



Can a bronchoscopist reliably assess a patient's experience of bronchoscopy?

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DECLARATIONS

Competing interests

None declared

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Summary

Objectives Bronchoscopy is an essential investigative tool in many respiratory complaints. The procedure can be unpleasant for both bronchoscopists and patients. To the best of our knowledge, there are only a few studies that correlate the bronchoscopist's satisfaction with that of the patient's during bronchoscopy. The aim of our study is to assess whether or not a bronchoscopist could reliably assess a patient's satisfaction during bronchoscopy.

Design Cross-sectional, observational study with convenience sampling.

Setting Patients attending flexible fiberoptic bronchoscopy appointments at the bronchoscopy suite, Respiratory Unit, Universiti Kebangsaan Malaysia Medical Centre (UKMMC), Cheras, Kuala Lumpur, Malaysia between March and September 2006.

Participants Sixty patients undergoing bronchoscopy over a 6-month period completed a questionnaire after the procedure. All patients received standard pre-medication with intravenous midazolam.

Main outcome measures Bronchoscopists and patients rated the level of satisfaction of the procedure using a 10 cm visual analogue scale (VAS). Lower scores indicated better satisfaction or less discomfort. Patients and bronchoscopists also rated coughing, choking and vomiting perception using the same 10 cm VAS. Reliability analysis (intra-class correlation coefficient [ICC]) was used to analyse the correlation between patients' and bronchoscopists' VAS scores.

Results All 60 patients answered the questionnaire. The median overall satisfaction scored by bronchoscopists was 2.2 (2.0) with a non-significant ($p = 0.880$) trend to a better median overall satisfaction of 1.9 (2.3) scored by patients. The VAS scores for cough sensation were 1.9 (2.7) and 1.5 (5.0), respectively. There was positive correlation between bronchoscopists' and patients' VAS scores for coughing sensation

($p = 0.047$, $ICC = 0.233$). No significant correlation for overall satisfaction, vomiting sensation and choking sensation was found.

Conclusion Positive correlation for cough perception suggested that the bronchoscopist could reliably assess the degree of cough discomfort patients experience during bronchoscopy.

Introduction

Flexible fiberoptic bronchoscopy (FFB) is a common diagnostic and therapeutic modality widely used by chest physicians around the world. It is safe and associated with very few serious adverse events.¹ It has also achieved a remarkable record of safety in a broad spectrum of patients with a variety of clinical problems.² Unfortunately, it can cause dysphagia, nose pain, throat pain, cough and fear.³⁻⁶ Despite these, the overall satisfaction and willingness of patients to return for a FFB in community practice has been shown to be extremely high and were independent of diagnostic procedures performed.⁷

Contemporary healthcare measures recognize patient satisfaction as an important outcome.⁸ Current literature on patient satisfaction towards FFB have mainly focused on comparing satisfaction using different methods of applying local anaesthesia during the procedure.⁹⁻¹¹ Some studies were performed to compare the effect of sedation towards suppression of cough reflex and patient satisfaction.^{12,13} The majority of these studies used a patient and bronchoscopist visual analogue scale (VAS) score of satisfaction or tolerance as measurement for satisfaction and efficacy of FFB. Graham *et al.*⁹ measured patient VAS score for choking, vomiting and coughing in their assessment of patient tolerability towards the various local anaesthetic agents and the different techniques for their application. Numerous investigators have demonstrated reliability and validity of VAS for clinical studies. The reliability of the instrument has been demonstrated by the test-retest method.¹⁴

There have been previous studies that had specifically assessed patients' satisfaction following FFB,^{7,15,16} but to the best of our knowledge there had only been one that assessed the reliability of the bronchoscopist at predicting patients' satisfaction following the procedure. That study¹⁷ attempted to compare patients' ratings of discomfort with the ratings estimated by medical

personnel performing the procedure but the subjects in the study were not standardized. They were divided into three different groups based upon their different pre-medicated conditions.

In the increasingly competitive healthcare environment, consumers and healthcare administrators have realized that patient satisfaction is an important goal.⁸ Therefore, it will be very helpful if we could reliably assess patient's satisfaction of the procedure as this would allow the bronchoscopist to adjust in realtime to adapt to the varying level of discomfort for the patients as they undergo the procedure. This study is, therefore, designed to see if bronchoscopist could reliably assess patients' satisfaction during bronchoscopy.

