



Regular Article

Communicating uncertainty in pathology reports: a descriptive study from a specialized cancer center[☆]

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A B S T R A C T

Pathologists use certain terminologies to communicate uncertainty in pathology reports. The message conveyed in pathology reports may be interpreted differently by clinicians leading to possible miscommunication. We aimed to compare the interpretation and impact of uncertainty phrases between pathologists and clinicians. A survey with examples of uncertain diagnoses containing (“suspicious for”, “indefinite for”, “favor”, “cannot exclude”, “suggestive of”, “compatible with”, “cannot rule out”, “highly suspicious for” and “consistent with”) was sent to pathologists and clinicians. For each diagnosis, participants assigned a level of certainty from 1 to 10 and were asked whether they would recommend treatment based on such phraseology. Thirty-six responses (from 7 pathologists, 10 surgeons, 8 pediatric oncologists, 8 medical oncologists, 2 radiation oncologists and 1 diagnostic radiologist) were received. Pathologists had a narrower range of uncertainty compared to clinicians. Wide variation between both groups was seen for all phrases except “compatible with” and “highly suspicious for”. ‘Indefinite for’ showed the lowest mean of certainty (4.67 for pathologists; 4.00 for clinicians) whereas ‘consistent with’ had the highest (8.83 for pathologists and 9.38 for clinicians). There was a significant difference in the degree of certainty between both groups for “compatible with” (7.83 for pathologists and 9.06 for clinicians, $p = .009$). For treatment decisions, pathologists and clinicians agreed on initiating treatment when “consistent with” and “compatible with” were used and gave variable responses for the other terms. They proposed opposing treatment recommendations for “favor”. Pathologists and clinicians varied in interpretation of uncertainty phrases which may impact treatment.

Keywords: Communication, Diagnosis, Pathology, Uncertain phrases

Introduction

Uncertainty is an inherent part of practicing medicine. Communicating uncertainty is not only practiced between clinicians and patients but also between clinicians themselves. Diagnostic uncertainty in pathology might be related to variable preanalytical and analytical factors. Those may include inadequate tissue, lack of important clinical information, processing artifacts, ambiguous morphology or immunohistochemical staining results, limited experience with the diagnosis, vague clinical and diagnostic criteria and unavailability of specific diagnostic tools.¹ Surgical pathologists often use different phrases to communicate uncertainty in pathology reports. Pathologists use these phrases whenever they encounter a case that has some diagnostic challenges resulting in a variable degree of uncertainty in the final diagnosis. The use of such phrases is not meant to add ambiguity to the diagnosis but is a way to express some conservatism from pathologists toward rendering a more unequivocal diagnosis. On the other hand, clinicians who read diagnoses with such phrases might interpret the message differently than what is intended leading to possible miscommunication with pathologists. As a result, this may prolong the time needed for diagnosis by requesting

repeated biopsies with exposing patients to additional interventions, increasing medical expenses, potentially delaying treatment and causing dissatisfaction among clinicians and patients. It is understandable that absolute diagnostic certainty is not attainable in medicine. Nevertheless, clinicians (including pathologists) use every possible means to reduce the level of diagnostic uncertainty to obtain as much unequivocal diagnosis as possible before initiating treatment.²

Previous studies have shown the presence of wide variation in the level of uncertainty assigned to diagnoses containing phrases of probable certainty.^{3–6} A few of those studies pointed out the importance of unambiguous communicative language for providing optimal patient care. However, the impact of using such phrases needs further investigation. We believe that advancing this topic one step further by asking physicians about their intentions in treating patients after reading such diagnoses can offer some insight, and probably measurable observation, on the importance of this topic. Therefore, we aimed to evaluate the communicative language between pathologists and clinicians and to analyze how this might affect treatment decisions. Our ultimate goal is to identify potential gaps in this communicative activity and how this possible miscommunication can be minimized.

