Factors Related to Activation in Chinese Patients With Chronic Obstructive Pulmonary Disease: A Cross-Sectional Survey Study

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ABSTRACT

Background: Improving patient activation can lead to better health outcomes among patients with chronic obstructive pulmonary disease (COPD). However, no studies have focused on the issue of activation in patients with COPD in China.

Purpose: This study was designed to explore the status of activation in patients with COPD in China and explicate the significant influencing factors.

Methods: One hundred seventy patients with COPD were recruited using a convenience sampling method from eight tertiary and secondary hospitals in Nanjing, China. Sociodemographic, clinical, and patient-reported factor data were collected. Univariate analysis and multivariate linear regression were performed.

Results: Only 10.6% of the patients were identified as activated for self-management. Multivariate linear regression analysis revealed four explanatory elements as significantly associated with patient activation, including social support ($\beta = .463, p < .001$), free medical insurance ($\beta = .173, p = .007$), smoking status ($\beta = -.195, p = .002$), and health status ($\beta = -.139, p = .04$).

Conclusions/Implications for Practice: The findings of this study indicate that a minority of patients with COPD are activated for self-management in China. Having a higher level of patient activation was associated with having better social support, having free medical insurance, being a nonsmoker, and having a better health status. Creating a supportive environment, promoting smoking cessation, and improving medical security and health status may be considered as potential strategies to activate patients into better self-management.

Key Words: pulmonary disease, chronic obstructive, patient activation, self-management.

Introduction

Chronic obstructive pulmonary disease (COPD) is a common, preventable, and treatable disease that is characterized by persistent respiratory symptoms and airflow limitation (Vogelmeier et al., 2017). COPD ranks among the leading causes of mortality and morbidity worldwide (Varmaghani et al., 2019). In 2015, 3.2 million people died of COPD worldwide, representing an increase of 11.6% over 1990 (Ruvuna & Sood, 2020). The global prevalence of postbronchodilator COPD has been estimated at around 12.16% (Varmaghani et al., 2019). In China, the age-standardized COPD mortality rate in 2017 was 68 per 100,000 individuals, making COPD the third leading cause of death (Zhou et al., 2019). Moreover, the prevalence of COPD in Chinese aged 40 years or older was approximately 13.7% in 2015 (C. Wang et al., 2018) and 8.2% in 2002–2004. Furthermore, COPD was ranked the eighth most significant cause of disease burden, as measured by disability-adjusted life years in 2015 (Ruvuna & Sood, 2020). Because of its high prevalence, rate of mortality, and disease burden, COPD has become a worldwide public health concern.

Self-management is a strategy widely used to address the burdens of COPD on patients and society (Zwerink et al., 2014). Self-management has been cited as being effective in improving well-being and reducing medical costs for patients with COPD (Cramm & Nieboer, 2013). In the last two decades, numerous self-management programs have been developed to improve patients’ health behaviors and equip them with the necessary skills to become actively involved in the management of their disease. However, a substantial
proportion of patients with COPD do not comply with these programs or engage in self-management (Bos-Touwen et al., 2015). Hence, it is crucial to understand the degree to which patients with COPD actively conduct self-management.

“Patient activation” is defined as the patient's knowledge, skill, and confidence to improve or maintain their own health (Hibbard et al., 2004). Specifically, “activation” refers to an individual's abilities, willingness, and readiness to take part in the health behaviors required to cope with the chronic conditions of their disease (Carey et al., 2018). Activation involves four stages: (a) believing in the patient role, (b) building the patient's confidence and knowledge in self-management, (c) taking action to maintain and improve one's health, and (d) staying in the course even under stress (Hibbard et al., 2005).

Ample evidence shows that higher activation is associated with better self-management behaviors (Barker et al., 2018), greater chances of clinical remission (Barnes et al., 2019), and lower healthcare utilization (Kinney et al., 2015). Moreover, patient activation has been increasingly regarded as having a unique role in improving patient behavior regarding disease management (J. Chen et al., 2014). Knowing about patient activation can help healthcare providers understand their patients' needs and develop targeted support strategies accordingly. For example, the National Health Service in England identified patient activation as a potentially useful tool in the development of services to meet the needs of patients with long-term conditions (Blakemore et al., 2016).

