The influencing factors of the willingness to screen for prostate cancer in middle-aged and elderly men:A qualitative study

Shutao Hao (1992024106@qq.com)

The First Affiliated Hospital of China Medical University: The First Hospital of China Medical University

Jin Zheng

The First Affiliated Hospital of China Medical University

Min Ju

The First Affiliated Hospital of China Medical University

Longfeng Sun

The First Affiliated Hospital of China Medical University: The First Hospital of China Medical University

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Research Article

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Abstract

Objective

To explore the factors influencing the willingness to screen for prostate cancer in middle-aged and elderly men, and to provide a basis for improving the status of insufficient prostate cancer screening in my country, and to improve the overall prognosis and quality of life of prostate cancer patients in my country.

Methods

Using phenomenological research methods to conduct semi-structured in-depth interviews with 21 middle-aged and elderly men, using MAXQDA software and Colaizzi's seven-step analysis method for coding, analysis and subject extraction.

Results

Based on the theoretical framework of planned behavior, the influencing factors of the willingness to screen for prostate cancer in middle-aged and elderly men can be refined into three themes of behavior attitude, subjective norms, and perceived behavior control, and 12 sub-themes of its sub-themes.

Conclusion

The willingness of middle-aged and elderly men to screen for prostate cancer is affected by many factors. Medical and health workers should adopt a variety of comprehensive interventions to guide the reasonable screening of middle-aged and old men to promote their prostate cancer screening behaviors.

Background

Prostate cancer is the cancer with the highest incidence among male genitourinary system tumors, accounting for 13.5% of the total incidence of male malignant tumors, second only to lung cancer, ranking second [1]. The latest national tumor incidence report pointed out that the incidence of prostate cancer in my country is as high as 9.8 per 100,000 and the mortality rate is 4.22 per 100,000. It has now become one of the main factors threatening the health of men in my country [2].

Prostate cancer has no obvious clinical symptoms in the early stage, and most patients have been accompanied by distant lymphatic metastasis when they see a doctor, and miss the best treatment opportunity, so the overall prognosis is poor [3]. Studies have shown that reducing the proportion of advanced patients is more effective than optimizing the treatment of advanced patients [4]. Early screening, diagnosis and treatment of high-risk groups of prostate cancer in my country is effective for improving their overall survival rate and improving their quality of life during their survival period [5].

However, my country's prostate cancer screening is still in its infancy. Our current situation is insufficient screening [6]. At present, there is still a lack of relevant research on the willingness to screen for prostate cancer in middle-aged and elderly men in China. Therefore, this study uses in-depth interviews to explore the influencing factors of the willingness to screen for prostate cancer in middle-aged and elderly men, and provide a reference for the implementation of intervention measures to meet their individual needs for prostate cancer screening.

The theory of planned behavior (TPB) is the most widely used in the study of the execution intention of health-related behaviors. The theory believes that the closest and most powerful predictor of actual behavior is intention. Behavior intention is determined by behavior attitude and subjective norms. It is determined by the three factors of perception and behavior control [7], which provides theoretical support for the study of promoting healthy behavior, and also provides a conceptual framework for the interview outline, data code, and qualitative content analysis of this research.

Methods

Setting and Recruitment This study adopted the purpose-based sampling method. From March to May 2021, middle-aged and elderly men from a health examination center of a Grade-A general hospital with prostate cancer screening qualifications in Shenyang were selected as interview subjects. Inclusion criteria: ①age > 40 years old (prostate cancer screening guidelines recommend that men who are younger than 40 years old and life expectancy less than 10–15 years do not need to undergo routine PSA screening[8]); ②male; ③cognition and communication Normal ability and informed consent. Exclusion criteria: Men who have a history of prostate cancer or have been diagnosed with prostate cancer. In order to achieve the greatest difference in the sample, the interviewees in this study showed certain differences in social demographic characteristics.

