Original Article

Levels and Predictors of Patient Satisfaction during Flexible Bronchoscopy Procedures

AA Aljohaney

Department of Internal Medicine, Faculty of Medicine, King Abdulaziz University, Saudi Arabia

Abstract

Background: Flexible bronchoscopy (FB) is a safe and commonly performed procedure in pulmonary medicine. Bronchoscopy literature mainly focusing on technical aspects. However, data on patients satisfaction and bronchoscopy is rare. **Aim:** To evaluate levels and factors affecting patient satisfaction with flexible bronchoscopy (FB). **Subjects and Methods:** This prospective study, conducted between June 2017 and May 2019 at King Abdulaziz University Hospital (Jeddah, Saudi Arabia), included all consecutive diagnostic bronchoscopies for adult patients. Patient willingness to return for another bronchoscopy (definitely not, probably not, unsure, probably would, or definitely would) was used as the indicator of satisfaction. Patients ranked their experiences with doctors, nurses, and process of care using a 5-choice scale (poor, fair, good, very good, or excellent). **Results:** A total of 351 patients participated in this study. Overall, patients were highly satisfied with their doctors, nurses, and process of care. However, only 34.1% of patients indicated that they would return for another FB if necessary. Predictors of return for FB were younger age (<65 years), university education, use of midazolam and higher doses of fentanyl >100 mcg, and inpatient setting. Logistic regression demonstrated that younger age (P = 0.005) and inpatient setting (P = 0.02) were significantly linked to willingness to return for bronchoscopy. **Conclusions:** Patient satisfaction with bronchoscopy was lower in our study compared to other studies, despite high ratings of doctors' and nurses' skills. Elderly patients and patients with outpatient bronchoscopies were less likely to return and should therefore be approached with extra care. Physicians can improve FB-related patient experiences by decreasing discomfort during bronchoscope insertion and by improving topical anesthesia.

Keywords: *Flexible bronchoscopy, patient satisfaction, pulmonary medicine*

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Introduction

Flexible bronchoscopy (FB) is an invaluable tool for diagnosing malignant and nonmalignant pulmonary conditions.[1] Pertinent FB-related literature focuses on technical aspects and procedural details of this procedure.[2,3] However, there is a scarcity of studies exploring the link between procedural variables and patient satisfaction.[4,5]

Patient satisfaction has been linked to a willingness of patients to return for another FB if required, along with patient compliance after discharge.[6,7] Diverse metrics related to patient demographics, and process-of-care factors, including wait times and education about the details of the procedure, have been associated with patient satisfaction and willingness to return for FB.[8,9] Assessing patient satisfaction and associated factors can result in better compliance rates

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Address for correspondence: Prof. AA Aljohaney, Department of Medicine, Faculty of Medicine, King Abdulaziz University, PO Box 80215, Jeddah 21589, Saudi Arabia.
E-mail: aaljohani@kau.edu.sa

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and improvements in procedural and other care-related factors.[10] In this study, we aimed to analyze the direct and inverse relationships among demographics, systemic factors, and technical factors and a patient's willingness to return for FB.

Subjects and Methods

Study setting and population

A 2-year prospective study to assess patient satisfaction with FB was conducted between June 2017 and May 2019 at our university hospital. All consecutive patients, aged 18 years or older, who were undergoing FBs were screened. We excluded patients who underwent therapeutic bronchoscopies or those who underwent bronchoscopies performed in intensive care units and operating theaters. Patients who refused to give consent or who had cognitive impairments that limited their ability to respond to questions were also excluded. The sample size is 351. The study protocol was approved by our institutional biomedical research ethics committee (Reference No 238-17) and was performed in adherence to the tenets of the Declaration of Helsinki, as revised in 2000.

On the day of FB, physicians completed data collection forms about the indications for the procedure, patient characteristics, details about the procedure, local and systemic complications of the procedure, and medication details. The patient's experience related to the procedural details, including discomfort and satisfaction with physicians and nurses, was collected from patients by a second questionnaire administered 48 hours after the procedure, allowing for the effects of sedation to wear off.