Material and methods

Sixty patients undergoing FFB were recruited from the bronchoscopy suite of Universiti Kebangsaan Malaysia Medical Centre (UKMMC), Cheras, Kuala Lumpur, Malaysia between March and September 2006. Convenience sampling was utilized and the study was approved by the Medical Research and Ethics Committee of the institution. All FFBs were performed on an elective basis using an Olympus CV-200 bronchoscope (Shirakawa Olympus Co. Ltd., Tokyo, Japan). The patient selection criteria included those who were older than 18 years and able to give signed, informed consent. We excluded those who were illiterate and could not give informed consent or answer the questionnaire. Patients with a known allergy to lignocaine were also excluded. Emergent bronchoscopy procedures were not included in this study. Four bronchoscopists, each with more than 2 years of experience in bronchoscopy, were involved in the study.

Blood pressure and body weight were recorded before the procedure. Oxygen saturation and pulse rate were recorded at baseline and monitored throughout the procedure. Lignocaine

spray (Xylocaine) 10% (Egis Pharmaceutical Ltd., Budapest, Hungary) was applied five times to the oropharynx and approximately 5 ml of lignocaine gel 2% (Pharmacia & Upjohn, United Kingdom) was administered into the nasal cavity where the bronchoscope would be introduced. All patients received supplemental oxygen at 2–5 L/min via a nasal cannula.

Visual analogue scale and cough assessment

A few minutes before bronchoscopy, a bolus of 1–2 mg intravenous (IV) midazolam was given followed by further 1–2 mg IV midazolam boluses which were administered during the procedure at the bronchoscopist's discretion. The total amount of midazolam given was in the range of 0.035–0.070 mg/kg body weight, depending upon patient clinical condition and bronchoscopist's clinical judgment. Lignocaine solution was given through the bronchoscope using the 'spray as you go' technique using 2 ml aliquots each time. Bronchoscopists were given the liberty to give up to a maximum total of 25 mls of lignocaine 2% to each patient according to their body weight, as long as they could perform the procedure comfortably and effectively and to alleviate patients' discomfort that they detected. All bronchoscopic procedures performed were documented during the study.

Immediately after bronchoscopy, the bronchoscopist was given the VAS of satisfaction and comfort to assess patient's tolerance to the procedure. VAS score of satisfaction and comfort had been widely used for evaluation of the use of sedation and local anaesthesia in bronchoscopy in various studies and showed good short-term reproducibility.^{9–11,13} Once the patients were fully alert and conscious (usually after 2 hours), we recorded their tolerability for the procedure using VAS to assess their satisfaction and comfort. The VAS of satisfaction and comfort in this study was depicted on a 10 cm horizontal straight line. The end anchors of the scale were labeled as extreme boundaries of the sensation being evaluated. The overall satisfaction score to the examination on VAS (0 = Very satisfactory; 10 = Totally unsatisfactory) as well as three specific sensations; vomiting, choking and cough

(0 = Very tolerable; 10 = Most unpleasant or awful) were scored independently by patients and bronchoscopists. High scores indicated an unfavourable response.

The number of cough episodes was recorded using the digital recorder. The patient's recording was analysed by the primary investigator alone to avoid bias. A single cough was defined as an expiratory sound of varying lengths that started abruptly and frequently that occurred several times in a single breath. A digital voice recorder (Sanyo ICR-B34T, Tokyo, Japan) recorded the number of coughs via a microphone attached to the patient's hospital gown. The intensity of cough was not assessed due to its subjectivity. The recorded cough episodes gave us a more objective measurement.