Data collection A semi-structured interview outline was designed based on the theory of TPB (Table 1). Pre-interview 5 survey subjects before the formal interview to improve the interview outline and adjust interview skills. The end of data collection is based on the saturation of data and no new themes. Before the interview, the informed consent of the subjects was obtained, and the principle of privacy protection was emphasized. In addition, the necessity of on-site recording was explained. After obtaining their consent, use a voice recorder and mobile phone conduct double backup recordings and on-site transcript interviews. At the same time, observe and record the body language, facial expressions and voice of the research subjects, and the interviewees are anonymously coded as M1M21. The interview adhered to the principles of fairness, impartiality, and neutrality. The convenience of the interviewee is also the principle [9], and the researcher himself will conduct one-on-one interviews at the end of the candidate or physical examination. The interview time is 30–60 min/person but the process is flexible.

Table 1
The outline of the interview

"Do you know prostate cancer?"
"Have you been screened for prostate cancer before? (probe: Do you know what screening methods are available for prostate cancer screening? How is this different from other cancer screenings such as lung cancer or stomach cancer?) "
"What do you think are the benefits of prostate cancer screening? What do you think are the risks or disadvantages of prostate cancer screening?"
"Do you think prostate cancer screening is necessary? Why?"
"Who will affect your prostate cancer screening (family, friends, doctors, social influence, such as the popularization and promotion of the news media about prostate cancer and related screening methods, the support of national policies...)? Who is most likely to affect you involved in prostate cancer screening?"
"What factors will motivate you to participate in prostate cancer screening (existing prostate symptoms, having a family history of cancer, someone around you suffering from prostate cancer, fear of prostate cancer...)? What factors prevent you from participating in prostate cancer screening (screening cost, time, medical insurance reimbursement...)? "

Data analysis After the interview, the recording was converted into words in time within 24 hours, and recorded verbatim to facilitate the researcher's data analysis. Use Excel 2016 software to make descriptive statistics on the interviewee's social demographic information and cancer screening status, and use MAXQDA software to code the interview data. The two people analyze the materials according to the Colaizzi seven-step analysis method. When there are objections, the third researchers ruled that the topic was not finalized until a consensus was reached.

Results

Sample Characteristics A total of 34 people in this study met the inclusion and exclusion criteria of this study. Among them, 9 people (29%) were interrupted in the interview, 4 people (12%) refused to participate, and 21 people (59%) finally agreed and accepted the interview. Their demographic characteristics in Table 2.

Table 2
Socio-demographic characteristics of respondents

Interviewee	Age	Education	Vocation	Household monthly income per capita (Yuan)	Cost-bearing method	Types of physical examination packages
M1	54	high school	a	≥ 5000 and < 8000	1	A
M2	55	Junior college	b	≥ 3000 and□5000	2	B
M3	57	Master	c	≥ 5000 and < 8000	2	A
M4	65	Undergraduate	b	≥ 5000 and < 8000	2	VIP
M5	48	Undergraduate	b	≥ 8000	2	B
M6	56	Undergraduate	b	≥ 8000	2	B
M7	63	Undergraduate	d	≥ 5000 and < 8000	1	C
M8	54	Undergraduate	c	≥ 5000 and < 8000	2	A
M9	63	Undergraduate	b	≥ 5000 and < 8000	2	A
M10	58	Undergraduate	b	≥ 5000 and < 8000	2	B
M11	55	Undergraduate	b	≥ 8000	2	A
M12	50	Undergraduate	b	≥ 8000	2	B
M13	76	Technical secondary school	e	≥ 3000 and□5000	2	A
M14	57	Primary school	f	□3000	1	A
M15	81	Junior college	b	≥ 5000 and□8000	2	B

Note: *Interviewee number*: M1□M21. *Vocation*: a- Self-employed persons; b-Business management personnel; c- Civil servants; d-Teacher; e-Worker; f-Farmer; g-Engineer; h-Staff; i-Researcher. *Cost-bearing method*:1-Own expense;2- Public expense. *Types of physical examination packages* are divided into five levels: A, B, C, D, and VIP according to the price. The higher the level, the more comprehensive the physical examination items. The packages of level B and above Prostate series test items.