Outcomes

Patient satisfaction as a primary outcome was assessed based on willingness to return for FB if necessary.[4] Patient responses obtained 48 hours after the procedure were categorized using a previously used 5-point Likert scale, in which patients rated their willingness to return for FB as definitely not, probably not, unsure, probably would, and definitely would.[4] A patient's opinion about his or her physicians was quantified by rating physicians' (1) kindness, (2) ability to comfort patients, and (3) overall skills in performing the bronchoscopy using a 5-choice scale, including poor, fair, good, very good, and excellent. A patient's knowledge regarding (1) the information received about bronchoscopy by the doctor before the procedure, (2) awareness of potential complications, and (3) his or her post-procedural results that include the bronchoscopy findings and diagnosis were also classified using a 5-choice scale, including poor, fair, good, very good, and excellent. Patients also rated nurses based on (1) kindness, (2) skills with Intravenous (IV) insertion, and (3) ability to comfort patients' concerns using the same 5-choice scale, including poor, fair, good, very good, and excellent. Patients were further asked about comfort/discomfort related to oral anesthetic spray, nasal anesthetic gel, and scope insertion in the throat, and the degree to which they were bothered by these factors was assessed on a three-choice scale, including not at all, a little, and a lot.

Based on the bronchoscopist's preference, bronchoscopy was performed either through the mouth or the nose, and lidocaine (1–2%) spray or gel was used for topical anesthesia. Intravenous midazolam (<2 mg, 2-5 mg, and >5 mg) and fentanyl (≤50 mcg, 51-100 mcg, and >100 mcg) were used for sedation at variable doses tailored to each patient's comfort level as per the bronchoscopist's discretion. All procedures performed during bronchoscopies, including bronchoalveolar lavage and endobronchial and transbronchial biopsies, were documented, and all complications such as hypoxia, pneumothorax, tachycardia, and hemorrhage were assessed.

Statistical analysis

Data were analyzed using Statistical Package for Social Studies (SPSS v22; IBM Corp., New York, USA). Continuous variables such as age and medication doses were expressed as mean ± standard deviation, and categorical variables were expressed as percentages. Chi-squared and Fisher's exact tests were used for categorical variables. Logistic regression (binary) analysis was carried out for predicting return among the studied group. A P value < 0.05 was considered statistically significant.

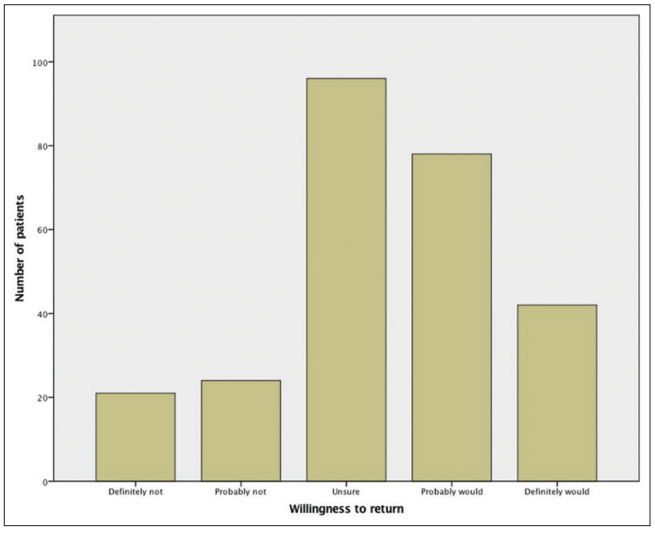

Figure 1: Patient willingness to return for flexible bronchoscopy

Table 1: Data on demographics of patients and details about bronchoscopy procedures (*n*=351)

