



Original Article

Patient delay and related influencing factors in Chinese women under 35 years diagnosed with cervical cancer: A cross-sectional study

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ABSTRACT

Objective: Patient delay was defined as an interval between the discovery of the initial symptoms and diagnosis, which was longer than 90 days. This study aimed to determine the patient delay rate and related factors in women with cervical cancer in Hunan province, South-Central China.**Methods:** A cross-sectional study was conducted among 140 women with cervical cancer aged <35 years from October, 2019 to March, 2021. Assumptions in Andersen Behavioral Model of Health Services Utilization were used to measure the factors influencing patient delay. Logistic regression models were used to identify factors associated with patient delay. A *P*-value of <5% was considered significant.**Results:** A total of 57 (40.71%) young women with cervical cancer had patient delay, with an average delay time of 178.70 (307.90) days. Predisposing factors, such as religion, unemployment, health beliefs related to cancer screening, and a history of cervical cancer screening within 2 years or more ($P < 0.05$), were associated with patient delay. Enabling factors, such as distance to the nearest medical facility and type of the nearest medical facility, were associated with a reduced likelihood of patient delay. With the need-for-care factor, young women who experienced vaginal pain after or during intercourse had a higher risk (adjusted odds ratio, 33.48; 95% confidence interval, 3.22–348.68, $P = 0.003$) of patient delay.**Conclusions:** These findings reinforce the need for programs to enhance knowledge and awareness about cervical cancer screening and the importance of early diagnosis in women to help eliminate cervical cancer in China by 2050.

Introduction

Cervical cancer is the fourth most common cancer in women.¹ Approximately 570,000 cases and 311,000 deaths due to cervical cancer were recorded worldwide in 2018.¹ China contributes to more than 18% of the global cervical cancer burden, with 106,000 cases and 48,000 deaths.¹ Human suffering, societal burden, and high economic costs associated with cancer have been reported in many countries^{2–4}, including China.² Although the maximum incidence rate is recorded around the age of 40 years, the number of cervical cancer cases is increasing at an alarming rate among younger women in China,⁵ that is, approximately 11 cases per 100,000, with an annual increase of 3.05%

($P < 0.001$).⁶ High frequencies of cervical adenocarcinoma⁷ and lymphatic metastasis³ have been identified in young women, especially in those who are < 35 years old; those with aggressive tumors have a poor prognosis.^{8,9} These factors make early diagnosis of cervical cancer in women an important societal target worldwide.¹

The World Health Organization recently announced a global strategy toward the elimination of cervical cancer and set the goal of reducing the global annual age-standardized incidence to 4 per 100,000 women.¹⁰ The concept of “delayed diagnosis” appears in the literature as an obstacle in cancer prevention and treatment.¹¹ Delayed diagnosis can lead to enlargement of the tumor, increased distant metastasis rate and TNM staging, a higher risk of relapse and death, and poor clinical

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outcomes.^{12,13} Delayed diagnosis is categorized into four components: patient delay, healthcare provider delay, referral delay, and system delay.¹⁴ These different types of delays play an important role in the prevention, diagnosis, and management of cancer.¹⁴ Patient delay is an important obstacle in effective cancer prevention.^{11,14} In the literature, patient delay is defined as an interval longer than 90 days between the discovery of the initial symptoms and diagnosis.^{11,14,15} Studies conducted in Africa reported that the median patient delay in patients with cervical cancer ranged from 97 to 133 days^{15–17}. One study that focused on women under 35 years of age showed that the median patient delay was 270 days (range, 90–720 days), which was significantly longer than that in the older group (270 vs. 60 days, $P = 0.0009$).¹⁸ Therefore, further deterioration of cancer caused by long-term patient delay makes young women bear more treatment burden and face a more severe survival dilemma.^{12,13}

Evidence in China is particularly limited, with only one study showing that the rate of patient delay in women with cervical cancer in the whole age-group was 45% in China.¹⁹ However, government-led cervical cancer screening has only been available for women aged 35–60 years in China,⁵ which allows women older than 35 years to receive immediate diagnosis and treatment after early screening for cervical cancer. Therefore, it is uncertain whether the rate of patient delay in women under 35 years of age is underestimated. Thus, further research is needed to investigate patient delays in young women in China.