Therefore, patient activation for self-management is crucial for individuals with chronic diseases as well as for determining the disease characteristics that influence patient activation. Previous studies have shown varying levels of activation in patients with COPD across different sociodemographic, psychosomatic, and clinical characteristics that have been regarded as key factors of activation in patients with chronic diseases. These factors include geographical origin, body mass index, age, disease severity (according to Global Initiative for Chronic Obstructive Lung Disease criteria), comorbidities, physical health status, illness perception, anxiety, depression, and social support (Bos-Touwen et al., 2015; Korpershoek et al., 2016; Yadav et al., 2020). However, in China, no studies have focused on the activation of patients with COPD. To address this knowledge gap, this study was designed to examine the status of self-management activation in patients with COPD in China and explore its influencing factors. By identifying the various factors associated with patient action, a targeted and effective intervention for Chinese patients with COPD may be developed.

**Methods**

**Design**

A descriptive cross-sectional study was conducted in the respiratory department of eight tertiary/secondary hospitals in Nanjing, China. The study was approved by the Ethics Committee of the First Affiliated Hospital of Nanjing Medical University (approval number: 2020-SR-019).

**Participants**

Patients were recruited based on the following inclusion criteria: having a clinical diagnosis of COPD (having a postbronchodilator forced expiratory volume in 1 s/forced vital capacity ratio of less than 70%), being at least 40 years old, being able to speak Mandarin, and having full use of mental faculties. Patients with a life expectancy of less than 3 months or a diagnosis of lung cancer were excluded.

It was recommended that sample size in this study be estimated by adding 50 to the total number of variables (Green, 1991). As 20 variables were used in this study, the sample size should be at least 70 patients. As the minimum sample size was increased in this study by 20% to account for potential withdrawals, a total sample size of 84 patients with COPD was targeted.

**Data Collection**

Two researchers took responsibility for data collection. Before data collection, the corresponding author trained these two researchers to minimize interrater bias. The researchers then sent out invitations to prospective participants in the outpatient departments and wards of eight tertiary/secondary hospitals in Nanjing, China. After consent was obtained, patients with COPD received a document with detailed study information, including an informed consent letter and a questionnaire. Patients were asked to sign an informed consent form and complete the questionnaire. The researchers guided the patients on how to complete the questionnaire. The questionnaire was composed of a series of Chinese-validated items, including questions related to sociodemographic and clinical characteristics.

**Measures**

The primary outcome was patient activation, which was assessed using the Chinese version of the 13-item Patient Activation Measure (PAM-13; S. Q. Chen, 2017). This scale is designed to measure self-reported knowledge, skills, and confidence in self-management, with items rated on a 5-point scale (1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree, and 0 = not applicable). A standardized spreadsheet was used to record the participants’ answers. This standardized spreadsheet allowed the research team to calculate participants’ PAM-13 scores and automatically output their respective levels of activation. Total possible scores ranged from 0 to 100. The Cronbach’s α, test–retest correlation coefficient, and content validity index for this scale were .82, .70, and .87, respectively (S. Q. Chen, 2017).

On the basis of previous studies (Korpershoek et al., 2016; McCabe et al., 2018), health status, illness perception, anxiety, depression, social support, sociodemographic characteristics, and clinical factors were selected as the predictor variables.
Health status was assessed using the COPD Assessment Test (Vogelmeier et al., 2017), which covers eight of the most burdensome symptoms and limitations related to COPD, including cough, phlegm, chest tightness, breathlessness when going up hills/stairs, activity limitations at home, confidence in leaving home, sleep, and energy. The total possible score range was 0–40, with a cutoff of 10, and higher scores associated with a poorer health status (Karloh et al., 2016). This disease-specific scale has been validated worldwide, with an internal consistency of .85–.98 and a test–retest reliability ranging between .80 and .96 for different countries (Gupta et al., 2014).

To measure illness perception in patients with COPD, the Brief Illness Perception Questionnaire (BIPQ; Broadbent et al., 2015) was used. The BIPQ is composed of eight dimensions: consequences, timeline, personal control, treatment control, identity, concern, understanding, and emotional response. Each item is scored from 0 to 10, with total possible scale scores ranging from 0 to 80. Higher scores are associated with a more-negative illness perception. A meta-analysis has shown that this scale has good psychometric properties, including concurrent, predictive, and discriminant validity (Broadbent et al., 2015). The Cronbach’s α of the Chinese version of the BIPQ in patients with COPD was .71 (Li et al., 2017).