Interviewee	Age	Education	Vocation	Household monthly income per capita (Yuan)	Cost-bearing method	Types of physical examination packages
M16	63	Junior high school	a	≥ 8000	1	VIP
M17	44	Junior college	a	≥ 5000 and < 8000	1	D
M18	52	Master	g	≥ 5000 and < 8000	2	B
M19	46	Undergraduate	h	≥ 3000 and 5000	2	A
M20	50	Undergraduate	a	≥ 3000 and 5000	1	A
M21	58	PhD	i	≥ 5000 and 8000	2	C

Note: *Interviewee number*: M1M21. *Vocation*: a- Self-employed persons; b-Business management personnel; c- Civil servants; d-Teacher; e-Worker; f-Farmer; g-Engineer; h-Staff; i-Researcher. *Cost-bearing method*:1-Own expense;2- Public expense. *Types of physical examination packages* are divided into five levels: A, B, C, D, and VIP according to the price. The higher the level, the more comprehensive the physical examination items. The packages of level B and above Prostate series test items.

Theme extraction 45,000 words were totally transcribed in the interview. Three themes as relevant to Middle-aged and elderly men' willingness to screen for prostate cancer, extracted from these interviews (Table 3 Select interviewee quotes by theme).

The first theme centered on the attitudes of prostate cancer screening. This topic explores the positive or negative evaluations of middle-aged and elderly men on prostate cancer and its screening.

Many middle-aged and elderly men regard prostate cancer screening as a willingness to improve their health. Interviews found that middle-aged and elderly men who recognize the importance of prostate cancer screening generally have a higher willingness to screen for prostate cancer. Many interviewees believe that if cancer is present, early detection through screening will lead to more successful treatment and fewer complications, and ultimately save a person's life. However, people who hold the concept of cancer fatalism regard the occurrence of cancer as a kind of fate, luck, or God's will. The corresponding prevention, screening, and treatment are meaningless. Death is inevitable [10], which is their reluctance or One of the reasons for refusing to participate in cancer screening. This finding shows that cancer fear hinders their actual screening behavior to a certain extent, which depends on cancer fatalism beliefs. In addition, most people lack understanding of the preventive nature of prostate cancer screening. Therefore, it is necessary to emphasize prostate cancer screening for the majority of the population. The importance and necessity of cancer screening.

Besides, some interviewees said that compared with local hospitals, the medical equipment of the city's top three general hospitals is more advanced, and the doctors have more experience, and the examination results may be more comprehensive and accurate. Therefore, in order to improve people's negative impression of small hospitals, it is recommended to increase the level of early diagnosis of prostate cancer in grassroots hospitals, standardize the implementation path of prostate cancer screening and clinical diagnosis in the physical examination population and determine simple and feasible screening and follow-up indicators and screening process.

Prostate cancer screening refers to a series of prostate examinations in asymptomatic men [11], however, some middle-aged and elderly men report that they do not know how the screening is performed and the risks and benefits of it. Surprisingly, even respondents who have undergone prostate cancer screening still have a certain degree of confusion about how to perform prostate cancer screening. Some of them think that abdominal color doppler ultrasound is sufficient to screen for prostate cancer. Therefore, it's necessary to strengthen the popularization of knowledge about prostate cancer prevention and treatment. Although the current physical examination center has listed the serum prostate-specific antigen (PSA) test as a diagnosis item for prostate cancer screening [12], middle-aged and elderly men rarely pay attention to this item and understand little when performing health examinations. Probably due to the large number of medical examinations, the medical staff in the medical examination center are usually rushed to give relevant instructions to the examinee, directly tell the examinee what to do. Sometimes, the results of cancer screening plan and physical examination report lack personalized or incomplete explanation, which hinders middle-aged and elderly men from actively performing related physical examinations for prostate cancer screening.

The Chinese do not want others to know that they have cancer, because they are afraid of receiving bad news and prefer not to obtain information about the situation, although it is possible to make better decisions based on this information. Interviews found that elderly men over 70 years of age generally have low willingness to screen for prostate cancer. Most elderly people have the psychology of not wanting to trouble their children when they are sick, and fear and avoidance seem to interact [13], which makes them not want to think about prostate cancer.

Individuals said that receiving screening allows them to understand their current health status. They believe that it is an obligation and responsibility to keep their families healthy. In addition, screening reduces their worries about the risk of prostate cancer, which makes them feel at ease. It can be seen that cancer fear may also be a contributing factor. Consistent with the results of other studies, serious concerns about cancer have strengthened their willingness to conduct screening, which in turn promotes their actual screening behavior, which may be out of seeking psychological comfort [14]. Some interviewees reported that the older they get, the more likely they are to get sick. Regardless of their health status, cancer is a hidden disease that develops quietly in the body. Participating in screening is a way and an opportunity to maintain their own health and can convince them They do not have prostate cancer, especially if they do not have regular physical examinations.

