

Impact of a designed educational program on elderly patients undergoing flexible bronchoscopy

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Background Bronchoscopy is a frequently required procedure in the elderly due to the high prevalence of pulmonary diseases. Bronchoscopy is associated with fears, stress, and anxiety.

Aim To evaluate the impact of an educational program on patient knowledge, anxiety level, difficulties, duration, and complications of bronchoscopy procedure in elderly patients.

Patient and methods One hundred and fifty patients aged 60 years and older candidates for bronchoscopy were included. The patients were randomly divided into two equal groups: 75 patients received educational guideline (study group); 75 patients did not receive educational guideline (control group). Patient knowledge about bronchoscopy and anxiety level were assessed. The designed educational program was applied to the study group on the day before the procedure. It included brochures with simple and brief instructions and pictures about bronchoscopy in Arabic language. It also includes the structure of the respiratory system, definition, indications and complications of bronchoscopy, patient preparation before, during and after the procedure, and patient's precautions that should be taken during and after bronchoscopy.

Results There were insufficient knowledge and high anxiety scale about bronchoscopy. Knowledge score significantly

increased and anxiety scale significantly decreased after providing the patients with educational program ($P < 0.001$ for each). There was significant reduction in the duration of bronchoscopy procedure and the amount of anaesthesia used in the study than in the control group ($P < 0.001$). Difficulties and discomfort were significantly lower in the study group.

Conclusion Besides improving knowledge and reducing anxiety score, implementing the designed educational program increases tolerability, easiness and decrease problems related to bronchoscopy.

Egypt J Bronchol 2018 12:193–199

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Egyptian Journal of Bronchology 2018 12:193–199

Keywords: anxiety, bronchoscopy, education, elderly, knowledge

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Received 26 June 2017 **Accepted** 10 September 2017

Introduction

Pulmonary disorders become highly prevalent as the population ages. About 50% of patients with lung cancer were 70 years or older [1]. Flexible bronchoscopy (FB) is increasingly requested for elderly patients because of the high prevalence of lung diseases especially lung cancer [2]. Anxiety is common in patients undergoing invasive procedures. Patients undergoing bronchoscopy commonly suffer from anxiety, fear, stress, lack of preparation, and low knowledge level. Anxiety may lead to increased duration and difficulty of the procedure. Prolongation in the duration may lead to an increase in sedation dose and complication such as hypoxemia. So there is a need to overcome these problems before the procedure [3]. A proper preparation of elderly patients before bronchoscopy is important, because effective preparation will facilitate a safe and successful procedure. The procedure should be fully explained to the patient; in addition, the preparation required, information about risks, benefits, and alternatives of the procedure should be obvious [4]. This will prepare him or her for any possible unpleasant experiences and will help to gain his or her cooperation and confidence.

However to our knowledge there is a lack of patients–caregiver interaction in our region. So we designed this educational program to study its value on patients' knowledge and anxiety level, duration, difficulties and complications of bronchoscopy procedure.

Patients and methods

A total of 150 elderly patients (60 years and above) who were candidates for bronchoscopy were consecutively included in the study. They attended the Bronchoscopy Unit of the Chest Department, Assiut University. The patients were randomly divided into two equal groups; 75 patients were given the designed educational program about the bronchoscopy procedure (study group) and 75 patients did not have any educational programs (control group). All patients were alert and were able to communicate verbally. Patients younger

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than 60 years, patients unable to cooperate, patients to whom bronchoscopy was contraindicated, patients with other pulmonary comorbidity than that necessitate bronchoscopy and patients with neuropsychiatric disorder or using any anxiolytic drugs were excluded. This designed educational program was applied by trained nursing staffs under supervision of independent pulmonologist and neuropsychiatric staff. The study was approved by the Research Ethics Committee of the Faculty of Medicine, Assiut University.

