Respirology (2008) **13**, 722–727 doi: 10.1111/j.1440-1843.2008.01311.x

ORIGINAL ARTICLE

Patient satisfaction with sedation for flexible bronchoscopy

Takashi HIROSE, Kentaro OKUDA, Hiroo ISHIDA, Tomohide SUGIYAMA, Sojiro KUSUMOTO, Masanao NAKASHIMA, Toshimitsu YAMAOKA AND Mitsuru ADACHI

The First Department of Internal Medicine, Showa University School of Medicine, Tokyo, Japan

Patient satisfaction with sedation for flexible bronchoscopy
HIROSE T, OKUDA K, ISHIDA H, SUGIYAMA T, KUSUMOTO S, NAKASHIMA M, YAMAOKA T, ADACHI M. *Respirology* 2008; **13**: 722–727

Background and objective: Patient satisfaction with health care has increasingly been recognized as an important health outcome, but few studies have examined patient satisfaction with flexible bronchoscopy (FB). The purpose of this study was to assess patient satisfaction with FB conducted under conscious sedation and to identify the aspects of the procedure related to patient satisfaction.
Methods: Patients' willingness to return for repeat FB was measured on a 5-point scale. Patients were asked whether they were bothered by the anaesthetic spray, scope insertion, shortness of breath, coughing, pharyngeal pain, chest pain or swallowing pain. Patients were asked to assess the quality of the physician, the institution and nursing, and their satisfaction with the privacy, waiting time and information provided about the procedure.
Results: Of 161 consecutive eligible patients who underwent FB, 129 (80.1%) completed the questionnaire. Of the 129 patients, 65.8% reported that they would return for a repeat FB (12.4% would definitely return and 53.4% would probably return). Male gender, shorter examination time, excellent physician quality and not being bothered by coughing, pharyngeal pain or swallowing pain were related to greater patient satisfaction. The results of multiple logistic regression analysis showed that male gender was related to greater patient satisfaction.
Conclusions: Bronchoscopists should try to recognize the factors that influence patient satisfaction and adjust their management accordingly.

Key words: conscious sedation, flexible bronchoscopy, patient satisfaction, tolerance, willingness.

INTRODUCTION

Flexible bronchoscopy (FB) has become essential for the diagnosis and treatment of pulmonary disease and is commonly performed in many institutions. Pue *et al*. have reported the mortality rate as 0% and the frequency of major complications as 0.5%.[1] However, FB can cause dysphagia, cough, nose pain, throat pain and fear.[2–6] In Japan, 84% of patients undergoing FB complain of problems, with pharyngeal symptoms being the most common.[5]

Patient satisfaction with health care is increasingly being recognized as a valid and significant treatment outcome.[7] Although the factors determining patient satisfaction are incompletely understood, patient satisfaction is closely associated with willingness to return for continued care.[8] Few studies have examined patient satisfaction with FB, and little has been done to improve patient satisfaction with this procedure. Indeed, bronchoscopists often underestimate the degree of patient discomfort and do not fully appreciate patients' responses to procedures.[9] As such greater attention should be paid to patients' opinions and to patients' satisfaction with FB.

Lechtzin *et al*. examined patient satisfaction with FB by assessing willingness to return for FB and noted that 71% would definitely return and 22% would probably return for a repeat FB.[10] A multicentre Scottish survey found that patient satisfaction with FB ranged from 48% to 89%.[11] However, FB procedures differ by country and institution. Most respirologists in North America routinely use intravenous sedation for FB;[12] midazolam and diazepam are the most frequently used sedative drugs. In contrast, pentazocin is often used as a sedative in Japan.[13] In addition, the

Correspondence: Takashi Hirose, The First Department of Internal Medicine, Showa University School of Medicine, 1-5-8 Hatanodai, Shinagawa, Tokyo 142-8666, Japan. Email: thirose-shw@umin.ac.jp

Received 13 April 2007; invited to revise 5 October 2007; revised 6 November 2007; accepted 7 December 2007 (Associate Editor: Kwun Fong).

nasal route of insertion is more frequently used in both North America and the UK,[12] whereas the oral route is used more frequently in Japan.[13] Few studies have examined Japanese patients' satisfaction with FB under conscious sedation. The present study was conducted to assess the satisfaction of Japanese patients with FB and to assess patient characteristics, procedures or medications, and patient-reported symptoms during FB.