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Material and methods

An anonymous survey was sent to attending pathologists and non-pathologists in our center. The non-pathologists group (assigned as the clinician group) included 10 surgeons, 8 pediatric oncologists, 8 medical oncologists, 2 radiation oncologists and 1 diagnostic radiologist. The pathologists group included 7 pathologists. Participants were asked to determine the level of certainty they perceive when reading nine hypothetical clinical scenarios that are followed by a diagnostic line containing examples of phrases with an intrinsic degree of uncertainty. The phrases of uncertainty were “Suspicious for”, “Indefinite for”, “Favor”, “Cannot exclude”, “Suggestive of”, “Compatible with”, “Cannot rule out”, “Highly suspicious for” and “Consistent with”. The degree of perceived certainty was measured on a scale from 1 to 10 with 1 being the least certain and 10 being the most certain. The clinical scenarios are listed in Table 1. Participants were then asked to answer a yes or no question about their recommendation to initiate treatment based on such diagnosis. The clinical scenarios were constructed based on real cases that had discussions between pathologists and clinicians during multidisciplinary clinics and telephone conversations. The range of assigned certainty for each phrase was recorded. The mean certainty level for each phrase was calculated. Results were compared between pathologists and clinicians using one-way ANOVA. Statistical analysis was performed using the SPSS 26 software. The categorical questions were compared using chi-square test and a *p* value of $\leq .05$ was considered statistically significant. The study was reviewed and approved by the institutional review board in our center.

Results

Seven attending pathologists and twenty-nine attending non-pathologists answered the survey for a total of thirty-six responses. The ranges of uncertainty assigned for all terms in both groups are shown in Fig. 1A and B. In general, the range of perceived uncertainty was narrower for pathologists compared to clinicians. The widest range of uncertainty among pathologists was for “highly suspicious for”, “cannot exclude” and “suspicious for”. As for clinicians, the widest range of uncertainty was for “cannot rule out”, ‘suggestive of’, “cannot exclude”, “favor”, “indefinite for”, and “suspicious for”. There was wide variation between both groups for all phrases except for “compatible with” (6 to 9 for pathologists and 6 to 10 for clinicians) and “highly suspicious for” (4 to 9 for pathologists and 5 to 10 for clinicians). An example of this variation is the phrase “indefinite for” which had a level of certainty that ranged from 4 to 5 for pathologists while it had a 1–8 range of certainty

Table 1

The hypothetical clinical scenarios used in the survey with diagnoses containing uncertainty phrases.

Phrase used	Clinical scenario
1 Suspicious for	Bone, left femur, biopsy: Atypical bone forming tumor, suspicious for osteosarcoma.
2 Indefinite for	Colonic mass, biopsy: Superficial fragments of high grade dysplastic epithelium, indefinite for submucosal invasion
3 Favor	Stomach, biopsy: Atypical lymphoid cells infiltrate, favor MALT lymphoma.
4 Cannot exclude	Lung, bronchio-alveolar lavage, cytology: Fungal microorganisms present, cannot exclude aspergillus spp.
5 Suggestive of	Mediastinum, biopsy: Atypical large cells present in a fibrotic background, suggestive of involvement by Hodgkin's lymphoma.
6 Compatible with	Left lung mass, biopsy: Feature are compatible with small cell carcinoma
7 Cannot rule out	Pancreatic mass, biopsy: Atypical glands preset, cannot rule out adenocarcinoma.
8 Highly suspicious for	Urinary bladder, TURBT: High grade papillary urothelial carcinoma, highly suspicious for muscularis propria invasion.
9 Consistent with	Stomach, biopsy: Features are consistent with graft versus host disease.