All patients were subjected to the following:

- (1) Sociodemographic data, past and present medical history, previous history of bronchoscopy, and other experiences of endoscopic intervention of all patients were noted.
- (2) Knowledge assessment questions before bronchoscopy included questions about preparation, instructions before, during and after procedure, precautions and complications. A scoring system consisted of 10 items rated on a two-point scale; 1 for correct answer and 0 for incorrect answer. The alternative of 'do not know' was included to eliminate the possibility of giving the right answer by chance. The maximum score on knowledge was 10. Patients who scored 30% or less (0–3 point) were considered as having 'poor' knowledge. Those who scored 40–70% (4–7 point) were considered as having 'fair' knowledge while those scored 80–100% (8–10 points) were considered as having 'good' knowledge [5].
- (3) Hospital anxiety scale (HAS): the HAS consists of seven items (Table 1). The scale has a score ranging from 0 to 21. Items were rated on a four-point Likert-type scale ranging from 0 to 3. Scores of 0–7 indicated normal levels of anxiety. Scores from 8 to 10 indicated borderline anxiety. Scores from 11 to 21 indicated abnormal levels of anxiety [6].
- (4) The designed educational program in the form of brochures contained simple and brief instructions with pictures about bronchoscopy in Arabic language based on the finding of the assessment phase considering patients' needs and their level of education and understanding. It included definition and structure of the respiratory system, definition and indications of bronchoscopy, patient preparation before bronchoscopy, and instructions that should be taken during and after the procedure [7]. For the study group, the data were collected in the day before bronchoscopy. A face to face interview

with patients was done. Number of patients in each interview was one patient. The first interview was nearly 1 h. Personal characteristics of the studied patients, patients' knowledge regarding using bronchoscopy, vital signs and hospital anxiety scale were assessed in the first 30 min, in the second 30 min, a designed teaching program with an attractive simple manner to ensure their understanding was given. Each patient obtained a copy of the brochure that included all guideline content with simple pictures. The second interview was done the next day in the bronchoscopy unit. It started about 1 h before doing bronchoscopy to evaluate patients' knowledge regarding bronchoscopy as their idea about the procedure, instructions that should be taken before, during, and after bronchoscopy, precautions and

Table 1 Hospital anxiety scale

Items	Score
I feel tense or 'wound up'	
Most of the time	3
A lot of the time	2
From time to time, occasionally	1
Not at all	0
I get a sort of frightened feeling as if something awful is about to happen	
Very definitely and quite badly	3
Yes, but not too badly	2
A little, but it does not worry me	1
Not at all	0
Worrying thoughts go through my mind	
A great deal of the time	3
A lot of the time	2
From time to time, but not too often	1
Only occasionally	0
I can sit at ease and feel relaxed	
Definitely	0
Usually	1
Not often	2
Not at all	3
I get a sort of frightened feeling like 'butterflies' in the stomach	
Not at all	0
Occasionally	1
Quite often	2
Very often	3
I feel restless as I have to be on the move	
Very much indeed	3
Quite a lot	2
Not very much	1
Not at all	0
I get sudden feelings of panic	
Very often indeed	3
Quite often	2
Not very often	1
Not at all	0
Total score	

complications of the procedure. Blood pressure, heart rate, and oxygen saturation were also measured and hospital anxiety level after the application of the educational program was assessed. For the control group, the study was carried in the bronchoscopy unit at morning shift. An interview with patients was done at least 1 h before bronchoscopy. Number of patients in each interview was one patient. The duration of an interview was 30 min, to take the personal characteristics of the studied patients, assess patients' knowledge regarding bronchoscopy as mentioned above, measure the vital signs and to assess hospital anxiety scale. Bronchoscopy was performed in all patients using a flexible fiber optic bronchoscope (BF-240; Olympus Optical Corporation, Tokyo, Japan) by an experienced bronchoscopist not aware of patient's randomization or given information. The bronchoscope was introduced nasally and the operator stands to the right of the patient facing him. Topical anaesthesia by lidocaine spray was administered and supplemental oxygen was given if needed. Conscious sedation using 5 mg medazolam was administered. Oxygen saturation, heart rate and mean arterial blood pressure before, during and after the procedure were monitored. The total number of diluted lidocaine syringes (4 ml of 0.02 lidocaine in each syringe), duration of procedure and if the patient had difficulties or complications during and after bronchoscopy procedure were assessed.

Statistical design

The collected data were organized, categorized, tabulated, and analysed using the statistical package for the social sciences for Windows version 16 (SPSS Inc., Chicago, IL, USA). The data were tested for normality using the Anderson–Darling test and for homogeneity variances prior to further statistical analysis. Categorical variables were described by number and percent, while continuous variables were described by mean and SD. χ^2 -Test and Fisher's exact test were used to compare between categorical variables while *t*-test was used to compare between continuous variables. A two-tailed *P* value of less than 0.05 was considered statistically significant.