The Behavioral Model of Health Services Utilization²⁰ provides a specific path for understanding the personal and external resource factors of patient delays. The model was developed to understand the determinants of health service utilization and to consider societal and individual determinants from the perspective of systematic analysis. This model has three key elements: predisposing, enabling, and requiring variances.²⁰ These elements can either expedite or hinder individuals' utilization of services.²¹

Predisposing factors include social demographic characteristics, such as age, religion, sex, basic beliefs, and attitudes pertaining to health services, which create conditions to increase the probability of health service utilization.²¹ Enabling factors are those that hinder or facilitate health service utilization; these factors include the availability, affordability, and accessibility of drugs and healthcare services.²² Furthermore, the need-for-care factors are variables concerning the perception of individuals' health status.²³ The model has been applied to health-seeking behavior and its determinants.^{24,25} It has also been found to be effective in predicting care delays.^{26,27} For example, predisposing factors, such as high illiteracy level, low socioeconomic status, comorbidities,¹⁸ lack of awareness, and lack of knowledge of early symptoms and causes,¹⁴ are accountable for patient delay among patients with cervical cancer. Studies have also found that the lack of a routine screening program could lead to patient delay.²⁸ However, population-wide cervical cancer screening is only available for women aged 35–60 years in China,⁵ and we cannot determine whether patient delay in young women is associated with inadequate cancer screening. Moreover, no study has comprehensively analyzed factors that may be associated with a delay in the diagnosis of cancer in young women.

Therefore, this study aimed to investigate the patient delay rate in young women with cervical cancer under 35 years of age in China and to explore factors associated with patient delay among this population. We used the Behavioral Model of Health Services Utilization,²⁰ which provides a specific path to understand personal and external resource factors of patient delay for the diagnosis of cancer. The predisposing, enabling, and need factors associated with patient delay were also investigated among young women with cervical cancer. These results provide support for early prevention and control of cervical cancer in the young population.¹⁰

The specific objectives of this survey were to (1) investigate the patient delay rate and (2) analyze its main influencing factors among young women with cervical cancer in Hunan province.

Methods

This article was written according to the Strengthening the Reporting of Observational Studies in Epidemiology 2007 (STROBE 2007).²⁹ The STROBE checklist is available in Additional File 1.

Study design

A cross-sectional study was conducted to examine the rate of patient delay and the potential determinants among young women with cervical cancer between October 27, 2019, and March 18, 2021, in Hunan province, China.

Study setting and participants

This study was conducted in a tumor hospital in Hunan province, China. The incidence of cervical cancer was 43.6 per 100,000 in 2017 in Hunan province, ranking among the top three in China,⁶ and it was higher than the global average rate (13.1/100,000).¹ The hospital, as a single tumor hospital in Hunan province, accepts patients from the entire province. The recruitment of research subjects from the hospital could make the samples sufficiently representative.

The participants were women who were admitted to the study hospital during the data collection period. The inclusion criteria were as follows: (1) age <35 years and (2) new diagnosis of cervical cancer or cervical intraepithelial neoplasia. The exclusion criteria were as follows: (1) participating in or having participated in similar studies in the past and (2) severe physical or mental illness and inability to cooperate with the investigation.

Data collection

The medical records of women who were admitted to the study hospital and diagnosed with cervical cancer were screened by trained hospital staff who acted as research assistants at the hospital. Potential participants who met the inclusion criteria received a phone call from a research assistant who explained the purpose of the study and asked about their preliminary interest in joining the study. If the participant was willing, the research assistant would confirm their eligibility and set a time and place to obtain written informed consent and provide the questionnaire.

A self-report questionnaire was developed based on two paths: first, conclusions from previous studies that reported factors associated with patient delay in women with cervical cancer^{4,11,14,18,30–33}; second, the conceptual framework by Andersen²⁰ (Fig. 1), the model provides a framework to complement more factors that affect health service utilization, such as access to health services and perceived health status.

The final comprehensive questionnaire in Chinese version with 31 items consisted of two parts: (1) the outcome measure was the rate of patient delay (which was classified as to whether there was a delay in symptom presentation) in young women with cervical cancer. The exact time and length of delay were recorded. (2) Independent variables were grouped into three dimensions: (1) predisposing factors included socio-demographic characteristics (age, nationality, religion, marital status, educational status, occupation, habitual residence, and income), family history, history of gestation, menstruation, sexual life, and health beliefs related to cancer screening; (2) enabling factors included medical insurance, type and distance from the nearest medical facility, services available in the nearest medical facility, serviceable time, and available professional nurses in the nearest medical facility; (3) the need-for-care factor was captured as self-perceived symptoms associated with cervical disease (vaginal bleeding after sexual intercourse, no cause of vaginal bleeding, regular lower abdominal pain unrelated to menstruation, vaginal pain after or during intercourse, vaginal discharge with unusual odor or color, and other symptoms).