Variables	Data, *n*=351 (100%)
Age (years)	
Mean±SD*	49.48±17.82
Range	(20-83)
Sex	
Male	213 (60.7)
Female	138 (39.3)
Education	
Primary	141 (40.2)
Intermediate	42 (12.0)
High School	57 (16.2)
University	111 (32.5)
Patient setting	
Inpatient	237 (67.5)
Outpatient	114 (32.5)
Previous bronchoscopy	
Yes	90 (25.6)
No	261 (74.4)
Comorbidities†	
Yes	228 (65)
No	123 (35)
Bronchoscopy route	
Oral	252 (71.8)
Nasal	99 (28.2)
Anesthesia and sedation	
Topical lidocaine	351 (100.0)
Midazolam	336 (95.7)
Fentanyl	327 (93.2)
Procedure performed	
BAL‡	285 (81.1)
EBBX§	144 (41.1)
EB brush‖	90 (25.6)
TBBX¶	63 (17.9)
TBNA**	51 (14.5)
Indication for bronchoscopy	264 (75.2)
Malignancy	87 (24.8)
Benign disease	
Complications	
No complications	288 (82.1)
Hypoxia	12 (3.4)
Pneumothorax	12 (3.4)
Tachycardia	33 (9.4)
Hemorrhage	6 (1.7)

*Standard deviation, †Comorbidities (any one of the following: congestive heart failure, renal failure, diabetes mellitus, chronic lung disease, psychiatric illness, and smoking), ‡Bronchoalveolar lavage, §endobronchial biopsy, ‖endobronchial brush, ¶transbronchial biopsy, **transbronchial needle aspiration

Table 2: Measures of patient satisfaction

Satisfaction Domain	Very good/ Excellent (%)
Knowledge received about bronchoscopy before procedure	71.5
Knowledge received about potential complications	84.4
Knowledge about obtaining results after procedure	82.9
Doctors' kindness	84.6
Doctors' skills in performing bronchoscopy	91.1
Doctors' ability to comfort patients	91.9
Nurses' kindness	89.7
Nurses' skills in IV insertion	88.6
Nurses' ability to comfort patients	91.9
Comfort with the anesthetic spray	15.4
Comfort with nasal anesthesia	54.1
Comfort with scope insertion	78.3

Results

Characteristics of study population

In total, 351 of 429 consecutive patients who underwent bronchoscopies during the study period were included. We excluded 78 patients, including 52 patients who underwent bronchoscopies in the critical care unit, six patients who underwent bronchoscopies in the operating theater, 11 patients who were unable or refused to give consent, and nine patients who had therapeutic bronchoscopies. There were 213 (60%) men, and patients' mean age (standard deviation) was 49.5 (17.8) years [Table 1]. Most patients (74.4%, *n* = 261) underwent the procedure for the first time. Only one-third of patients (34%, *n* = 120) reported a willingness to return, and 65% (n = 231) of patients were either not sure or sure to not return [Figure 1]. Details about the bronchoscopic procedures are also shown in Table 1. Bronchoalveolar lavage was the most commonly performed procedure in 81.1% of cases, followed by endobronchial biopsy in 41.1% of patients. All patients received topical anesthesia with lidocaine, and sedation was performed with midazolam in 95.7% of patients.

Patient evaluation of domains related to satisfaction with bronchoscopy

Patients evaluated various factors related to their satisfaction with bronchoscopy, as shown in Table 2. In general, patients were highly satisfied with the information provided before the procedure, as 71.5% of patients rated this aspect as very good or excellent. Furthermore, 84.6% and 91.1% of patients were highly satisfied with their doctors' kindness and skills in performing the procedure, respectively. The lowest satisfaction level was reported with the oral anesthetic spray, as only 15.4% of patients found its use

Table 3: Patient demographics and procedural details in relation to willingness to return for another bronchoscopy