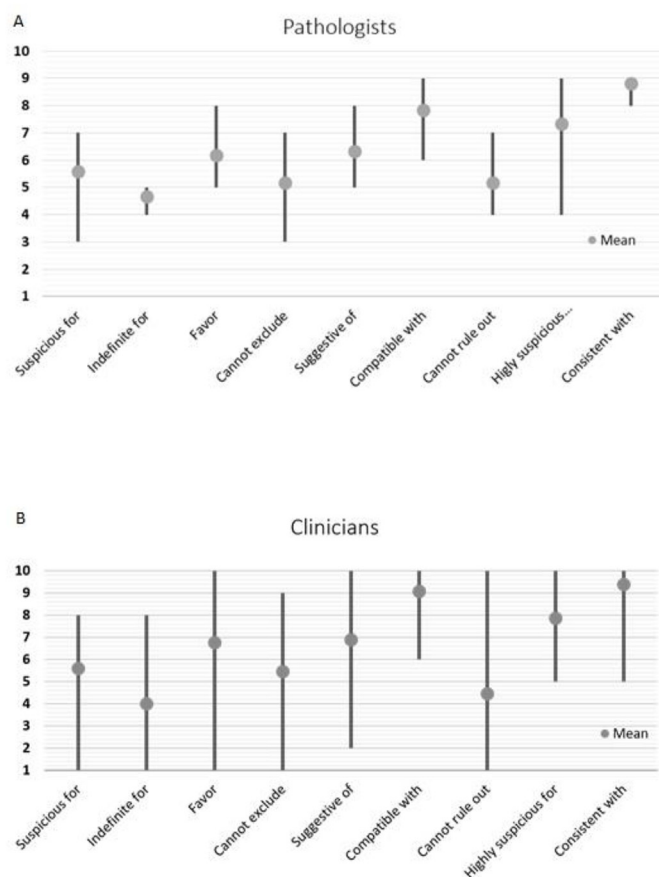


Fig. 1. A) Ranges of perceived certainty for phrases used in the pathology reports for attending pathologists. B) Ranges of perceived certainty for phrases used in the pathology reports for attending clinicians.

for clinicians. However, the mean level of certainty between both groups showed close results. When comparing the mean level of assigned certainty between all phrases, the terms “indefinite for”, “suspicious for”, “cannot exclude” and “cannot rule out” showed the lowest mean of certainty (4.67 vs 4.00, 5.17 vs.5.59, 5.17 vs.5.46, 5.17 vs.4.46, for pathologists versus clinicians, respectively). The highest mean of certainty was seen when “compatible with” and “consistent with” were used (7.83 vs.9.07, 8.83 vs.9.38 for pathologists versus clinicians, respectively). Statistical significance in the interpretation of “compatible with” (*p* = .009) was found between both groups, see Table 2. For this phrase, the assigned score of certainty given by clinicians was higher compared to pathologists suggesting that clinicians were probably more certain regarding the diagnosis when this phrase was used.

Table 2

p values for perceived certainty and therapy recommendation for attending pathologists and other clinicians.

	Pathologists vs clinicians	
	<i>p</i> value of perceived certainty	<i>p</i> value for initiation of therapy
Suspicious for	.63	.16
Indefinite for	.43	.60
Favor	.48	.08
Cannot exclude	.74	1
Suggestive of	.51	.66
Compatible with	.009	Not applicable
Cannot rule out	.46	1
Highly suspicious for	.43	.60
Consistent with	.23	1