METHODS

Study participants

This prospective study examined satisfaction with FB performed as a diagnostic procedure in consecutive adult patients during 2004–2005. Patients with known confusion (due to cerebral metastases, degenerative dementia, or other conditions), or who were otherwise judged too ill to participate, were excluded. Other exclusion criteria included intubation, age greater than 80 years and the inability to speak Japanese. All subjects gave informed consent. Demographic data collected included age, gender, supplemental oxygen use, complications, admission status and experience with FB. Physicians reported the specific procedure performed: bronchial washing, peripheral brushing, peripheral curetting, transbronchial biopsy, BAL, transbronchial needle aspiration or proximal biopsy. Physicians also reported examination time (i.e. how long the bronchoscope was in the patient), the total dose of lidocaine administered and their experience in performing FB.

Questionnaire

Patient satisfaction was assessed in the recovery room after FB, by means of a self-administered questionnaire following a standardized format. Patients were advised that the questionnaire would be seen by a single respirologist only. The completed questionnaire was sealed in an envelope and handed to the nursing staff. Patients' willingness to return for repeat FB, if necessary, was measured on a 5-point scale (definitely not, probably not, unsure, probably would, and definitely would return). Patients were asked whether or not they were bothered by the anaesthetic spray, scope insertion, shortness of breath, coughing, pharyngeal pain, chest pain or swallowing pain. Patients were also asked to rate (on a three point scale: poor, good, and excellent) the quality of the physician, the nursing and the institution, as well as privacy, waiting time and information provided about the procedure.

Method of examination and procedures

Prior to FB, the procedure was explained to patients using standard written information. Sedation was achieved with 7.5 or 15 mg of pentazocin, according to age and body weight, injected intramuscularly 10 min before the examination in all patients. FB was performed with 2% lidocaine as a topical anaesthetic. Lidocaine was first sprayed onto the surface of the pharynx and was then administered through the bronchoscope onto the vocal cords and the tracheobronchial tree. During FB, SaO_2 was monitored by transcutaneous pulse oximetry and the heart rate was measured. Supplemental oxygen was administered via nasal prongs if SaO_2 decreased to less than 95%.

Statistical analysis

Fisher's exact test was used to assess significance and differences with P-value < 0.05 were considered significant. An ordinal logistic regression model using the proportional odds assumption was constructed. Odds ratios and 95% confidence intervals for significant predictors were calculated. Multivariable analyses were performed using multiple logistic regression. Willingness to return for repeat FB was the dependent variable (definitely or probably would return compared with all other categories).

RESULTS

Subject characteristics and procedures

During the study period, 190 consecutive patients underwent FB. Of these, 29 were excluded as they did not meet the inclusion criteria. Of the 161 eligible patients, 129 (80.1%) completed the questionnaire (Table 1). The clinical characteristics of patients who completed the questionnaire and patients who did not were not significantly different. The mean age of patients was 64 years (range 24–80 years). Of the 129 patients who completed the questionnaire, 27.9% reported their health status as excellent, 45.0% as good, and 27.1% as poor.

The medications administered during FB and the methods used to obtain clinical specimens are shown in Table 2. There were no severe complications, such as pneumothorax or bleeding. The mean examination time was 25 min (range 9–52 min). The mean dose of lidocaine was 340 mg (range 200–520 mg). Bronchial washing was performed in all patients. During the study period, FB was performed by 10 different respirologists.

Factors associated with willingness to return for repeat FB

Of the 129 patients, 85 (65.9%) reported that they would return for a repeat FB if necessary (16 (12.4%) would definitely return, and 69 (53.4%) would probably return), whereas 22 (17.1%) reported they were unsure if they would return, 10 (7.8%) reported they would probably not return, and 12 (9.3%) reported they would definitely not return. Male gender was associated with greater satisfaction with the procedure (Table 1). Patient age, supplemental oxygen use,

Table 1 The association between patient characteristics and willingness to return for repeat flexible bronchoscopy (FB)