A pretest was conducted on seven young women with cervical cancer

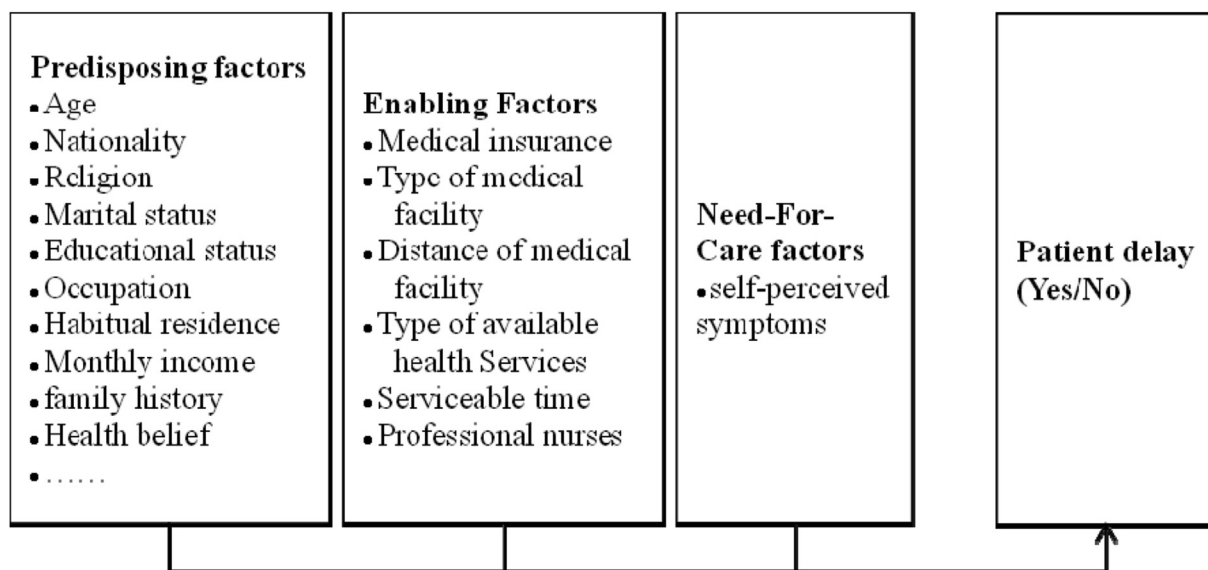


Fig. 1. Theoretical framework.

to ensure that the questionnaire was appropriately structured and consistent. A 2-day training was given to data collection assistants to improve the data collection process. The principal investigator performed close supervision to ensure the completeness of the questionnaires at the time of data collection. Data editing and clearance were performed to ensure proper data management.

Ethical approval was obtained from the Nursing and Behavioral Medicine Research Ethics Review Committee, Xiangya School of Nursing, Central South University (E2019080).

Data analysis

The required sample size was determined using a single-population proportion formula based on the following assumptions: about 45% of patient delay data were taken from the results of a study conducted by Ma et al¹⁹ in women with cervical cancer in China, with 95% confidence interval (CI) and a margin of error of 9%. The minimum sample size was calculated using the following formula:

$$N = \frac{(Z_{\alpha/2})^2 P(1 - P)}{\sigma^2}$$

where *N* is the sample size, *Z*_{α/2} is the normal distribution value at 95% CI (*Z* = 1.96), *P* is the proportion of patient delay (45%),¹⁹ and *σ* is the margin of error (9%), which is generally 0.1–0.2 times of the estimated total ratio (45%). Therefore, the final sample size after adding a 15% nonresponse rate was 139 young women with cervical cancer.

Data were imported into IBM SPSS version 26.0 statistical software (Armonk, NY, USA) for analysis. Only the complete data for the included variables were used. Summary descriptive statistics were calculated using appropriate measures of central tendency (mean) and dispersion (standard deviation [SD]) for continuous data and number and percentage for categorical data.