The Hospital Anxiety and Depression Scale (HADS), including the two subscales of anxiety and depression, was used to measure the presence and level of emotional disorders (Beekman & Verhagen, 2018). Each subscale contains seven items graded on a 4-point Likert scale, with total possible scores ranging from 0 to 21. The internal consistency for the subscales of anxiety and depression was high, whereas their Cronbach’s α ranged from .68 to .93 and from .67 to .90, respectively. Furthermore, the ability of the questionnaire to discriminate was found to be moderate to high, with sensitivities and specificities of ≥ .70 (Beekman & Verhagen, 2018). The Cronbach’s α of the Chinese version of the HADS (overall), the HADS anxiety subscale, and the HADS depression subscale were all > .75 in patients with COPD, whereas the cutoff point in the Chinese population was 8 (Li et al., 2017).

The 10-item Social Support Rating Scale (Liu & Li, 2019) was used to measure social support in this study. This instrument includes the three dimensions of objective support, subjective support, and the utilization of social support, with higher scores indicating better social support. The Cronbach’s α and test–retest correlation coefficient of the scale were .72 and .92, respectively.

The sociodemographic characteristic information collected in this study included gender, age, body mass index, family income, medical insurance, educational level, marital status, living conditions, working status, and smoking status. Because of its implications for pulmonary disease, smoking status was of particular importance. The participants were classified as smoker, ex-smoker, or nonsmoker. Following a previous study (Zhang et al., 2016), ex-smokers included persons who had consumed at least 100 cigarettes or 100 grams of tobacco during their lifetime but had not smoked 30 days before the study. Smokers included persons who had consumed at least 100 cigarettes or 100 grams of tobacco during their lifetime and had done so within 30 days before the survey. Nonsmokers included persons who had consumed fewer than 100 cigarettes or 100 grams of tobacco during their lifetime.

Clinical characteristics included the course of COPD, exacerbation, dyspnea level, grade of COPD, and comorbidities. The course of COPD was defined as the time from the first diagnosis of the disease. Exacerbation was defined as the degree to which change in symptoms exceeds the daily variation range and leads to medication treatment plan changes (Chronic Obstructive Pulmonary Disease Group, Respiratory Branch, Chinese Medical Association, 2014). Dyspnea was rated using the 5-point modified Medical Research Council dyspnea scale. COPD grades were assessed according to the Global Initiative for Chronic Obstructive Lung Disease criteria (Vogelmeier et al., 2017). Data on lung function were extracted from participants’ medical records. Comorbidities included the following chronic conditions: asthma, cancer, chronic kidney disease, diabetes, hypertension, heart disease, hyperlipidemia, arthritis, osteoporosis, gastric disease, and stroke. Following a previous study (Blakemore et al., 2016), comorbidities were classified into “one or none” and “two or more.”

Data Analysis

IBM SPSS Statistics 22.0 (IBM Inc., Armonk, NY, USA) was used for data analysis. Categorical variables are presented as numbers and percentages, whereas continuous variables are presented as either mean and standard deviation (when normally distributed) or median and interquartile range (when nonnormally distributed). In the univariate analysis, because the PAM-13 scores showed skewed distributions, a Spearman’s correlation was conducted to determine the association between PAM scores and the continuous variables. Moreover, the Mann–Whitney U test or Kruskal–Wallis test was used to determine the association between PAM-13 scores and the categorical variables. Furthermore, to identify the variables associated with activation for self-management, multivariate linear regression was performed, and a stepwise selection was used, including those variables with values of \( p < .05 \) in the univariate analysis. The assumptions of linearity, normality, multicollinearity, and homoscedasticity were checked and approved. Statistical significance was set at \( p < .05 \), and all tests were two-tailed.

Results

Response and Participant Characteristics

Approximately 248 eligible patients with COPD were invited to participate in the study, of which 192 signed consent letters and were enrolled as participants. Twenty-two were
excluded because of submitting invalid PAM-13 questionnaires, leaving data from 170 participants available for inclusion in the final analysis. The average total time required to complete the questionnaires was 24 minutes. There were no missing data in the returned questionnaires. The characteristics of the participants are shown in Table 1. The participants ranged in age between 50 and 92 years; most patients were male (83.5%), married (83.5%), unemployed (94.1%), and ex-smokers (58.8%). More than half had a modified Medical Research Council dyspnea scale score above 1 (57.1%) and a disease course longer than 5 years (57.1%).