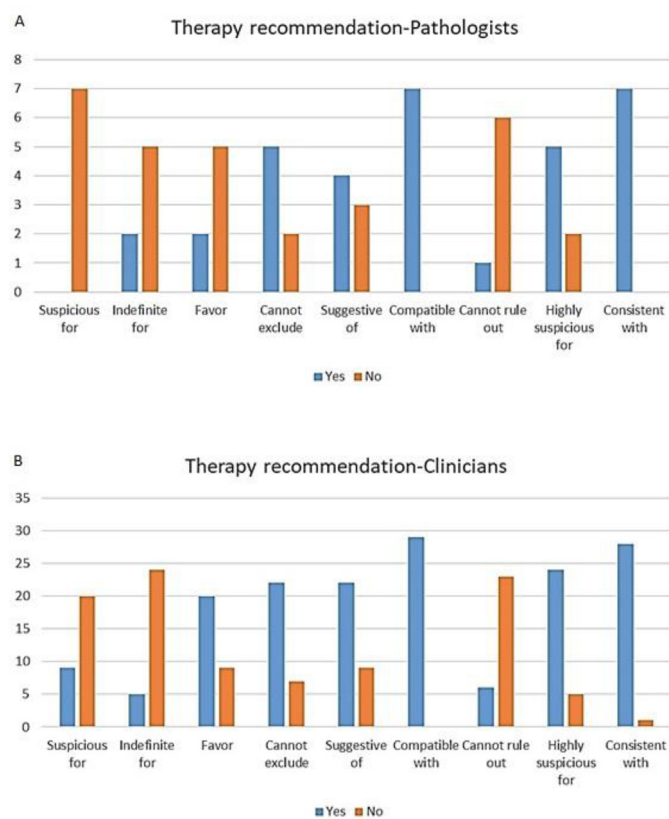


Fig. 2. A) Therapy recommendations for diagnoses containing phrases of uncertainty for attending pathologists. B) Therapy recommendations for diagnoses containing phrases of uncertainty for attending clinicians.

When participants were asked about recommending treatment plans after making/reading a diagnosis using uncertainty phrases, variable responses were noticed, see Fig. 2A and B. Pathologists recommended initiating treatment when “consistent with” and “compatible with” were used and did not recommend treatment when “suspicious for” was used. Similarly, clinicians recommended treatment for “consistent with” and “compatible with”. Regarding the other phrases, mixed responses were observed. For example, almost half of the clinicians recommended initiation of therapy when “suspicious for” was used compared to none in the pathologists group. In addition, most respondents in both groups differed in their recommendation for “favor”. Despite the variation seen in the responses, statistical significance was not obtained.

Discussion

Uncertainty is prevalent in all aspects of medicine.⁷ Despite this fact, physicians are taught that they can (and must) manage disease, control patient behaviors and are expected to provide the right answer.^{8,9} In recent years, medical knowledge has grown exponentially but also the amount of uncertainty grew beside it as a *de facto*. Uncertainty is not only encountered in patient care but also extends to research and medical education which is an underappreciated component of the practice and teaching of medicine.⁷ Evidence has shown that acknowledging uncertainty strengthens clinician-patient relationship which leads to better patient engagement and enhances shared decision making.^{10,11} Uncertainty in pathology, as in other branches of medicine, is not uncommon. Pathologists frequently encounter cases and situations where uncertainty is present. As far as they try to narrow the level of uncertainty in their reports, the conveyed message might be interpreted in a different way than what was intended. Similar to previous studies, our results showed the presence of wide variation in the range of assigned certainty between

pathologists and clinicians when they interpret diagnostic lines containing uncertainty phrases.^{1,3-5} The variation may not only vary between pathologists and clinicians but also between pathologists themselves^{3,5} and between clinicians from different specialties.^{3,4,6} This variation is not only present across the level of training or specialty, but also depends on the implication of the diagnosis and pathologists’ prior experience.¹² Moreover, Gibson et al. found that this variability is preserved across broad geographic and practice regions, as shown in their study which involved three large-territory academic medical centers in the USA.¹³ In fact, our study supports the latter point. Most of the current literature on this topic is derived from studies performed in the USA or the United Kingdom. In our study, we have shown that the variability in interpreting uncertain diagnostic phrases also applies to the practice of pathology on the international level which points to the universality both of pathology practice and communication of uncertainty in pathology.