Independent sample *t*-tests and one-way analysis of variance were performed to explore the associations between patient delay and categorical independent variables. Variables with significant associations with patient delay (*P* < 0.05) in bivariate analysis were qualified for binary logistic analysis. Binary logistic analysis models were used to identify the independent factors associated with patient delay in young women with newly diagnosed cervical cancer. The “enter” regression technique was used to run the analysis. Statistical significance was set at *P* < 0.05.

Results

Characteristics of the study population

A total of 1559 newly diagnosed patients with cervical cancer were tracked throughout the study, among whom 432 (27.71%) were 35 years old and below. A total of 147 participants were eligible and willing to participate in the study, and thus, 147 questionnaires were issued. After removing the incomplete data (*n* = 7), the final sample size was 140. The summary descriptive statistics for the 140 patients are presented in Tables 1 and 2. The minimum age of the study participants was 21 years, and the maximum age was 35 years, with a mean (SD) age of 30.94 (2.83) years. Among 140 young women with cervical cancer, 124 were hospitalized because of the self-discovery of symptoms. The most common symptom was “vaginal bleeding after sexual intercourse” (40/140, 28.6%) and “no cause of vaginal bleeding” (26/140, 18.6%), while the remaining 16 patients were referred for screening or other diseases (Fig. 2).

Patient delay in young women with cervical cancer

Patient delay was defined as an interval longer than 90 days between the discovery of initial symptoms and diagnosis^{11–13}. For patients who were referred, we counted the duration from the time when the referral was recommended for diagnosis. Among the 140 respondents, 57 (40.71%) had patient delays. The minimum delay time of this population was 90 days, and the maximum was 375 days, with the mean (±SD) delay time of 178.70 (307.90) days.

Determinants of patient delay among young women with cervical cancer

Twenty-nine variables were tested for potential association with patient delay in young women with cervical cancer. Sixteen patients had a significant association with patient delay (Table 3).

After adjusting for all other predictors through multivariable analysis, predisposing factors, such as religion, occupation, health beliefs related to cancer screening, and history of cervical cancer screening, were found to be significantly associated with patient delay. Buddhism (adjusted OR [aOR], 3.21; 95% CI, 1.02–10.11, *P* = 0.047) or other religions (aOR, 3.96; 95% CI, 1.10–14.20, *P* = 0.035), and unemployment (aOR, 16.93; 95% CI, 1.09–262.47, *P* = 0.043) were associated with an increased likelihood of patient delay. Attaching importance to disease treatment

Table 1
Predisposing factors of young women with cervical cancer.

Variables	Categories	Mean or frequency	SD or %
Age, mean (SD), years		30.94	2.83
Ethnicity, n (%)	Han	117	83.6
	Ethnic minorities	23	16.4
Region, n (%)	No religion	75	53.6
	Buddhism	35	25.0
	Taoism	3	2.1
	Christianity	8	5.7
	Else	19	13.6
Marital status, n (%)	Married	119	85.0
	Divorced or widowed	13	9.3
	Spinsterhood	7	5.0
Education status, n (%)	Primary school or below	18	12.9
	Junior high school	78	55.7
	High school or technical school	31	22.1
	College or above	13	9.3
Habitual residence, n (%)	Countryside	108	77.1
	City	32	22.9
Occupation, n (%)	Unemployed	51	36.5
	Farmer	45	32.1
	Worker	20	14.3
	Merchant	16	11.4
	civil servant	8	5.7
Monthly income, n (%), yuan	Indetermination	26	18.6
	≤3000	58	41.4
	3000–6000	43	30.7
	6000–9000	12	8.6
	>9000	1	.7
Family history of cervical cancer, n (%)	Yes	5	3.6
	No	135	96.4
Family history of other cervical diseases, n (%)	Yes	17	12.1
	No	123	87.9
The number of pregnancy, mean (SD), times		2.31	1.11
The number of abortion, mean (SD), times		0.56	0.83
The number of children, mean (SD), times		1.76	0.75
Age of menarche, mean (SD)		13.47	1.57
Menstrual cycle, mean (SD), day		29.81	3.63
Age of first intercourse, mean (SD)		20.10	2.67
Sexual frequency, mean (SD), times a week		3.09	2.38
History of cervical cancer screening, n (%), year	≤ 0.5	34	24.3
	0.5–1	34	24.3
	1–2	14	10.0
	2–3	13	9.3
	Never	45	32.1
Health belief, n (%)	Attach importance to disease treatment	40	28.6
	Attach importance to disease prevention	67	47.9
	Neglect the two aspects	33	23.6
Whether know cervical cancer screening policies, n (%)	Yes	68	48.6
	No	72	51.4

(aOR, 0.23; 95% CI, 0.07–0.73, $P = 0.013$) or prevention (aOR, 0.23; 95% CI, 0.06–0.82, $P = 0.023$) and a history of cervical cancer screening within 2 years or more (aOR < 1, $P < 0.05$) were associated with a reduced likelihood of patient delay.