### Patient Activation

As shown in Table 2, PAM-13 scores for the participants ranged from 38.10 to 100, with a mean and median of 57.06 and 55.60, respectively. The participants were nearly equally distributed among Level 1 (24.7%) and Level 2

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**Table 1**

**Patient Characteristics (N = 170)**

| Characteristic                     | n    | %      | p     |
|-----------------------------------|------|--------|-------|
| Age (median and [Q1, Q3])         | 71.00| 64.75, 77.25 | .48   |
| Body mass index (M and SD)        | 22.58| 3.82   | .37   |
| Gender                            |      |        |       |
| Male                              | 142  | 83.5   |       |
| Female                            | 28   | 16.5   |       |
| Marital status                    |      |        |       |
| Married                           | 142  | 83.5   |       |
| Unmarried                         | 28   | 16.5   |       |
| Working                           |      |        |       |
| Employed                          | 10   | 5.9    |       |
| Unemployed                        | 160  | 94.1   |       |
| Living arrangement                |      |        |       |
| Living alone                      | 19   | 11.2   |       |
| Living not alone                  | 151  | 88.8   |       |
| Income (yuan)                     |      |        |       |
| ≤ 3,000                           | 54   | 31.8   | .003  |
| 3,001–5,000                       | 80   | 47.1   |       |
| 5,001–10,000                      | 24   | 14.1   |       |
| > 10,000                          | 12   | 7.1    |       |
| Education                         |      |        | < .001|
| Primary school or below           | 47   | 27.6   |       |
| Middle school                     | 53   | 31.2   |       |
| High school or junior college     | 55   | 32.4   |       |
| Bachelor degree or above          | 15   | 8.8    |       |
| Insurance                         |      |        | .02   |
| None                              | 9    | 5.3    |       |
| Residents’ medical insurance      | 22   | 12.9   |       |
| Employees’ medical insurance      | 119  | 70.0   |       |
| Free medical insurance            | 20   | 11.8   |       |
| Smoking status                    |      |        | .02   |
| Nonsmoker                         | 35   | 20.6   |       |
| Ex-smoker                         | 100  | 58.8   |       |
| Smoker                            | 35   | 20.6   |       |
| Course of disease                 |      |        | .38   |
| < 2 years                         | 40   | 23.5   |       |
| 2–5 years                         | 33   | 19.4   |       |
| > 5 years                         | 97   | 57.1   |       |
| mMRC score                        |      |        | .10   |
| < 2                               | 73   | 42.9   |       |
| ≥ 2                               | 97   | 57.1   |       |
| Exacerbation                      |      |        | .02   |
| Yes                               | 142  | 83.5   |       |
| No                                | 28   | 16.5   |       |
| GOLD stage                        |      |        | .11   |
| I                                 | 9    | 5.3    |       |
| II                                | 49   | 28.8   |       |
| III                               | 69   | 40.6   |       |
| IV                                | 43   | 25.3   |       |
| Comorbidities                     |      |        | .29   |
| None or 1                         | 117  | 68.8   |       |
| Two or more                       | 53   | 31.2   |       |

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**Table 2**

**Description of Patient Activation Score of the Sample (N = 170)**

| Measure                           | n    | %      |
|-----------------------------------|------|--------|
| PAM scores (mean and SD)          | 57.06| 11.51  |
| PAM scores (median and [Q1, Q3]) | 55.60| [48.42, 63.10] |

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Note. PAM = Patient Activation Measure.
(21.8%), with 42.9% classified as Level 3 and only 10.6% classified as Level 4 (activated for self-management).

**Determinants Associated With Activation for Self-Management**

The results of the univariate analysis are shown in Table 1. Income, educational level, insurance, smoking status, exacerbation, anxiety, depression, social support, and health status were all shown to be significantly related to activation \((p < .05)\). Multivariate linear regression analysis revealed the following four characteristics as significantly related to patient activation \((F = 24.97, p < .001)\): social support \((\beta = .46, p < .001)\), free medical insurance \((\beta = .17, p = .007)\), smoking status \((\beta = −.20, p = .002)\), and health status \((\beta = −.14, p = .04; \text{Table 3})\). The adjusted \(R^2\) of the multivariable model was .36.