Statistical analysis

Data analysis was performed using the Statistical Package for Social Sciences, version 12.0 (SPSS Inc, Chicago, IL, USA), and a *P* value of less than 0.05 was considered statistically significant. Two-tailed Pearson Chi-square (χ^2) test or Fisher's exact test was used to analyse categorical variables and numerical data were expressed as mean \pm standard deviation (SD). Non-normally distributed data were subjected to non-parametric tests and median was used as a central measure with inter-quartile range (IQR). Spearman correlation coefficient, r_s , was used for correlation between the number of cough and the various VAS scores. Reliability analysis was performed to determine the correlation between patient and bronchoscopist VAS scores. *P* value of <0.05 was considered as statistically significant and a value of intra-class correlation coefficient (ICC) or Spearman correlation coefficient, $r_s \geq 0.8$ was considered as a strong positive correlation.

Results

Sixty patients were recruited and all successfully completed the study without any complications. The mean age and body weight were 57.6 ± 13.6 and 53.4 ± 11.2 kg, respectively. Other demographic parameters, duration of bronchoscopy, the total amount of lignocaine 2% solution and

Table 1
Patients' baseline characteristics, bronchoscopy duration, amount of lignocaine 2% solution and midazolam used, and total number of cough

	Total number of patients (n = 60)
Age (mean ± SD)	57.6 ± 13.6
Gender	
Men	36 (60%)
Women	24 (40%)
Race	
Malay	21 (35%)
Chinese	34 (56.7%)
Indian	5 (8.3%)
Body weight, kg (mean ± SD)	53.4 ± 11.2
Duration of bronchoscopy (mins)	24.2 ± 11.2
Total volume of lignocaine (mL)	17.8 ± 4.4
Total midazolam dose (mg)	2.0 ± 0.7
Total number of coughs	283 ± 182

midazolam used, and total number of coughs were shown in Table 1.

The VAS score for overall satisfaction, coughing, choking and vomiting sensation for both

bronchoscopists and patients were shown in a box plot form in Figure 1 and expressed as median (inter-quartile range) as the data were not normally distributed. The VAS scores for overall satisfaction were 2.2 (2.0) and 1.9 (2.3) for bronchoscopists and patients, respectively. VAS scores for cough sensation, choking sensation and vomiting sensation are summarized in Figure 1 and Table 2. Both bronchoscopists and patients reported higher VAS scores for cough perception than other variables.

Reliability analysis was performed to determine the correlation between bronchoscopist and patient VAS scores. There was a significant difference noted in the VAS scores for coughing sensation between the two groups ($P = 0.047$). The median VAS score for patients was lower than bronchoscopists. However, it was not a strong positive correlation (intra class correlation, ICC = 0.233). There was no correlation between bronchoscopists and patients with regards to VAS score for overall satisfaction and sensations of vomiting and choking. All the ICC values for the various VAS scores were low, indicating very poor correlation between patients' and bronchoscopists'. Table 2 summarizes the results above.

Figure 1
Comparison between the VAS scores of bronchoscopists and patients for the various assessment after the procedure. VAS = visual analogue scale