Results

As regards demographic data, male was the predominant sex and nearly two-thirds of the patients were illiterates (66.7% in control group and

65.3% in the study group). The majority of patients (88% in the control group and 85.3% in the study group) were living in rural areas and the majority were smokers (82.7% in the control group and 80% in the study group) (Table 2). Lung mass and haemoptysis were the main indication for bronchoscopy (Table 3). Knowledge about bronchoscopy significantly increased after receiving nursing guidelines in the study group than the control group ($P<0.001$) (Table 4). There was statistically significant decrease of hospital anxiety scale in the study group than in the control group ($P<0.001$) (Table 5).

Table 6 illustrated significant reduction in the duration of bronchoscopy procedure (14.53 ± 1.98 vs. 23.13 ± 3.66 min, $P<0.001$) and in the total number of diluted lidocaine syringes (5 ± 0.64 vs. 6.47 ± 1.17 syringes, $P<0.001$) in the study group than in the control group. Oxygen saturation significantly increased and heart rate significantly decreased before, during, and after the bronchoscopy procedure in the study group than in the control group. There is also significant reduction in the number of patients who developed difficulties and complications during the bronchoscopy procedure in the study group than in the control group ($P<0.001$).

Discussion

FB is a common procedure used in more than 95% of all bronchoscopy procedures. Although most of the studied patients were satisfied with different aspects of their FB examination, only a few would repeat this experience if needed [8]. Patient's stress can lead to prolongation of the procedure and also may trigger some hindrance in the procedure steps leading to harmful effect on the patient. Although it is not a painful procedure most patients find it extremely exhausting and uncomfortable. These feelings could be exaggerated if the patient does not receive the appropriate information about these procedures. So the provision of information before a medical or surgical procedure can improve postoperative recovery and reduce anxiety [3]. Providing the needed information related to the procedure process helps the patients remain relaxed and cooperative. Once the primary information needs of patients are met, they are ready to assimilate information that would assist them in adaptation; therefore, effective patient education is integral to bronchoscope complication management [9]. Therefore, this study was designed to gain insight on the effect of the designed educational program on the knowledge and anxiety level of elderly patients undergoing

Table 2 Demographic characteristics of patients undergoing bronchoscopy (N=150)

Items	Control group (n=75) [n (%)]	Study group (n=75) [n (%)]	P value
Age			
60>75	45 (60.0)	42 (56.0)	0.044*
75>85	27 (36.0)	21 (28.0)	
85 and more	3 (4.0)	12 (16.0)	
Sex			
Male	48 (64.0)	51 (68.0)	0.605
Female	27 (36.0)	24 (32.0)	
Level of education			
Cannot read and write	50 (66.7)	49 (65.3)	0.736
Basic education	16 (21.3)	20 (26.7)	
Secondary	7 (9.3)	4 (5.3)	
University	2 (2.7)	2 (2.7)	
Occupation before retirement			
Farmer	13 (17.3)	20 (26.7)	0.428
Housewife	22 (29.3)	17 (22.7)	
Employee	21 (28.0)	17 (22.7)	
Free business	5 (6.7)	9 (12.0)	
Skilled worker	14 (18.7)	12 (16.0)	
Residence			
Urban	9 (12.0)	11 (14.7)	0.631
Rural	66 (88.0)	64 (85.3)	
Smoking habits			
Current smoker	38 (50.6)	34 (45.3)	0.737
Stopped smoker	11 (14.7)	13 (17.3)	
Passive smoker	13 (17.3)	13 (17.3)	
Nonsmoker	13 (17.3)	15 (20.0)	

$P < 0.05$ is statistically significant.

Table 3 Indications for bronchoscopy among the studied patients (N=150)

Diagnostic indication for bronchoscopy	Control group (n=75) [n (%)]	Study group (n=75) [n (%)]	P. value
Haemoptysis	11 (14.7)	17 (22.7)	0.072
Lung mass	33 (44.0)	39 (52.0)	
Mediastinal lymphadenopathy	16 (21.3)	7 (9.3)	
Pleural effusion	9 (12.0)	6 (8.0)	
Lung abscess	6 (8.0)	6 (8.0)	

$P < 0.05$ is statistically significant.