	No. of patients (%) (n = 129)	No. of patients (%) definitely or probably would return (n = 85)	Odds ratios	95% CI	P-value
Gender					
Male	93 (72.1)	68 (73.1)			
Female	36 (27.9)	17 (47.2)	3.04	1.37–6.76	<0.01
Age (years)					
≤60	35 (27.1)	22 (62.9)			
61–70	39 (30.2)	26 (66.7)			
71–80	55 (42.6)	37 (67.3)	1.11	0.53–2.33	0.78
Supplemental oxygen use					
Yes	64 (49.6)	38 (59.3)			
No	65 (50.4)	47 (72.3)	0.56	0.27–1.17	0.12
Complication					
Yes	49 (38.0)	34 (69.4)			
No	80 (62.0)	51 (63.8)	1.29	0.60–2.75	0.51
Admission status					
Inpatient	46 (35.7)	30 (65.2)			
Outpatient	83 (64.3)	55 (66.3)	0.95	0.45–2.04	0.90
Self-reported health					
Excellent	36 (27.9)	25 (69.4)			
Good	58 (45.0)	39 (67.2)			
Fair	35 (27.1)	21 (60.0)	1.25	0.55–2.86	0.60
Experience with FB					
First	104 (80.6)	67 (64.4)			
Second or more	24 (18.6)	17 (70.8)	1.34	0.51–3.53	0.55

Table 2 The association between procedures, medication and willingness to return for repeat flexible bronchoscopy (FB)

	No. of patients (%)	No. of patients (%) who would definitely or probably return	Odds ratios	95% CI	P-value
Examination time (min)					
≤30	97 (75.2)	73 (75.3)			
31<	32 (24.8)	12 (37.5)	5.07	2.16–11.88	<0.01
Lidocaine (mg)					
≤400	93 (72.1)	65 (69.9)			
>400	36 (27.9)	20 (55.6)	1.86	0.84–4.10	0.12
Procedures brushing or curetting					
Yes	69 (53.5)	42 (60.9)			
No	60 (46.5)	43 (71.7)	1.63	0.78–3.41	0.20
TBB					
Yes	69 (53.5)	49 (71.0)			
No	60 (46.5)	36 (60.0)	0.61	0.29–1.27	0.19
BAL					
Yes	24 (18.6)	13 (54.2)			
No	105 (81.4)	72 (68.6)	1.85	0.75–4.55	0.18
TBNA or proximal biopsy					
Yes	19 (14.7)	11 (57.9)			
No	110 (85.3)	74 (67.3)	1.49	0.55–4.04	0.43
Physicians' experience					
≤10	103 (79.8)	64 (62.1)			
>10	26 (20.2)	21 (80.8)	2.56	0.89–7.34	0.07

TBB, transbronchial biopsy; TBNA, transbronchial needle aspiration.

Table 3 Factors of patient-reported symptoms and association with willingness to return for repeat flexible bronchoscopy (FB)

	No. of patients (%)	No. of patients (%) definitely or probably would return	Odds ratios	95% CI	*P*-value
Anaesthetic spray					
Bothered	41 (31.8)	23 (56.1)			
Not bothered	88 (68.2)	62 (70.5)	1.87	0.87–4.02	0.11
Scope insertion					
Bothered	89 (69.0)	54 (60.7)			
Not bothered	40 (31.0)	31 (77.5)	2.23	0.95–5.25	0.06
Shortness of breath					
Bothered	117 (90.7)	74 (63.2)			
Not bothered	12 (9.3)	11 (91.6)	6.39	0.80–51.23	0.05
Coughing					
Bothered	111 (86.0)	69 (62.2)			
Not bothered	18 (14.0)	16 (88.9)	4.87	1.07–22.25	0.03
Pharyngeal pain					
Bothered	55 (33.3)	31 (56.4)			
Not bothered	74 (57.4)	54 (73.0)	3.09	1.42–6.72	<0.01
Chest pain					
Bothered	42 (32.6)	25 (59.5)			
Not bothered	87 (67.4)	60 (69.0)	1.51	0.70–3.25	0.29
Swallowing pain					
Bothered	81 (62.8)	48 (59.3)			
Not bothered	48 (37.2)	37 (77.1)	2.31	1.03–5.18	0.04

complications, admission status, health status and experience with FB were not significantly related to greater patient satisfaction. Shorter examination time was related to greater satisfaction with the procedure (Table 2). Doses of lidocaine, procedures and physician experience were not significantly related to greater patient satisfaction.

Table 3 shows patient-reported symptoms during FB and patient willingness to return for repeat FB. Approximately 70% of patients were bothered by scope insertion, whereas 31.8% were bothered by the anaesthetic spray. The percentages of patients bothered by shortness of breath, coughing, pharyngeal pain, chest pain or swallowing pain were 90.7%, 86.0%, 33.3%, 32.6% and 62.8%, respectively. Not being bothered by coughing, pharyngeal pain or swallowing pain were related to greater patient satisfaction.