The enabling factors that were significantly associated with patient delay in young women with cervical cancer were the distance to the nearest medical facility and type of the nearest medical facility. A distance of 20–50 km from the nearest medical facility (aOR, 6.02; 95% CI, 1.44–25.26, $P = 0.014$) or >50 km (aOR, 22.54; 95% CI, 3.30–153.80, $P = 0.001$) was associated with an increased likelihood of patient delay. Regarding the nearest medical facility, county-level hospitals or above (aOR, 0.17; 95% CI, 0.05–0.67, $P = 0.011$) were associated with a reduced likelihood of patient delay compared with pharmacies.

With the need-for-care factor, young women who experienced vaginal pain after or during intercourse had a higher risk (aOR, 33.48; 95% CI, 3.22–348.68, $P = 0.003$) of patient delay than those who experienced vaginal bleeding after sexual intercourse.

Table 2
Enabling factors of young women with cervical cancer.

Variables	Categories	Mean or frequency	SD or %
Medical insurance, n (%)	No insurance	3	2.1
	New-type Rural Cooperative Medical Insurance	116	82.9
	Basic medical insurance system for urban residents	21	15.0
Reimbursement rate of medical insurance, n (%)	≤30%	33	23.6
	31%–50%	59	42.1
	51%–70%	24	17.1
	≥71%	24	17.1
Nearest medical facility, n (%)	Pharmacy	23	16.4
	Clinic	13	9.3
	Township health center	65	46.4
	County-level hospital or above	39	27.9
Distance of nearest medical facility, n (%), km	1–5	26	18.6
	5–10	59	42.1
	10–20	30	21.4
	20–50	14	10.0
	≤50	7	5.0
	>50	4	2.9
Serviceable time of nearest medical facility, n (%)	Only weekday daytime	12	8.6
	Only daytime	37	26.4
	Only weekday 24-h service	0	
		91	65.0
Services available in nearest medical facility, n (%)	Over-the-counter medications purchase	83	59.3
	No	57	40.7
Outpatient or emergency	Yes	95	67.9
	No	45	32.1
Inpatient	Yes	88	62.9
	No	52	37.1
Professional nurses in nearest medical facility, n (%)	Yes	90	64.3
	No	50	35.7

Discussion

Main findings

This study showed that 40.71% of the respondents had patient delay, which is lower than the patient delay rate (45%) of all ages reported by Ma et al¹⁹ in China and that in another study in Brazil (92.6%)³⁴; however, it was significantly higher than that of young women in the United Kingdom (28%).¹¹ Although the patient delay rate in young women is lower than that in some developing countries, this group has a longer delay time, with an average delay time of 178.10 days, which is significantly longer than 110 days in Brazil,³⁴ 162 days in Malawi,¹⁷ 91 days in Denmark,³⁵ and 97 days in Ethiopia.¹⁵ In the last 5 years, no study has specifically reported patient delays in young women. The present results showed that the status quo of timely health seeking is not optimistic in this population; diagnosis delay and disease progression caused by patient delay might be important reasons for the poor prognosis in this population.^{3,8} The overall trend demonstrated a decline in cervical cancer mortality, while cervical cancer deaths tended to occur in younger age-groups^{2,36} (up to 5.5% annually).⁵

Determinants of patient delay among young women with cervical cancer

In this study, we explored the determinants of patient delay from three aspects: predisposing, enabling, and need-for-care factors.