**Discussion**

The results of this study indicate that only a minority of patients with COPD are activated for self-management in China. Higher PAM-13 scores in the participants were associated with better social support, nonsmoking, free medical insurance, and a more positive health status. To our knowledge, this is the first study to investigate patient activation and its influencing factors in patients with COPD in China.

In this study, the mean PAM score (55.6) was similar to that reported in a Dutch study (54.7; Korpershoek et al., 2016), lower than those reported in an American study (66; Wetzstein et al., 2020) and a Dutch study that included patients with COPD (61.3; Rademakers et al., 2012). This discrepancy may be because of differences in culture, participant ages, and the inclusion of patients with different chronic diseases. Nearly a quarter of the patients in this study were classified as Level 1, indicating a lack of awareness that they should play an active role in their own health and that they tend to be passive recipients of care. This situation may be because of the influence of the culture surrounding traditional Chinese medicine (S. Q. Chen, 2017), within which patients perceive doctors as solely responsible for treatment and controlling disease depends on the doctors alone. Only a minority of the patients in this study (10.6%) were activated for self-management, indicating there still is considerable room to improve patient activation in China.

Social support in this study was strongly and positively related to patient activation, which is inconsistent with the findings of Bos-Touwen et al. (2015), who observed a negative association between social support and activation in patients with COPD. This discrepancy in findings may be because of the higher ratio of married patients and patients living with families in this study, implying that they may receive more care-related support. Another reason for this discrepancy may be the specific values and circumstances of traditional Chinese culture. Filial piety is an important concept in Confucianism that advocates for the care of the older adults (Tsai et al., 2016). Most participants were more than 60 years old. Typically, when older people become ill, family members assume related caring responsibilities. Some investigators reported similar findings in patients with Type 2 diabetes (van Vugt et al., 2018) and other chronic diseases (Blakemore et al., 2016; Bos-Touwen et al., 2015; Gleason et al., 2016). In addition, it is well known that social support has a significant and positive predictive effect on the self-efficacy of patients with chronic disease (Rashid et al., 2018). In other words, the more social support that patients perceive, the greater their sense of self-efficacy and motivation for self-management. Given the unsatisfactory activation status of patients with COPD, targeted interventions that encourage families and health professionals to engage in disease management are necessary.

In this study, free medical insurance was associated with better PAM-13 scores. This finding echoes McCabe et al., who found that better insurance was associated with higher activation levels in patients with atrial fibrillation (McCabe et al., 2018). Currently, basic medical insurance, which is composed of residents’ medical insurance and employees’ medical insurance, covers 95% Chinese citizens, whereas nearly all civil servants are covered by free medical insurance (Qiu & Wang, 2019). The financing level and reimbursement ratio for free medical insurance are higher than those for other types of medical insurance (Du & Lv, 2017). A Chinese survey indicated that patients with COPD who enjoy free medical insurance have better health literacy (L. Wang, 2012). This may be because patients who enjoy free medical care generally have better occupational backgrounds and

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**Table 3**

Multivariate Linear Regression for Determinants Associated With Patient Activation \((N = 170)\)

| Variable                   | \(B\)  | \(SE\) | \(\beta\) | \(t\)  | \(p\)  | 95% CI       | VIF |
|----------------------------|-------|-------|----------|-------|-------|--------------|-----|
| Constant                   | 34.26 | 4.59  | .46      | 7.46  | <.001 | [25.19, 43.33] |     |
| Social support             | 0.84  | 0.12  | .46      | 6.97  | <.001 | [0.60, 1.07]  | 1.17|
| Free medical insurance vs. none | 6.15  | 2.24  | .17      | 2.74  | .007  | [1.71, 10.58] | 1.05|
| Smoker vs. nonsmoker       | −5.54 | 1.76  | −.20     | −3.14 | .002  | [−9.02, −2.02] | 1.02|
| Health status              | −0.22 | 0.11  | −.14     | −2.07 | .040  | [−0.43, −0.01] | 1.20|

Note. \(R^2 = .38\), adjusted \(R^2 = .36\), \(F = 24.97, p < .001\). CI = confidence interval; VIF = variance inflation factor.
social status, less financial pressure, and more chances to acquire health knowledge (L. Wang, 2012). Therefore, it is important for medical staff to focus on promoting activation in patients who have lower levels of medical security. The government should introduce measures such as expanding the reimbursement rate of medical insurance and reducing the price of drugs through negotiations with pharmaceutical companies to protect the medical rights of patients with COPD.