Table 3
Select interviewee quotes by theme

Theme	Quotes
Theme 1: Attitudes of Behavior Importance of screening	M4: "Now that medicine is advanced, some cancers can be overcome. Early detection and early treatment should not be a big problem. I think (prostate cancer) should be cured. Anyway, if you get rid of it, it will be over. Is this inflammation? You don't know about cancer. If you find cancer after screening, you won't be able to deal with it as soon as possible." M17: "I think all cancer screenings are necessary. If you have a disease, treat it as soon as possible. It may be better to treat it early. It is necessary for life." M21: "All cancers are detected and treated early to get a good recovery or a longer survival period."
Fatalistic belief	M10: "Cancers are all discovered in the later stages. What use is there when you find them later? It can only be said to be waiting (die)." M18: "Actually, there are many people around me who are afraid of physical examination, especially those who work at the bottom. They think that they may live for 3 years without cancer detection. If they are found out, they may be dead in the same year, because if they don't know, there will be no trouble in this area. This kind of disease has too much psychological impact!"
Distrust	M5: "Many physical examinations are a bit of a formality, I think the probability of finding out is very low." M13: "Because the hospital physical examination is for you to find no problems, you feel disgusted when it is necessary and unnecessary, such as hardening of the blood vessels. It's impossible not to harden when you reach your age." M14: "The medical level of the small clinics or small hospitals in the area is not as good as that of the big hospitals in the city. I don't really believe in their medical methods, so I come here for the physical examination, hoping to be more comprehensive and accurate."
Confusion	M1: "The physical examination of the unit usually includes color Doppler ultrasound for men's abdomen. This should be able to detect it. If there is an abnormality in the prostate, the doctor will say." M3: "I don't understand the risks of PSA blood testing. This is a bit confusing for me, because I have done blood tests for other items and there is no problem." M6: "How exactly is this screening? I don't know much, so I can't talk about what I think about it." M16: "I have done PET-CT for the whole body. Isn't this one can screen for all cancers, the report is all normal, so I don't understand why it is necessary to screen for prostate cancer. "

Theme	Quotes
Worry	M13: "You said that you are about to be over 80 years old, what else do you have to check? Normally this age is almost dead. Why spend that money to suffer the crime and make the children worry about it." M15: "You don't know about our elderly people." Mentality, we are so old, now we try not to organize a physical examination by the unit. I don't want to come to the hospital. If I become ill, it will cause a lot of trouble to the relatives of the children, and the medical expenses will also affect the children."
Peace of mind	M7: "I haven't had a physical examination in 2 years, so this time I chose a package with a more comprehensive range of items, including cardiovascular and cerebrovascular, tumor screening, and so on. After all, my age has gone up." M16: "I will do a comprehensive cancer check every year. If I say that I am not at risk of cancer, I will feel at ease psychologically." M19: "At our age, there are old and young people, and work pressure is also great. So I pay much attention to health. If I have a disease, I still hope that I can find it and treat it early, so I feel at ease."
Topic 2: Subjective Norms	
Medical staff's advice and guidance	M2: "If the doctor advises me to go, I will definitely go. The doctor will do what the doctor says. I still have to listen to the doctor." M6: "The suggestions of relatives, friends or colleagues will have some influence but they may not go, although this suggestion is definite. They are all positive, but they will still consider their physical conditions; like a doctor’s purposeful and directional advice, he will definitely go there. Generally speaking, his advice must be well-founded."
Related experiences of relatives, friends or colleagues	M7: "My dad is prostate cancer. The mortality rate of this disease is not the highest among cancers. Especially when you are over 55 to nearly 60 years old, you should check regularly. Men's prostate function declines around 60 years old. During menopause, his body hormones have changed. This aspect is prone to disease. At this age, it is necessary to have a screening." M8: "For example, a unit has more patients. You must have it. Pay attention. Besides, if your relatives have prostate cancer, you have to pay attention, mainly relatives, and colleagues, classmates, comrades-in-arms, friends, etc. You can get it, people around you get it more or which local area has it. Then you are nervous and want to go automatically." M16: "Because we have cancer in our family history, there are more people like this, almost all of whom have died of cancer, so I am wary of having a comprehensive cancer check every year."