First, the need factor, namely, self-perceived symptoms, was the most dominant predictor of patient delay in young women with cervical cancer, even after adjusting for predisposing and enabling variables. Young women with self-perceived vaginal pain after or during intercourse (aOR, 33.48; 95% CI, 3.22–348.68, $P = 0.003$) had a higher likelihood of patient delay than those who experienced vaginal bleeding after sexual

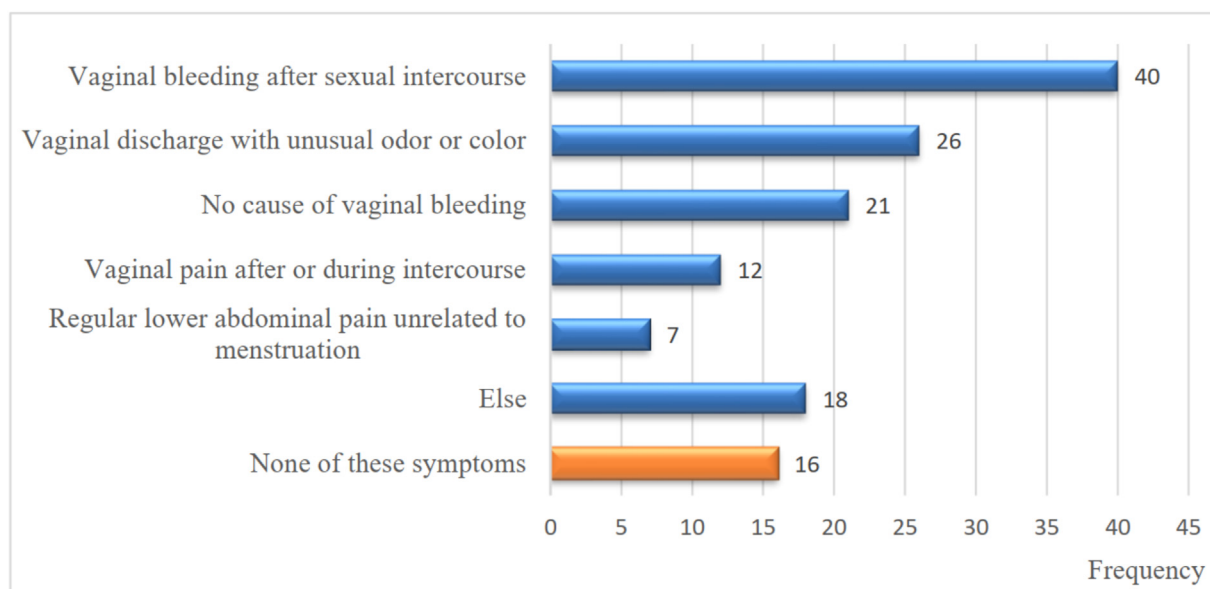


Fig. 2. Need-for-care factors (self-perceived symptoms) of young women with cervical cancer.

intercourse. People with various symptoms of certain health conditions may put up behaviors to get rid of such conditions.³⁷ Therefore, other factors may account for these differences. First, young women aged less than 35 years might have limited knowledge and cognition of cervical cancer; they might even think that the mild symptoms (vaginal pain after or during intercourse) they experienced were normal.³⁸ Second, considering high health-related expenses along with deficiencies in free screening for cervical cancer, young women might be more likely to neglect symptoms or take self-purchased nonprescription drugs instead of seeking healthcare services in medical institutions when they only have a minor illness.⁴ These findings reinforce the need for programs to enhance knowledge and awareness of cervical cancer-related symptoms and the importance of early diagnosis in young women.¹⁵

Second, we observed that one predisposing variable, namely religion, significantly contributed to patient delay in young women with cervical cancer. Women who were Buddhist or belonged to other religions were more likely to have delayed diagnosis. Special religious beliefs may affect people's health service-seeking behavior. Hunan is a multiethnic region influenced by Buddhism and other traditional religions, such as polytheism. As such, young women in this area are more likely to endorse fatalistic beliefs³⁹ and hold the view that the etiology of cervical cancer is due to breaching social taboos or undertaking unacceptable behavior. Moreover, fear of stigmatization could make them reluctant to seek timely care.⁴⁰

In addition, negative health beliefs and awareness of cervical cancer screening seem to be important factors in increasing patient delay, indicating their synergistic effects with unstable career factors. The possible explanations could be divided into two aspects. First, population-wide cervical cancer screening has only been available for women aged 35–60 years in China,⁵ and young women aged less than 35 years may be overlooked by the government. Health education related to cervical cancer has no effect on this population compared with that in developed countries.³⁸ On the other hand, young women have more economic and caregiving responsibilities for their families,²⁸ and they are reluctant to spend excessive time and money on some symptoms that are not serious in their awareness,⁴ especially when income is not steady. Consistent with the need factor, these findings reinforce the need for education programs to enhance knowledge and awareness of cervical cancer screening and the importance of early diagnosis in young women.¹⁵ Increasing the budget for vaccination against human papillomavirus and cervical cancer screening in young women in the low economic levels will also be important to eliminate cervical cancer in China by 2050.⁴¹