Variables*	Total, *n*=351 (100%)	Definitely returning, *n* (%)	Definitely not, *n* (%)	*P*†
Age (years)				
≤65	273 (77.7)	99 (36.3)	174 (63.7)	0.048
>65	78 (22.3)	21 (26.9)	57 (73.1)	
Sex				
Male	213 (60.6)	69 (32.4)	144 (67.6)	0.22
Female	138 (39.4)	51 (37.0)	87 (63.0)	
Education				
Primary	141 (40.1)	36 (25.5)	105 (74.5)	0.031
Secondary	41 (11.6)	15 (37.7)	27 (64.3)	
High school	57 (16.2)	21 (36.8)	36 (63.2)	
University	111 (31.6)	48 (43.2)	63 (56.8)	
Previous Bronchoscopy				
Yes	90 (25.6)	24 (26.7)	66 (73.3)	0.052
No	261 (74.4)	96 (36.8)	165 (63.2)	
Patient setting				
Impatient	237 (67.5)	69 (29.1)	168 (70.9)	0.003
Outpatient	114 (32.5)	51 (44.7)	63 (55.3)	
Comorbidities**				
Yes	228 (65)	118 (51.7)	110 (48.3)	0.72
No	123 (35)	70 (56.9)	53 (45.1)	
Midazolam				
Yes	336 (95.7)	120 (35.7)	216 (64.3)	0.002
No	15 (4.3)	0 (0)	15 (100)	
Fentanyl				
Yes	327 (93.1)	111 (33.9)	216 (66.1)	0.32
No	24 (6.9)	9 (41.9)	15 (58.1)	
Midazolam dose				
<2 mg	114 (32.4)	36 (31.6)	78 (68.4)	0.418
2-5 mg	222 (63.2)	78 (35.1)	144 (64.9)	
>5 mg	12 (3.4)	6 (50.0)	6 (50.0)	
Fentanyl dose				
≤50 mcg	225 (64.1)	78 (34.7)	147 (65.3)	0.013
51-100 mcg	93 (26.4)	30 (32.3)	63 (67.7)	
>100 mcg	12 (3.4)	9 (75)	3 (25)	
Procedure performed				
BAL‡	285 (81.2)	99 (34.7)	186 (65.3)	0.12
EBBX§	144 (41.0)	48 (33.3)	96 (66.6)	
EB Brush‖	90 (25.6)	24 (26.6)	66 (75.4)	
TBBX¶	63 (17.9)	30 (47.6)	33 (52.4)	
FNA**	51 (14.5)	15 (29.4)	36 (70.6)	
Complications				
None	288 (82.0)	93 (32.3)	195 (67.7)	0.12
Hypoxia	12 (3.4)	3 (25)	9 (75)	
Pneumothorax	12 (3.4)	9 (75)	3 (25)	
Tachycardia	33 (9.40)	15 (45.5)	18 (54.5)	
Hemorrhage	6 (1.7)	0 (0)	6 (100)	

Contd...

Table 3: Contd...

Variables*	Total, *n*=351 (100%)	Definitely returning, *n* (%)	Definitely not, *n* (%)	*P*†
Pre-bronchoscopy diagnosis				
Malignant	264 (75.2)	99 (37.5)	165 (62.5)	0.016
Benign	87 (24.8)	21 (24.1)	66 (75.9)	

*Variables were compared using the Chi-squared test, **Comorbidities (any one of the following: congestive heart failure, renal failure, diabetes mellitus, chronic lung disease, psychiatric illness, and smoking), †Statistical significance is defined as a $P<0.05$. ‡Bronchoalveolar lavage; §endobronchial biopsy; ‖endobronchial brush; ¶transbronchial biopsy; **fine-needle aspiration

Table 4: Discomfort during procedure in relation to willingness to return for another bronchoscopy