Table 4 Knowledge score about bronchoscopy of the studied patients (N=150)

Knowledge score	Control group (n=75)	Study group (pre-educational program) (n=75) [n (%)]	Study group (post-educational program) (n=75) [n (%)]	P_1	P_2	P_3
Poor	70 (94.7)	67 (89.3)	39 (52)	0.724	<0.001	<0.001
Fair	4 (5.3)	5 (6.7)	20 (26.7)			
Good	1 (1.3)	3 (4)	16 (21.3)			
Total knowledge score (mean±SD)	2.3±1.5	2.5±1.6	8.9±2.1	0.631	<0.001	<0.001

$P < 0.05$ is statistically significant; P_1 : between control group and study group (pre-educational program); P_2 : between control group and study group (post-educational program); P_3 : between pre- and post-educational program.

bronchoscopy and reflection of this on the easiness and difficulty of bronchoscopy procedures.

Assessment of sociodemographic characteristics of patients undergoing the health education program is important as the program can be tailored to meet the patient learning needs and health messages could be received easier [10]. The present study has shown that

male patients were predominant than female patients which may be attributed to the higher incidence of chest diseases in men than in women due to the increase in the number of male smokers, and the higher work-related risk in men than in women. Another studies supported this [11]. In this study, nearly two-third of the study patients were illiterate and this may be due to the setting of the study in free

Table 5 Hospital anxiety scale in studied patients (N=150)

Hospital anxiety scale	Control group (n=75) [n (%)]	Study group (pre-educational program) (n=75) [n (%)]	Study group (posteducational program) (n=75) [n (%)]	P_1	P_2	P_3
Normal anxiety	2 (2.7)	3 (4)	17 (22.7)	0.802	0.001	0.001
Borderline case of anxiety	27 (36)	24 (32)	56 (74.7)			
Abnormal case of anxiety	46 (61.3)	48 (64)	2 (2.7)			
Total anxiety score (mean±SD)	13.3±4.3	12.7±2.4	7.94±2.1	0.647	<0.001	<0.001

$P < 0.05$ is statistically significant; P_1 : between control group and study group (pre-educational program); P_2 : between control group and study group (posteducational program); P_3 : between pre and posteducational program.

Table 6 Data of the bronchoscopy procedure among the studied patients (N=150)

Items	Control group (n=75)	Study group (n=75)	P
Oxygen saturation (mean±SD) (%)			
Before procedure	96.87±3.36	98.13±2.03	0.082
During procedure	94.47±1.28	96.93±2.18	<0.001
After procedure	96.8±1.63	98.27±2.05	0.003
Heart rate (mean±SD) (beat/min)			
Before procedure	100.73±13.83	89.53±11.77	0.001
During procedure	126.6±16.86	106.2±14.56	<0.001
After procedure	116.93±18.66	97.13±11.95	<0.001
Mean arterial pressure (mean±SD) (mmHg)			
Before procedure	90.07±9.61	91.47±7.82	0.538
During procedure	91.2±7.88	93.27±6.68	0.278
After procedure	91.73±8.29	93.53±6.67	0.358
Duration of procedure (mean±SD) (min)	23.13±3.66	14.53±1.98	<0.001
Number of diluted lidocaine syringes (mean±SD)	6.47±1.17	5±0.64	<0.001
Patient had discomfort during procedure (%)	57 (76)	13 (17.3)	<0.001
Complication during bronchoscopy procedure (%)	45 (60)	27 (36)	0.04

$P < 0.05$ is statistically significant.

governmental hospital and the majority of patients having a low education and economical standards. Educated or highly educated patients are treated in private hospitals or in health insurance hospitals. Higher proportions of our patients came from rural area; this is related to inadequate health services in these places; moreover, patients in these areas are exposed to many chemical substances used in farming and building in addition to fumes from burning agriculture wastes and dry plants and this increases the risk of chest diseases. This was in agreement with another study which reported that chest diseases incidence rate had a tendency to reduce in urban areas [12]. More than two-thirds of the studied patients were cigarette and water-pipe (shisha) smokers. Cigarette contains about 60 known carcinogens. In addition, nicotine depresses the immune response to malignant growths in the exposed tissue. So cigarette smoking is the main cause of lung cancer. Other types of tobacco smoking, such as pipe, cigar, are also linked to chest diseases, although the relative risks are not as high as for cigarette smoking [13]. Lung masses were the common indication of bronchoscopy. This is