Marital and educational statuses were not significant predictors of patient delay in the multivariable model. Univariable analysis indicated that young women with low education levels or who were widowed or divorced had strongly increased odds of patient delay. This finding was unexpected, given that marital and educational status is often shown to be an influential predictor of health-seeking behavior among women.^{42,43} Considering the small sample size of this study, future studies should focus on young women with cervical cancer as a unique group for the investigation of patient delay and influencing factors.

Despite the importance of promoting early diagnosis and reducing the incidence of care delay, few studies have investigated the accessibility factors of health services that may influence the health-seeking behavior of young women with cervical cancer.⁴⁴ Our study indicated that some enabling factors, such as the distance to the nearest medical facility, were predictors of patient delay in young women with cervical cancer. The greater the distance from the medical facility, the higher the likelihood of patient delay, which might be due to the reduced availability of medical treatment due to the long distance.⁴⁵ Although hierarchical diagnosis and treatment have been implemented for many years, people still prioritize senior general hospitals in medical treatment selection in China,⁴⁶ indicating low subjective trust in primary medical services among young women with cervical cancer.

A possible explanation could be the inconsistency between the objective quality of healthcare provided and the subjective quality perceived by patients⁴⁷; therefore, to improve service quality, patients should identify the actual quality of primary health care precisely and then improve their satisfaction, thereby promoting the more efficient use of primary-level health resources.

Strengths and limitations

In general, research on patient delays in young women with cervical cancer is lacking. In addition to the demographic data and pregnancy history mentioned in previous studies, the present study comprehensively included a series of factors related to medical behavior. The findings provide a basis for policy decision-makers and healthcare professionals to determine multilevel factors of barriers to health service utilization in young women with cervical cancer. This study ultimately contributed to the development of more effective interventions and increased access to medical welfare among vulnerable populations.

Table 3
Univariable and multivariable analyses of factors associated with patient delay.

Factors	Univariable		Multivariable	
	OR (95% CI)	P value	OR (95% CI)	P value
Predisposing factors				
Religion				
No religion	1.00		1.00	
Buddhism	2.89 (1.18–7.05)	0.020	3.21 (1.02–10.11)	0.047
Taoism	1.26 (0.11–14.76)	0.852	2.68 (0.10–73.28)	0.560
Christianity	3.79 (0.59–24.50)	0.162	3.97 (0.50–31.23)	0.191
Else	3.47 (1.21–9.97)	0.021	3.96 (1.10–14.20)	0.035
Marital status				
Married	1.00		1.00	
Divorced or widowed	4.40 (1.10–17.56)	0.036	4.40 (0.70–27.59)	0.114
Spinsterhood	.66 (0.12–3.56)	0.629	1.33(0.17–10.16)	0.782
Education status				
College or above	1.00		1.00	
Primary school or below	10.00 (1.44–69.26)	0.020	8.23 (0.77–87.53)	0.081
Junior high school	4.32 (0.88–21.21)	0.071	2.85 (0.42–19.60)	0.286
High school or technical school	1.74 (0.31–9.69)	0.528	0.77 (0.10–6.14)	0.801
Occupation				
civil servant	1.00		1.00	
Unemployed	10.50 (1.11–98.91)	0.040	16.93 (1.09–262.47)	0.043
Farmer	4.20 (0.47–37.56)	0.199	5.32 (0.37–75.77)	0.217
Worker	0.82 (0.06–10.62)	0.882	0.77 (0.04–14.39)	0.859
Merchant	4.67 (0.45–48.26)	0.196	7.92 (0.47–134.18)	0.152
History of cervical cancer screening				
Never	1.00		1.00	
Within half year	0.25 (0.09–0.71)	0.009	0.25 (0.07–0.87)	0.030
Within a year	0.12 (0.04–0.36)	0.000	0.11 (0.03–0.43)	0.001
Within 2 years	0.13 (0.03–0.56)	0.006	0.13 (0.02–0.76)	0.023
Within 3 years	0.41 (0.11–1.49)	0.177	0.38 (0.08–1.78)	0.219
Health belief				
Neglect the two aspects	1.00		1.00	
Attach importance to disease treatment	0.39 (0.16–0.94)	0.036	0.23 (0.07–0.73)	0.013
Attach importance to disease prevention	0.29 (0.10–0.79)	0.016	0.23 (0.06–0.82)	0.023
Enabling factors				
Reimbursement rate of medical insurance				
≥71%	1.00		1.00	
≤30%	3.78 (1.14–12.47)	0.029	4.65 (0.92–23.59)	0.063
31%–50%	1.89 (0.64–5.61)	0.252	2.99 (0.60–14.95)	0.182
51%–70%	1.51 (0.43–5.36)	0.523	2.54 (0.41–15.63)	0.316
Distance of nearest medical facility				
≤1 km	1.00		1.00	
1–5 km	1.30 (0.40–4.19)	0.660	1.40 (.37–5.33)	0.624
5–10 km	3.33 (0.86–12.98)	0.083	3.79 (.586–24.50)	0.162
10–20 km	7.60 (1.07–54.09)	0.043	8.88 (0.87–153.80)	0.065
20–50 km	4.43 (1.27–15.49)	0.020	6.02 (1.44–25.26)	0.014
>50 km	13.93 (2.78–69.88)	0.001	22.54 (3.30–153.80)	0.001