Some of our findings were similar to those reported by others in terms of highest range of assigned certainty and the absence of significant difference in the level of assigned certainty between pathologists and clinicians for certain terms such as “consistent with” and “compatible with”. On the other hand, other commonly used phrases showed variable levels of uncertainty between pathologists and clinicians.^{1,6} We noticed the presence of a wider range of uncertainty among clinicians compared to pathologists for most of the used terms. For example, some clinicians interpreted the phrases “cannot rule out” and “favor” to be as certain as 10 and as uncertain as 1. This likely indicates the presence of a significant difference in the interpretation of some of those phrases and raises several points. Effective and clear communication between pathologists and clinicians is probably lacking despite being an essential element in providing optimal healthcare. Most of the phrases we used in this study showed wide ranges of uncertainty reflecting the ambiguity, and probably the confusion, that these terms create for clinicians interpreting diagnoses containing these uncertain phrases. Pathologists should try as much as possible to avoid using ambiguous terminologies in the diagnostic line. We believe that some phrases might be overused or probably misused by pathologists. For example, diagnostic lines such as “non-small cell lung carcinoma consistent with adenocarcinoma” should be strictly used according to recent guidelines and should not be used simply to describe a tumor with a clear morphologic pattern of adenocarcinoma.¹⁴ On the other hand, clinicians are advised to follow up with pathologists in case they perceive some degree of uncertainty in the diagnosis. Discussing the case in tumor boards or simply over the phone may clarify possible ambiguity or misunderstandings.

It is understandable that initiation of therapy is subject to many factors and is not solely based on interpreting pathologic diagnoses. Nevertheless, we opted to study trends in recommending therapeutic plans following reading clinical scenarios with specific diagnoses that contain phrases of uncertainty. Although we did not find statistical significance in recommending initiation of therapy between both groups, some important observations can be noted. In general, pathologists were more hesitant to recommend initiation of treatment when they used uncertainty phrases. Most pathologists recommended not to treat patients when they used “favor” compared to clinicians, ($p = .08$, close to significance). In addition, all pathologists preferred not to initiate treatment when “suspicious for” was used compared to almost half of the clinicians who preferred to treat. Both groups almost completely agreed on initiating therapy when “consistent with” and “compatible with” were used, this may indicate a high level of understood certainty when using/reading those phrases. Interestingly, although the phrases “cannot exclude” and “cannot rule out” apparently carry the same meaning, they had opposite treatment recommendations. When “cannot exclude” was used, most pathologists and clinicians agreed to initiate therapy whereas they did not when “cannot rule out” was used. This can be possibly explained by the presence of other factors that may have affected the clinical decision. In our hypothetical case scenario for those two phrases, the benefit/risk of the treatment plan might have affected the clinical decision. It is very likely that clinicians would have better clinical

judgment regarding a specific case if they were aware of the clinical context, had discussions with pathologists or understood the significance of the performed ancillary tests and their results. We also did not include a free text comment section in our hypothetical scenarios that would explain the rationale behind using such terminology. The variability in clinicians' and pathologists' recommendations suggests that uncertainty phrases are probably understood differently among individuals and may affect treatment decisions. It is clear that the more confident clinicians are with the diagnosis, the more comfortable they will be in treating patients. This is especially important for certain groups such as cancer patients. As for pathologists, hedging the diagnostic line and adding a free text comment help them explain why a specific diagnosis carries some degree of uncertainty. Pathologists understand the implications of assigning diagnoses and would prefer to be as much confident as possible before signing out their reports. They are increasingly aware of the medico-legal consequences they may face especially in this modern era of practicing medicine. Some opinions postulate that including such phrases in pathology reports might be overused by pathologists to minimize possible legal consequences in relation to misdiagnosis.⁴ However, this should not be used as an excuse for overusing these terms.