	Total, *n*=261 (100%)	Definitely returning, *n* (%)	Definitely not, *n* (%)	*P**
Bothered by oral anesthetic spray				
No	45 (17.2)	24 (53.3)	21 (46.7)	0.27
Yes	216 (82.8)	96 (44.4)	120 (55.6)	
Bothered by nasal anesthetic gel				
No	24 (9.2)	15 (62.6)	9 (46.7)	0.13
Yes	237 (90.8)	105 (44.7)	132 (55.7)	
Bothered by scope insertion in throat				
No	21 (8.04)	9 (42.9)	12 (57.1)	0.94
Yes	240 (91.95)	111 (46.2)	129 (54.8)	

*Variables were compared using the Chi-squared test. $P<0.05$ were considered statistically significant

Table 5: Logistic regression (binary) analysis for prediction of return among the studied group

Variables	B	Sig.	Exp (B)	Confidence interval
Age	0.019	0.005	1.019	1.009-6.76
Inpatient	0.430	0.020	1.44	1.006-7.54
Constant	-20.249	0.998	0.00	

comfortable, whereas 54.1% of patients reported very good to excellent comfort with nasal anesthesia.

Relationship between patient demographics and willingness to return for FB

Patient age had a significant impact (P = 0.048) on willingness to return for the procedure, with patients ≤65 years of age significantly more willing to return than those >65 years of age [Table 3]. In addition, patient education level was a significant factor, with 43.2% of patients with a university level of education showing a willingness to return [Table 3], which was a significantly higher proportion (P = 0.031) than those with other education levels. Furthermore, patients who had bronchoscopy performed as an inpatient were significantly more willing to return for FB if needed (P = 0.003) than those who had outpatient bronchoscopies [Table 3].

Relationship between procedural details and willingness to return for FB

Patients who received a fentanyl dose of >100 mcg were significantly more likely to return for bronchoscopy, with a P value of 0.013 [Table 3]. Furthermore, patients with a suspected malignancy were significantly more willing to return for bronchoscopy if needed, with a P value of 0.016. Interestingly, a patient's willingness to return was not significantly associated with the type of procedure performed nor the complications associated with the procedure, including hypoxia, pneumothorax, tachycardia, or hemorrhage (P = 0.12).

Relationship between patient comfort and willingness to return for FB

Patients' reported comfort or discomfort with the anesthetic spray and/or the bronchoscopy insertion was not associated with their willingness to return [Table 4]. There was no significant relationship between willingness to return and annoyance in patients due to scope insertions in the throat or administration of anesthetic spray.

Prediction model

Table 5 shows the logistic regression (binary) analysis for the prediction of return for FB in the studied group. The significant predictors were a younger age (P = 0.005) and inpatient setting (P = 0.02). The overall predictability for both predictors was 70%.

Discussion

In this prospective study, we evaluated several aspects of patient satisfaction and willingness to return for FB. Most patients reported high satisfaction levels with both the information provided to them about the bronchoscopy and the skills of their doctors and nurses. Nevertheless, only one-third of patients reported a willingness to return for FB if necessary. We found that the significant predictors for returning for FB if needed included a younger age (<65 years) and an inpatient setting. In addition, university-educated patients, patients with a suspected malignancy, and patients who received

higher doses of fentanyl were more willing to return for FB.

Although we report that 34.1% of patients were willing to return for FB, Lechtzin *et al*. reported that 71% of their study patients were willing to return for FB.[4] In another study, 98% of patients were found to be sure of returning for FB.[11] The different rates identified among studies may be related to the patients' cultural backgrounds, number of patients studied, and the time lapse between the procedure and administration of the questionnaire. Thus, it is imperative to develop consensus guidelines for studies related to patient satisfaction in order to generate comparable results.

Although age has been shown to be a significant factor affecting patient satisfaction when visiting emergency departments, the effect of age on patient satisfaction with bronchoscopy has not been consistently reported in previous studies.[6] In the present study, a patient's age was found to significantly impact the decision to return for FB, which differs from other studies in which age was not a significant predictor of a patient's decision to return for FB or age was not evaluated.[4,11] The knowledge that patients in the older age group (>65 years) are less likely to return for FB can inform physicians of the need to pay special attention to this age group during anesthesia, bronchoscope insertion, and while comforting patients. This information might aid in improving care factors for elderly patients.