Table 4 shows factors of care and patient willingness to return for repeat FB. Most patients were satisfied with (rated as excellent) the information provided about the procedure, nursing quality, privacy and the institution. Waiting time was the aspect of care that patients were least satisfied with. Physician quality considered to be excellent was significantly correlated with the greater patient satisfaction.

The results of multivariate logistic regression analysis showed that gender was a significant independent predictor of patient satisfaction after adjusting for other factors, including examination time, coughing, pharyngeal pain, swallowing pain and physician quality.

DISCUSSION

In the present study, 65.8% of patients undergoing FB reported that they would be willing to return for a repeat FB if necessary: 12.4% said they would definitely return and 53.4% said they would probably return. A Scottish survey has found that patient satisfaction with FB ranged from 48% to 89%.[11] Lechtzin *et al*. have reported that 93% of patients undergoing FB reported that they would return for a repeat FB.[10] Although the reasons for the differences in patient satisfaction between studies is not known, the procedures used in the present study differed in some ways from those of previous studies. In the study by Lechtzin *et al*. intravenous midazolam was used as a sedative in almost all patients, and the bronchoscope was inserted via the nose in about 80% of patients. By contrast, in the present study, the FB was inserted orally and pentazocin was the sedative. Moreover, Lechtzin *et al*. asked patients to answer questionnaires 48 h after FB, because doing so earlier might have been difficult because of the effects of analgesics. However, such a delay carries the risk of diminished patient recall about the procedure. Therefore, patients were asked to answer questionnaires just after the completion of FB.

The results of the present study show that male patients were more satisfied with FB than were female patients. This result confirms the results of previous studies, in which male patients were less fearful of FB and tolerated FB better than did female patients.[6,9,11]

Table 4 Patients' rating of care factors and association with willingness to return for repeat flexible bronchoscopy (FB)

	No. of patients (%)	No. of patients (%) definitely or probably would return	Odds ratios	95% CI	*P*-value
Information about FB					
Excellent	106 (82.2)	72 (67.9)			
Good or poor	23 (17.8)	13 (56.5)	0.61	0.24–1.54	0.30
Physician quality					
Excellent	91 (70.5)	67 (73.6)			
Good or poor	38 (29.5)	18 (47.4)	0.32	0.15–0.71	<0.01
Nursing quality					
Excellent	117 (90.7)	80 (68.4)			
Good or poor	12 (9.3)	5 (41.7)	0.33	0.10–1.11	0.06
Institution assessment					
Excellent	110 (85.3)	75 (68.2)			
Good or poor	19 (14.7)	10 (52.6)	0.52	0.19–1.39	0.19
Privacy					
Excellent	105 (81.4)	71 (67.7)			
Good or poor	24 (18.6)	14 (58.3)	0.67	0.27–1.66	0.39
Waiting time					
Excellent	82 (63.6)	54 (65.9)			
Good or poor	47 (36.4)	31 (65.6)	1.10	0.52–2.33	0.80

This should alert physicians of the need to pay special attention to female patients.

Shorter examination time was related to greater patient satisfaction. Previous studies have reported that longer examination time is related to nose pain and pharyngeal symptoms.[4,5] Because anaesthesia produced by topical lidocaine lasts 30–60 min, longer procedures may outlast the anaesthesia and cause pain or discomfort.[4] Patient satisfaction with FB should be improved by shortening examination time.

Many patients were bothered by scope insertion, shortness of breath or coughing. Not being bothered by coughing, pharyngeal pain or swallowing pain were related to greater patient satisfaction. Ideally, bronchoscopists should improve their techniques of scope insertion and of FB itself to reduce the incidence of these side-effects.

Adequate local anaesthesia with lidocaine is clearly desirable. British Thoracic Society guidelines for FB call for a total lidocaine dose not more than 8.2 mg/kg in adults (approximately 500 mg for a 60-kg patient).[14] In the present study, 72.1% of patients received less than 400 mg of lidocaine. As much of the administered lidocaine is swallowed or aspirated by suction, re-administration of a sufficient dose of lidocaine to patients during longer examinations might decrease the frequency of shortness of breath, coughing and pain during FB.

If sedation is inadequate, up to 60% of patients may find the procedure unpleasant, and up to 25% are unwilling to undergo FB again.[14] When sedation is titrated to induce a light sleep, patient acceptance of FB is high.[15] Amnesia during FB was associated with excellent pain control.[3] Bronchoscopists should titrate the dose of sedative to improve comfort, tolerance and cooperation during FB, if a patient experiences pain, shortness of breath or coughing.