There are some limitations of this study. We tried to measure the uncertainty level that each phrase carries by asking participants to assign a numerical value to describe their understanding of the diagnosis. Translating the level of uncertainty for ambiguous phrases into discrete numerical probability is difficult.⁴ In addition, we understand that different people might have different understandings of ambiguous terminologies or phrases. For example, how would a level 2 of certainty differ from level 4? Or what is the cut-off value that convinces a group of clinicians to initiate therapy and others not? This can be theoretically solved by assigning predefined levels of uncertainty for each phrase used in the report. However, it is difficult to derive different definitions of uncertainty for those phrases, not only because guidelines on the use and interpretation of ambiguous terminologies are absent, but also because it seems difficult to develop such guidelines.^{4,15} Despite this, discussing the terms with clinicians to reach a mutual understanding for those terms can enhance the communicative language between both groups. For example, broadly dividing those terms into two groups; one with phrases implying a high level of certainty and the other implying a low level of certainty, may offer guidance to clinicians and may help decrease the use of such phrases by pathologists. In their work, Atanoos et al. studied thirteen descriptive phrases that were most used among 300 randomly selected pathology reports and divided them into two groups; definitive (containing phrases such as "diagnostic of", "characteristic of") and non-definitive (such as "consistent with", "favor", "suspicious of") and asked participants to assign certainty level to them. They recommended the adoption of a limited number of descriptive phrases that were acceptable for both groups to avoid interpretive ambiguity in pathology reports.⁴ Another limitation is the nature of our practice and the demographics of our patients. All participants were from a single specialized cancer center. Given the specificity and complexity of cancer cases, pathologists and clinicians might practice more conservatism in diagnosing and treating this group of patients. For pathologists, this might lead to unnecessary overuse of uncertain phrases in their reports. For clinicians, initiation of therapy might be delayed until more confirmation of the diagnosis is obtained. It would be interesting to study the implication of using such terminologies in a larger sample with different levels of practice and variation in patient populations. In addition, we think the relatively small and unequal number of participants in both groups may have affected the statistical calculations and impacted the power to obtain statistical significance. Other factors that should be also considered are the participants' level of medical experience and their proficiency in the English language.

To minimize such variability in the understanding of such terminologies, some points can be considered. Cases that contain uncertain phrases can be peer-reviewed or seen in consultation where more than one pathologist should review the case and consensus on the wording of the diagnosis is obtained. Junior pathology trainees can benefit from

structured training on how to phrase such diagnoses and how to better communicate the findings. Clinicians, on the other hand, can benefit from focused group discussions where they are trained on how to interpret the diagnosis in the context in which they were phrased to minimize the variability between what is intended and what is understood. For example, introducing a key in the pathology report explaining the relative level of certainty that each phrase carries can be useful.³ Statements such as "Regarding diagnostic certainty, phrases are used in the following order to describe how certain a diagnosis is; consistent with > suspicious for > suggestive of "can be added as a footnote in the pathology report. Typically, the use of such an approach needs selecting a limited number of uncertainty phrases that are endorsed and agreed upon by pathologists and clinicians in the same medical practice. The use of common and consistent terminology in communicating uncertainty and clarifying measures of individual differences in response to uncertainty were also some of the recommendations suggested by Simonovic et al. to minimize the effect of uncertainty in health practice.¹⁶ Although standardizing surgical pathology reports can seem a difficult task, some guidance and insight might be learned from cytopathology practices which developed few systems to standardize the reporting language in cytopathology. The "Bethesda System for Reporting Cervical Cytology" and the latest "International Academy of Cytology Yokohama System for Reporting Breast Fine-Needle Aspiration Biopsy Cytopathology" are some examples where standardized diagnostic terminologies are used and can serve as starting models in this field.

Conclusion

It is evident that good and effective communication between pathologists and clinicians is an integral part in practicing medicine according to the highest standards of care. In this study, we showed that pathologists and clinicians can vary widely in their understanding of diagnoses containing phrases of uncertainty. We identified potential gaps between what pathologists send in their reports and what clinicians receive as information. Understanding these trends may guide pathologists to modify the diagnostic phraseology to minimize the effect of a potentially significant source of miscommunication. This may also serve as a quality assurance method in pathology practice. The goal is to improve the quality of care offered to patients.

Author contribution

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Declaration of competing interest

The authors declare that there are no competing interests.

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