In earlier studies, the educational qualifications of patients were also shown to be linked to patient satisfaction.[12] Education level has been linked to various aspects of patient satisfaction and, most importantly, to an understanding of the information given before the procedure. This knowledge may help physicians to devise better communication strategies for patients with a primary level of education.

Patients with a pre-bronchoscopy diagnosis of a malignancy were also found to be more likely to return. This finding might be explained by the eagerness of these patients to establish a definitive diagnosis in order to commence therapeutic interventions promptly.[13] Furthermore, patients who had a bronchoscopy during inpatient hospitalization were also more likely to return for FB if needed, which might be explained by the acuity of their illnesses and the urgent need to establish diagnoses.

We found that most of our patients were bothered by the nasal gel and oral spray for anesthesia. More than 60% of patients reported discomfort with topical anesthesia; however, this factor did not show any significant association with a patient's decision to return for FB if necessary. Although it has previously been reported that patients who were bothered by numbing of the nose were less willing to return for FB, we did not find any such correlation in our cohort.[4] Still, the knowledge that patients experience discomfort with topical anesthesia (oral or nasal) needs to be addressed in the correct context. Parenteral sedation, followed by local topical nasal or oral anesthesia, may improve comfort levels.[4] Previously, it has been reported that transoral FB is linked to a lower likelihood of a patient's return for FB if needed, and most patients were shown to be uncomfortable with bronchoscope insertion in the throat, thereby impacting their willingness to return.[4] However, this factor proved to be nonsignificant in our study.

This study had several limitations. First, it was a single-center study, and therefore, its results may be less generalizable. This study was, however, conducted prospectively, with a heterogeneous population and wide range of ages and demographics, which might increase its relevance for a broader patient group. Second, our reliance on a patient's willingness to return for FB as an indicator of satisfaction might be considered a drawback because of the subjectivity of this outcome. Furthermore, the likelihood of a patient's returning for FB might be influenced by factors that are not directly related to patient satisfaction with bronchoscopists, nurses, or process of care. These factors include proximity to the healthcare facility, availability of transportation, logistics of procedural approvals, and costs. All these factors can theoretically impact a patient's decision to return for the procedure, even if patient satisfaction was high during the initial visit. Nevertheless, a willingness to return for further care has previously been associated with patient satisfaction.[6] Finally, the optimal timing to assess patient satisfaction after the procedure is unknown because recall is impaired soon after the procedure due to sedation. Patients have, however, been shown to be able to recall accurately within 5 days after the procedure.[14] Therefore, we opted to assess satisfaction 48 hours after the procedure because the effects of sedation had worn off and patients had regained their ability to recall.

In conclusion, we found three important predictors for willingness to return for bronchoscopy, including younger patient age, higher education level, and an inpatient bronchoscopy setting. Future studies that specifically explore ways to improve elderly patients' satisfaction with bronchoscopies are recommended. Furthermore, the content of information related to this procedure that is presented to patients should be evaluated through further studies that consider patients' educational statuses. The use of midazolam and a high dose of fentanyl >100 mcg,

a pre-bronchoscopy diagnosis of malignancy, and an inpatient setting were also important determinants of patient satisfaction. However, patient satisfaction with all domains related to physicians' and nurses' skills and kindness were not found to be associated with patients' willingness to return, and most patients highly rated all these domains. The high number of patients reporting discomfort during topical anesthesia and bronchoscope insertion also needs to be addressed by physicians to improve patients' overall experiences. Further studies are required to explore in detail the factors related to anesthesia and bronchoscope insertion and to identify specific areas where improvements can be made.

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Conflicts of interest

There are no conflicts of interest.

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