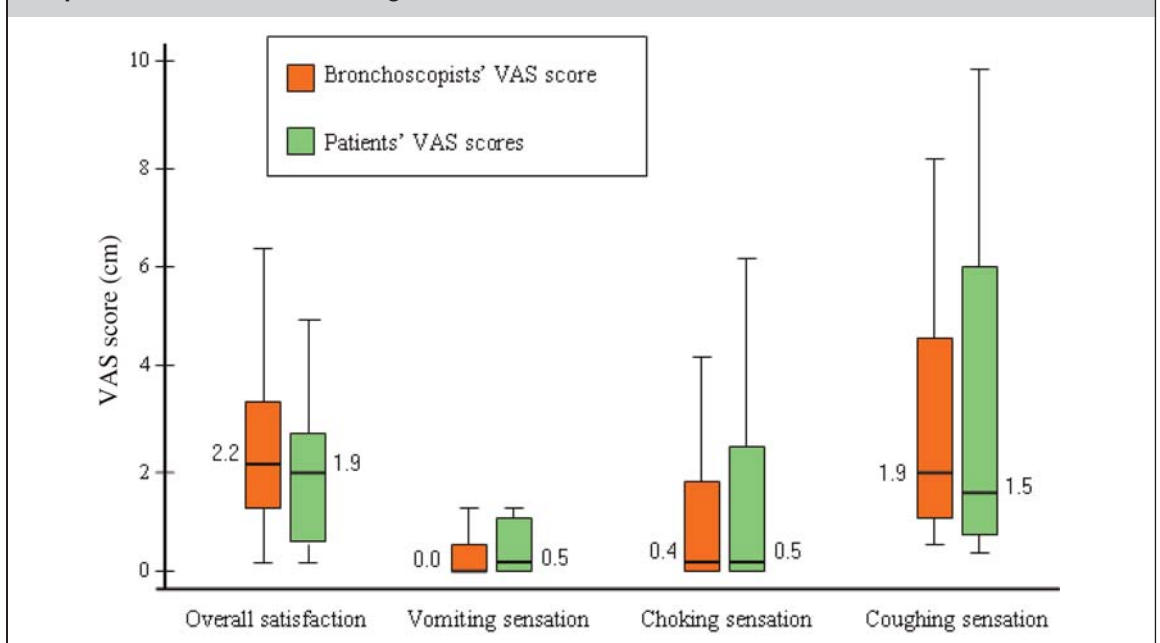


Table 2
Results of reliability analysis for the correlation between patients' and bronchoscopists' VAS score

		ICC value	P value
VAS score for overall satisfaction	Bronchoscopists Patients	0.135	0.830
VAS score for coughing sensation	Bronchoscopists Patients	0.233	0.047*
VAS score for vomiting sensation	Bronchoscopists Patients	0.474	0.368
VAS score for choking sensation	Bronchoscopists Patients	0.051	0.360

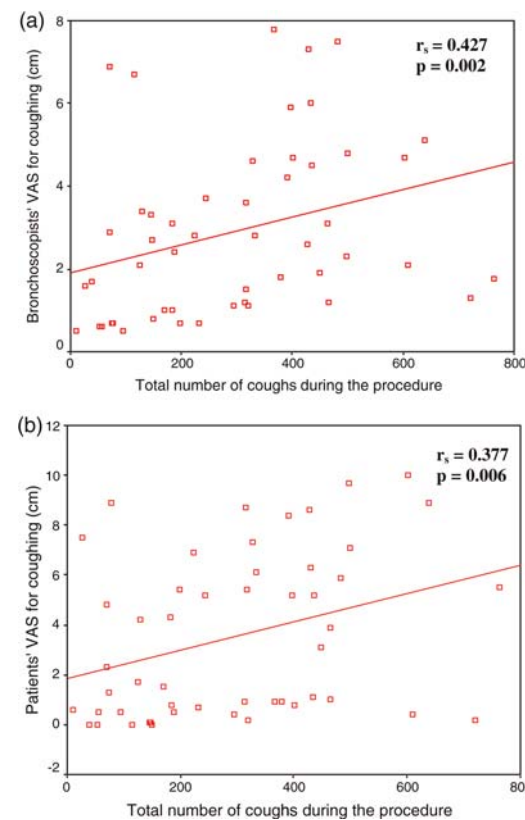
*P value is significant at $p < 0.05$

The correlation between the total number of coughs and the VAS score for coughing sensation of bronchoscopists and patients were also analysed (Figures 2a and 2b). The correlation was statistically significant for both the bronchoscopists ($P = 0.002$) and patients VAS score ($P = 0.006$) with the total number of coughs with moderate positive correlation, $r_s = 0.427$ and $r_s = 0.377$, respectively. Correlation of VAS scores for other perceptions was not analysed as vomiting and choking could not be objectively measured.

Discussion

There are four factors that determined favourable patient satisfaction during bronchoscopy;¹⁶ better health status, less discomfort from scope insertion, better patient ratings of information quality, and better patient ratings for bronchoscopist quality. In another study,¹⁵ it was found that those of male gender, shorter examination time, excellent physician quality and being less bothered by coughing, pharyngeal pain or swallowing pain were related to greater patient satisfaction. Our result is consistent with these studies and also suggests that VAS score for cough perception is the most reliable subjective measurement of patient satisfaction level. This is further illustrated by the positive correlation shown between the VAS

Figure 2
Correlation between the total number of coughs with VAS scores for: a, bronchoscopists; b, patients



score of bronchoscopists and patients with the total number of coughs. The objective measurement of cough count conformed to the subjective VAS assessment of coughing sensation for both bronchoscopists and patients. Therefore, we believe that cough assessment by bronchoscopists is the main factor that can predict patient satisfaction during bronchoscopy.

