing in these states who had been interpreting breast cases for at least one year before the start of the study and who planned to continue interpreting breast tissue for the next year were eligible. We excluded residents and fellows. We identified eligible pathologists through telephone calls to pathology laboratories, membership lists from professional organizations, Internet searches, or through their affiliation with the BCSC or Providence Health & Services Oregon.

Survey content

The pathologist survey took about 10 min to complete and assessed clinical experience, confidence and expertise in breast pathology, professional and academic affiliations, fellowship training in surgical and breast pathology, number of years interpreting breast pathology, and percentage of caseload devoted to breast specimens. Pathologists reported how challenging they find breast cases to interpret on a 6-point scale ranging from 1 ('very easy') to 6 ('very challenging'). Similarly, we assessed confidence in assessments of breast cases using a 6-point scale from 1 ('very confident') to 6 ('not confident at all'). Finally, pathologists rated their level of enjoyment of interpreting breast pathology "Interpreting breast pathology is enjoyable" using a 6-point Likert scale. For this analyses we collapsed the Likert responses into a binary outcome of enjoy breast pathology ('strongly agree,' 'agree,' 'somewhat agree') and do not enjoy breast pathology ('strongly disagree,' 'disagree,' and 'slightly disagree').

Agreement with the reference diagnosis

After completing the survey, participants were randomly assigned to independently interpret a test set of 60 breast cases in glass-slide-only or digital-slide-only format. A 3-member panel of pathologists with expertise in breast pathology previously interpreted each test set case to determine a consensus reference diagnosis [16]. Methods for test set development have been reported elsewhere [16]. In brief, 240 breast biopsy specimens were obtained from two BCSC registries, a collaborative network of five geographically distinct mammography registries with linkages to breast pathology and/or tumor registries [17]. Women aged 40–49 years and women with dense breast tissue were oversampled. There was a higher percentage of atypical ductal hyperplasia (ADH)

and ductal carcinoma in situ (DCIS) cases than would ordinarily be seen in routine clinical practice. Four final test sets were developed, each of which contained 60 unique patient cases.

Because the reference diagnoses were based on glass slide reviews only, we excluded the 137 pathologists who were randomized to interpret digital slides. Thus, the study sample for assessment of agreement with the references diagnosis included the 115 pathologists (of 252 or 46%) randomized to interpret glass slides.

Statistical analysis

Descriptive statistics were used to summarize level of enjoyment, and pathologist and practice characteristics. Each study participant's interpretation of a test set case was compared to the reference diagnosis to calculate under interpretation, over interpretation, and misclassification rates (under interpretation + over interpretation). Over-interpretation was defined as cases classified by the participants at a higher diagnostic category relative to the reference diagnosis; under-interpretation was defined as cases classified lower than the reference diagnosis [16]. Associations

Table 1

Characteristics of pathologists responding to the pathologists survey ($N = 252$), by self-reported enjoyment of interpreting breast pathology.

Participant characteristics	Interpreting breast pathology is enjoyable		<i>p</i> -Value ^b
	Agree ^a <i>n</i> (%)	Disagree ^a <i>n</i> (%)	
Total	208 (82.5)	44 (17.5)	
Demographics			
Age at Survey (yrs)			
30–39	24 (11.5)	8 (18.2)	0.19
40–49	70 (33.7)	17 (38.6)	
50–59	74 (35.6)	16 (36.4)	
60+	40 (19.2)	3 (6.8)	
Gender			
Male	132 (63.5)	27 (61.4)	0.79
Female	76 (36.5)	17 (38.6)	
Training & experience			
Fellowship training in surgical or breast pathology			
No	101 (48.6)	28 (63.6)	0.069
Yes	107 (51.4)	16 (36.4)	
Affiliation with academic medical center			
No	150 (72.1)	33 (75.0)	0.70
Yes	58 (27.9)	11 (25.0)	
No. Breast cases (per week)			
<5	41 (19.7)	16 (36.4)	0.003
5–9	87 (41.8)	22 (50.0)	
≥10	80 (38.4)	6 (13.6)	
Do your colleagues consider you an expert in breast pathology?			
No	159 (76.4)	41 (93.2)	0.013
Yes	49 (23.6)	3 (6.8)	
Breast pathology experience (yrs)			
<10	70 (33.7)	20 (45.5)	0.17
10–19	73 (35.1)	16 (36.4)	
≥20	65 (31.3)	8 (18.2)	
Perceptions about breast pathology			
How confident are you interpreting breast pathology?			
High confidence (1,2,3)	198 (95.2)	35 (79.5)	<0.001
Low confidence (4,5,6)	10 (4.8)	9 (20.5)	
How challenging is breast pathology?			
Easy (0,1,2)	105 (50.5)	9 (20.5)	<0.001
Challenging (3,4,5)	103 (49.5)	35 (79.5)	
Breast pathology makes me more nervous than other types of pathology			
No	135 (64.9)	8 (18.2)	<0.001
Yes	73 (35.1)	36 (81.8)	

^a Dichotomized responses for enjoyment are defined as Likert responses 'slightly agree', 'agree' and 'strongly agree' and no enjoyment defined as Likert responses 'strongly disagree', 'disagree' and 'slightly disagree'.

^b *p*-Value for agree vs disagree from the Chi-square test.

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