In this study, we found smoking status to be negatively related to the activation of self-management in patients with COPD. To our knowledge, this is the first study to establish a predictive relationship between smoking status and self-management activation in patients with COPD. It is well known that smoking is an important risk factor for COPD and that patients are often encouraged to quit smoking (Vogelmeier et al., 2017). Failure to quit smoking may be indicative that a patient does not perform self-management well. A previous study found smoking to be associated with a lower level of health-directed activities, lower self-monitoring, and insight in patients with COPD (Bringsvor et al., 2018). However, Wetzstein et al. (2020) found a relationship between heavy smoking and better patient activation in patients with COPD. As the main cause of COPD is tobacco smoking, it is challenging to explain why smoking would be a predictor of better self-management. Wetzstein et al. theorized that this may have been because most patients are urged to quit smoking, and self-efficacy (which is crucial for patient activation) is enhanced during the initiation and success of the quitting process. Further research is needed to explore the relationship between smoking and patient activation and its underlying mechanisms.

In addition, the results of this study indicate that a worse health status may independently predict a lower activation level in patients with COPD. This echoes the findings of previous studies on different chronic diseases (Van Vugt et al., 2018; Zimbudzi et al., 2017). To our knowledge, this is the first study to identify health status as a key determinant to the variance in activation in patients with COPD. A possible explanation may be that COPD-related pathophysiological changes and respiratory symptoms result in reduced health-related activities, social functioning, and engagement in life (Bringsvor et al., 2018). However, considering the large body of evidence showing the positive effect of activation on patient health outcomes, it will be worth exploring whether heavy symptom burden reduces patient activation or if lower patient activation and subsequent health outcomes lead to poorer health status. Future studies are required to clarify the relationship between these two variables. The median score of health status in this study was 12, indicating that more than half of the patients experienced heavy symptom burdens and further suggesting that the overall situation for persons with COPD in China is grim. A COPD Assessment Test score of ≥ 10 should alert healthcare providers that a patient may be at risk of lower activation for self-management.

An association between anxiety or depression and patient activation has been observed consistently in patients with chronic disease (Blakemore et al., 2016; Korpershoek et al., 2016; McCabe et al., 2018). However, to our surprise, no significant relationship between the HADS subscale scores and patient activation was found in this study. This may be attributable to the different characteristics and measures considered in this study. In addition, previous studies have noted a Chinese cultural tendency to deny/suppress mental and emotional symptoms (Guo et al., 2017). Most of the patients involved in this study did not exhibit symptoms of anxiety or depression. Further study of the relationship between negative emotions and patient activation in a diverse Chinese sample will be necessary to determine the nature of this relationship in patients with COPD.

One of the key strengths of this study is the inclusion of a wide range of determinants. In addition, conducting the survey in eight tertiary and secondary hospitals with a wide population flow made our sample highly representative. However, this study was also affected by several limitations. First, because of its cross-sectional design, no causality could be identified. Second, the multivariate linear regression conducted on variables with a value of $p < .05$ in the univariate analysis may enhance the chance of false positives. Third, only 170 patients were included, most of whom were in the severe or very severe stage of their disease process. Hence, the results should not be generalized to the entire population of patients with COPD—especially those with mild or moderate COPD. Fourth, although this study took several variables into account, others such as the quality of the patient-provider relationship, patients’ perception of quality of care, and hospitalization status were not included and should be explored in future research. Fifth, the interrater reliability of the questionnaires was not tested because there were two researchers collecting data, which may have caused bias.

Conclusions

In this study, only a minority of the patients were ready or had already begun to take health-directed activities to improve their health. Understanding the factors influencing patient activation is very important for healthcare providers to identify patients who are less likely to be activated for self-management as well as to propose appropriate interventions to help patients self-manage their disease better. Medical staff should carefully supervise patients, especially those with poor social support, smokers, those with poor medical insurance, and those with poor health status, to enhance their activation for self-management. Creating a supportive environment, promoting smoking cessation, and improving medical security and health status should be adopted as key strategies for activating patients for better self-management.

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