Table 3 (continued)

Factors	Univariable		Multivariable	
	OR (95% CI)	P value	OR (95% CI)	P value
Nearest medical facility				
Pharmacy	1.00		1.00	
Clinic	1.11 (0.35–3.50)	0.857	1.01 (0.25–4.04)	0.985
Township health center	1.42 (0.39–5.24)	0.597	1.23 (0.20–7.59)	0.827
County-level hospital or above	0.28 (0.11–0.68)	0.005	0.17 (0.05–0.67)	0.011
Services available in nearest medical facility- Over-The-Counter Medications purchase				
No	1.00		1.00	
Yes	0.48 (0.23–1.00)	0.050	0.42 (0.16–1.08)	0.073
Need-for-care factors				
Self-perceived symptoms				
Vaginal bleeding after sexual intercourse	1.00		1.00	
No cause of vaginal bleeding	0.71 (0.19–2.60)	0.600	0.40 (0.08–1.85)	0.239
Regular lower abdominal pain unrelated to menstruation	2.25 (0.43–11.82)	0.338	1.19 (0.18–8.04)	0.857
Vaginal pain after or during intercourse	33.00 (3.77–288.62)	0.002	33.48 (3.22–348.68)	0.003
Vaginal discharge with unusual odor or color	3.50 (1.22–10.02)	0.020	2.78 (0.82–9.48)	0.101
Else	2.40 (0.74–7.76)	0.144	2.35 (0.56–9.80)	0.240

This study had several limitations. First, it was limited to Hunan province due to constraints of time and funds, and the sample size was small due to the particularity of the population. Second, all the items in the questionnaire were self-reported, which could be a source of bias. Although the questionnaire was pretested before surveying, it was not fully validated. Third, we started the data collection process before coronavirus disease 2019 (COVID-19) occurred, and we could not explore the likely impact of COVID-19 on the results using the available data. Finally, the inability to infer causality from observational research was acknowledged. Further research is required to address these deficiencies.

Conclusions

Limited research has explored factors associated with patient delay in young women with cervical cancer. Evidence indicates that early diagnosis and treatment are the most cost-effective measures for eliminating cervical cancer among young women. Our study found that the rate of patient delay in young women with cervical cancer reached 40% and was positively associated with predisposing, enabling, and need-for-care factors. These findings reinforce the need for programs to enhance knowledge and awareness of cervical cancer screening and the importance of early diagnosis in young women to help eliminate cervical cancer in China by 2050.

Author contributions

Jun MA: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Roles/Writing – original draft. Yang LUO: Conceptualization; Funding acquisition; Methodology; Project administration; Supervision; Writing – review and editing. Shengbo YANG: Conceptualization; Formal analysis; Writing – review and editing. Xiangyu LIU: Investigation; Methodology. Yueyang PENG: Investigation; Roles/Writing – original draft. Honghong WANG: Formal analysis; Writing – review and editing. Maritta Valimaki: Writing – review and

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Declaration of competing interest

None declared.

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Appendix A. Supplementary data

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