Theme	Quotes
Propaganda of media information	M1: "There is still cancer in the prostate. I have never heard of it. You are like children who are getting the cervical cancer vaccine in the community. I often use my mobile phone. I know." M5: "We often see breast cancer on TV, cervix I have never seen prostate cancer. I don't think there are so many people who deserve this disease, or it's not that important. Everyone may not pay attention to it, unless the professionals know who the ordinary people are. I understand this (laughs)." M9: "I listen to the health radio every day. In fact, there is not much information about it (prostate cancer), but I have heard of prostatitis and prostatic hyperplasia."
Topic 3: Perceived Behavioral Control	
Cost	M4: "There are no symptoms. If the cost is very low and popular, and the individual's financial strength is reached, then I think it should be screened." M6: "Especially prostate cancer screening. I think the penetration rate is very low. One is for individuals. The reason for the cognitive level is the cost. In fact, the lower the income level, the less people want to do this." M13: "Can this screening be reimbursed for medical insurance? If it can be reimbursed, you can consider doing it." M14: "You need a little bit of money for the screening. It costs one or two thousand, and the common people can't afford it! (Emotional)"
Physical examination package setting	M2 said, "If this item must be included in the group medical examination package, there is no need to consider it (add or not); the unit is all group medical examinations, and now women's group packages include gynecology, and men should also Add one (prostate cancer screening program), but you control this age". M4: "Aren't all the packages for physical examinations? If you list this item, it will be over. When you take the blood, you can bring it together."
	M4: "Serum PSA? Then don't you just draw a tube of blood. It's easy, and it doesn't cost much..." M12: "I still choose what physical examination item according to my own situation, because every year I will choose the item that I haven't undergone physical examination. If there is an abnormality in the body, further examinations will be carried out." M21: "I have been screened before, and the results are normal. Although I no longer worry about getting cancer, I still have regular physical examinations."
Self-efficacy	M3: "I have some problems with the prostate when I get older. I should check it but I won't actively add this because I don't have any special symptoms, and I heard that prostate cancer is rare, unlike breast cancer and stomach cancer. If you feel uncomfortable in the situation, you will be checked, or if you do a color Doppler ultrasound, you can check it out." M10: "I know very little about prostate cancer. The prostate itself is a very weak part of the body, compared to the five organs. As far as the device is concerned, people may not pay too much attention to it, and they will not deliberately screen it, but only pay attention to it."

The second theme is subjective norms. This theme explores the social pressure that individuals feel when deciding whether or not to undergo prostate cancer screening, such as important people or groups [7]. Respondents said that the advice and guidance of medical staff can affect their willingness to screen prostate cancer to the greatest extent, although relatives and friends and colleagues also have some influence on them. This may be because medical staff usually play the role of educators, leaders, and experts in the process of patients seeking medical care, and in their active medical treatment behaviors. Plays a key role [15]. Men who have no history of cancer or related experience simply say, “I will do what the doctor requires.” This finding also emphasizes the key role that doctors’ recommendations play in shaping the attitudes and behaviors of middle-aged and elderly men in PSA screening [16]. Respondents who have blood relatives with poor quality of life or death at the end of life due to cancer generally have a desire to avoid a similar fate. Many men with a family history of cancer are strongly aware of the impact of cancer on health and quality of life, and cancer in family members or people around them. Experience makes him pay more attention to his own health, which affects his prostate cancer screening. The acquisition of multimedia information is one of the important ways to improve the level of health knowledge, effective communication between healthcare providers, policy makers, and the general public through educational programs and the media is also important for raising men’s awareness of prostate cancer screening.