There were several limitations to the present study. First, the generalizability of the findings is limited, because the study was conducted at a single institution where most respirologists use similar techniques for FB. The findings reported would be more generalizable if a multicentre study were conducted. Second, the primary outcomes were patient-oriented and subjective, and so could be attributed to the characteristics of individual patients. Third, no assessment was made of other aspects of a patient's reactions to FB, such as anxiety, fear and the amount of time the physician spends explaining the details of the procedure. Lastly, the reproducibility and validity of the questionnaire needs to be tested.

This is the first prospective study to evaluate the satisfaction of Japanese patients to FB under conscious sedation. It showed that 65.8% of patients undergoing FB under conscious sedation were satisfied with the procedure. Male gender, shorter examination time, excellent physician quality and not being bothered by coughing, pharyngeal pain, or swallowing pain were associated with greater patient satisfaction. There are opportunities to improve patient satisfaction with FB. First bronchoscopists should recognize that patient dissatisfaction is present and should improve their techniques of scope insertion, scope use and sedation. Further studies to improve FB techniques are needed.

ACKNOWLEDGEMENT

We appreciate the helpful advice of E. Takahashi MD, PhD, Department of Public Health, Showa University School of Medicine, in data analysis.

REFERENCES

1 Pue C, Pacht ER. Complications of fiberoptic bronchoscopy at a University hospital. *Chest* 1995; **107**: 430–2.
2 Bechara R, Beamis J, Simoff M, Mathur P, Yung R *et al.* Practice and complications of flexible bronchoscopy with biopsy procedures. *J. Bronchol.* 2005; **12**: 139–42.
3 Lechtzin N, Rubin HR, Jenckes M, White P, Zhou L *et al.* Predictors of pain control in patients undergoing flexible bronchoscopy. *Am. J. Respir Crit. Care Med.* 2000; **162**: 440–5.
4 Diette GB, White P, Terry P, Jenckes M, Wise RA *et al.* Quality assessment through patient self-report of symptoms prefiberoptic and postfiberoptic bronchoscopy. *Chest* 1998; **114**: 1446–53.
5 Mori K, Saito Y, Suga Y, Takahashi T, Yokoi K *et al.* A study of pharyngeal symptoms caused by brochofiberscopy. *Jpn. J. Clin. Oncol.* 1993; **23**: 162–5.
6 Poi PJH, Chuah SY, Srinivas P, Liam CK. Common fears of patients undergoing bronchoscopy. *Eur. Respir. J.* 1998; **11**: 1147–9.
7 Donabedian A. The quality of care: how can it be assessed? *JAMA* 1988; **260**: 1743–8.
8 Sun BC, Adams J, Drav EJ, Rucker DW, Brennan TA *et al.* Determinants of patient satisfaction and willingness to return with emergency care. *Ann. Emerg. Med.* 2000; **35**: 426–34.
9 Putinati S, Ballerin L, Corbetta L, Trevisani L, Potena A. Patient satisfaction with conscious sedation for bronchoscopy. *Chest* 1999; **115**: 1437–40.
10 Lechtzin N, Rubin HR, White P, Jenckes M, Diette GB. Patient satisfaction with bronchoscopy. *Am. J. Respir Crit. Care Med.* 2002; **166**: 1326–31.
11 Mclean AN, Semple PDA, Franklin DH, Petrie G, Millar EA *et al.* The Scottish multi-centre prospective study of bronchoscopy for bronchial carcinoma and suggested audit standards. *Respir. Med.* 1998; **92**: 1110–15.
12 Prakash UBS, Offord KP, Stubbs SE. Bronchoscopy in North America: the ACCP survey. *Chest* 1991; **100**: 1668–75.
13 Abe S, Ayabe H, Kondoh T, Yamada G, Takahashi H. Bronchoscopy in Japan: survey by the Japan Society for Bronchoscopy in 2000. *JJSB* 2003; **25**: 5–15 (in Japanese).
14 British Thoracic Society Bronchoscopy Guidelines Committee, a subcommittee of the Standards of Care Committee of the British Thoracic Society. British Thoracic Society guidelines on diagnostic flexible bronchoscopy. *Thorax* 2001; **56** (Suppl.): 1–21.
15 Maguire GP, Rubinfeld AR, Trembath PW, Pain MCF. Patients prefer sedation for fibreoptic bronchoscopy. *Respirology* 1998; **3**: 81–5.