Bronchoscopists' VAS score for cough perception correlated positively but poorly with that of the patients and this was statistically significant ($r_s = 0.233$, $P = 0.047$). Correlation was not observed for the other variables. There was also mutual dissatisfaction towards cough perception but not to the others. In fact, the overall satisfaction assessment of the procedure did not show any correlation between bronchoscopists and patients. Results of this study indicate that bronchoscopists

are unable to accurately estimate patients' discomfort during bronchoscopy. Palayew *et al.* and Salajka reported that in many cases, the bronchoscopists and respiratory technicians were unable to accurately assess patients' anxiety and fear during the procedure.^{17,18} Putinati *et al.* found that the bronchoscopist underestimated the patients' level of tolerance during bronchoscopy and another study by Dubois *et al.*, using the Borg scale, found that correlations were extremely poor, with a correlation coefficient of 0.19 between bronchoscopists and patients and just 0.09 between technicians and patients.^{12,19}

The VAS scores for patients and bronchoscopists were higher for cough perception than the others. Previous studies have found that coughing was one of the most distressing symptoms associated with bronchoscopy.^{9,20} In fact some other studies that compared patient satisfaction undergoing bronchoscopy had only analysed the VAS score for coughing as a measure of patient discomfort.^{13,21} One study used a combined sedation of midazolam and hydrocortisone for cough suppression, while the other involved nebulized lidocaine. Interestingly, statistically significant positive correlations were noted for the VAS score of bronchoscopists perception towards choking ($r_s = 0.286$, $P = 0.042$) and vomiting ($r_s = 0.363$, $P = 0.002$) with the total number of coughs but unfortunately the same could not be said for perception of vomiting and choking. This implies that the bronchoscopists are good at detecting patients' coughs during bronchoscopy but they are not aware of patients' choking and vomiting sensations. Moreover, based on these findings, bronchoscopists may have mistakenly perceived the increased number of coughing in patients as vomiting and choking. A reasonable interpretation of these results is that during bronchoscopy, the bronchoscopists are more focused and concentrated on the findings on screen for diagnosis. Therefore, they are good at perceiving patients distress mainly from their hearing sense, i.e. patients' coughs. They are reliant on their assistants such as nurses to alert them for any other distress to patients such as choking or vomiting.

There are several limitations to this study. The ideal time to assess patient satisfaction has not been established. In our study, patients completed questionnaires one to two hours after the

procedure. This could not be avoided because of the lingering effects of the sedatives and analgesics given during the procedure. Sedation has also been shown to improve patients' comfort.^{13,22} It reduces pain and provides amnesia towards the procedure. Although we did not objectively assess whether the patients were fully over the effects of midazolam, some studies^{23,24} have shown that the wake-up time for sedation was only 35–60 minutes (after which many patients were alert enough to assess their discomfort) and discharge time 75–120 minutes after the procedure. We assessed the patients about one to two hours after the completion of the procedures. Delay in completing the questionnaires carries the risk that patients could not reliably recall the procedure that they had undergone.¹⁶ The generalizability of our findings is potentially limited by the nature of the data as they are derived from just a single centre. Nevertheless, our study population was quite heterogeneous with different bronchoscopists and differing techniques and levels of competency.

We have shown that bronchoscopists and patients showed similar discomfort level towards cough sensation during bronchoscopy but although they were significantly correlated, the bronchoscopist could not reliably and objectively assess the patients' satisfaction and comfort during the procedure. We, therefore, suggest that coughing be adopted as the main parameter for assessment of patient discomfort by bronchoscopists for further evaluation of satisfaction towards bronchoscopy. Furthermore, future studies should expand the assessment to include both attending nurses and technicians for positive correlation with that of the bronchoscopists.

In conclusion, we have found that coughing is perceived to be equally distressing to patients and bronchoscopists alike and is reliably correlated with the patients' level of discomfort. It should, therefore, be adopted as the main assessment for patient comfort in future bronchoscopic procedures.

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