observed in our daily practice where most patients attending our bronchoscopy unit has a mass-like lesion in their radiographs or computed tomography chest. Preprocedural preparation and health teaching is important and should include completed patient's chart containing consent, all laboratory reports and nurses' records. Other aspects of preprocedural preparation and teaching include advising the patient to leave jewelry and contact lenses at home, to wear loose fitting, comfortable clothes, a fasting period of 4–6 h, psychological support in addition to explanation of the procedure to the patients [4]. However, the finding of the current study has shown that more than half of the studied patients have insufficient information about the bronchoscopy procedure. They have poor knowledge about preprocedural preparation and teaching. This may be explained by the fact that the majority of the patients were illiterate. Also the majority of the studied patients did not receive any advice or knowledge about the bronchoscopy preparation and how to manage its complications and this may be due to the lack of sufficient communication with the healthcare givers. Healthcare givers are either too busy with

administration work or unaware about the importance of knowledge and information about bronchoscopy that should be given to the patients. This observation was supported by some authors who reported that the nurses perform only professional activities such as taking vital signs, giving treatment, and they lack time to give any knowledge about the patient condition or teaching him how to prepare for the procedure, in addition to patients preferred physicians as the main source to give advice and knowledge [10].

In this study, the knowledge score significantly improved by application of the designed educational program including diagrams and pictures as elderly patients need more pictures to obtain instructions and this method of receiving knowledge is preferable to written instructions to overcome the illiteracy problem. In consistent with this, Thomas and colleague reported that a structured teaching program is an effective strategy in improving the knowledge level of the patients undergoing endoscopy. This can be made more effective by using appropriate audiovisual aids and is important in reducing anxiety related to the procedure [5].

Assessment of anxiety is important, because the response to anaesthesia and analgesia in anxious patients is different when compared with nonanxious patients. Emotional and psychological preparations play an important role in many areas of nursing. Preoperative preparation is vital to patient safety and a key nursing outcome that can minimize and ensure patients arrive in the operating department ready for the procedure. Patient education is also a valuable tool for reducing preoperative anxiety [14]. This study evaluated the effectiveness of a psychoeducational intervention through the designed guideline in reducing the procedural anxiety related to bronchoscopy and to demonstrate the feasibility and utility of this intervention and concluded that providing patients with simple and comprehensive preprocedural educational program significantly reduced the anxiety scale and improve the tolerability of the procedure. That was matched with some studies which reported that the psychoeducational intervention while providing specific information about what will happen during a medical procedure will reduce anxiety related to the procedure [15].

Moreover, in agreement with the current study Gunay *et al.* [16] have concluded that multimedia information will help bronchoscopists in having a patient with lesser anxiety scores especially if the patients are having no previous experience of any type of endoscopic examinations. The interview before the procedure,

build a trustful relation and provide the patient with information essential to prevent anxiety and the structured teaching program resulted in an increased knowledge and a decrease in the anxiety score [5].

Larger doses of analgesics are required to patients with extreme preoperative anxiety. In addition, those patients tend to have longer procedure time and longer hospital stays. In the current study, patients who take nursing guidelines have significantly low level of anxiety, short procedure time, low sedation dose and less discomfort and few complications than in the control group. Some studies support this observation [3]. Finally the analysis of the present study finding has revealed that patients have insufficient knowledge related to the bronchoscopy procedure and have increased levels of anxiety. Therefore, there is a need that all the required information should be supplied to help patients and to achieve a successful outcome of the bronchoscopy procedure. Application of instructions and guidelines is very important as a routine care for patients undergoing bronchoscopy to improve knowledge and anxiety scale and to increase tolerability and easiness of the procedure. Nursing staff play an important role in providing information and being supportive during the procedure.

The most important limitation of the current study was that it was a single-centre and small-sized sample study and needed to be confirmed by further multicenter large number of studies. In addition, the duration and challenges during bronchoscopy may be affected by many factors such as the location and the nature of lesion(s) and if biopsy was taken or not.

Acknowledgements

Ali A Hassan, Soad. A. Sharkawy, and Hanan. A. Abozeid were responsible for the conception and design. Ali A Hassan collected the cases. Anwar M Ali revised the knowledge and anxiety scores used in the study and translated them into Arabic language. Martha. M. Labieb made the interview with the cases and explained the educational program in a simple manner according to the patient's understandings. Ali. A. Hasan, Soad. A. Sharkawy, and Hanan. A. Abozeid were responsible for the analysis and interpretation of data. Ali A Hassan, Hanan. A. Abozeid, and Martha. M. Labieb were responsible for drafting the article, revising it critically for important intellectual content, and for the final approval of the version to be published.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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