The final topic explores the individual’s obstacles that may be encountered in the actual process before undergoing prostate cancer screening [7]. First of all, the cost of screening is an important consideration for interviewees for prostate cancer screening. Most middle-aged and elderly men in the physical examination center have medical insurance and/or unit medical assistance, and only one-twentieth are not insured. They will show obvious negative emotional reactions when the screening is not covered by the insurance because most interviewees hope that prostate cancer screening is free, simple and fast. Therefore, including cancer screening in the medical insurance reimbursement is one of the important measures to increase the screening rate of prostate cancer in my country. Moreover, the domestic physical examination is mainly based on the unit physical examination at present. In view of the fact that physical examination is the main method for people to prevent diseases at this stage [17], scientific, reasonable and personalized physical examination items have become an important means to protect the vital interests of the majority of people being examined. Last but not the least, self-efficacy is a key factor for people to change their original behavior and maintain a healthy lifestyle [18], which is positively correlated with the healthy behavior of prostate cancer screening. The higher the self-efficacy level of middle-aged and elderly men, the more significant the behavioral intention of prostate cancer screening [19]. Individuals with low self-efficacy in prostate cancer screening are also more likely to refuse the screening and are less likely to repeat the screening.

Discussion

Prostate cancer screening is a preventive health behavior, and the application of related theories of health behavior can help to find the social and psychological cognitive factors that affect behavior to explain people's behavior [20]. TPB has been widely used in the study of cancer prevention and control behaviors.

There is still a lack of research on prostate cancer screening behavior in my country. Therefore, this study is based on this theory to conduct in-depth interviews with middle-aged and elderly men on prostate cancer screening. Explore the factors that promote and hinder prostate cancer screening in this population. Interviews found that individuals' evaluations of prostate cancer screening were mixed, including positive evaluations such as cure, early treatment, and peace of mind, and negative evaluations such as doubts and concerns. In addition, the guidance of medical staff, the suggestions of relatives, friends and colleagues, and the promotion of various media information are of certain significance to promote the prostate cancer screening behavior of middle-aged and elderly men, and the screening costs, the personalized setting of the physical examination package items and the personal self-efficacy Sense also plays an important role in this process. When an individual has a positive attitude towards prostate cancer screening, the higher the degree of support given by important others or groups, and the stronger the individual's perceived behavioral control over the behavior, the stronger the individual's intention to implement the behavior. The more likely the behavior is to be executed.

Cancer fear may be a facilitator or a deterrent, depending on the specific aspect of the fear. On the one hand, the fear of possible positive test results or the fear of prostate cancer is a hindering factor for prostate cancer screening [21], which may be related to the poor outcome of prostate cancer cases leading to their negative attitudes towards the disease. Do not expect prostate cancer, or make them not think about prostate cancer, so they are unwilling to undergo prostate cancer screening. However, some studies have shown that worry and fear of prostate cancer are predictive factors for prostate cancer screening [22], which may be related to their higher health awareness. It can be seen that cancer as the biggest health fear or serious concern about cancer promotes the intention to participate, and the uncomfortable thoughts about cancer do not affect the intention and hinder actual participation [23]. Besides, some people believe in cancer fatalism, which hinders their prostate cancer screening. However, a study showed that although people hold high fatalistic beliefs, fatalistic attitudes have nothing to do with their screening intentions. Because the formation of a certain behavior is affected by many factors, belief as a predisposing factor cannot fully explain/determine a certain behavior [24], this is inconsistent with the interview results, therefore, the predictive role of this factor needs to be further explored.

Most of the interviewees in this study said that they know little about this disease and have never read related content. Muliira pointed out that the willingness of middle-aged and elderly men to undergo prostate cancer screening is affected by their level of knowledge about prostate cancer screening [25]. In order to promote their prostate cancer screening behavior, the work of popularizing the knowledge of prostate cancer prevention and treatment should be strengthened first. A study found that Chinese people rely on the media and the Internet to obtain health information, especially when combined with advice from health care providers and support from health care infrastructure [26]. Therefore, medical institutions should cooperate with communities and units to carry out regular publicity activities on prevention and treatment knowledge of related topics, so as to strengthen the popularization of prevention and treatment knowledge of prostate cancer, thus expanding the scope of publicity and improving the educational effect.

A recent study in my country investigated the current status of residents' willingness to screen for prostate cancer in Hefei,which showed that risk perception, severity perception, benefit perception, impairment perception and self-efficacy five cognitive-emotional factors affect prostate cancer [27]. The study is consistent with the conclusion of this study, but it did not focus on the social pressure encountered in the process of seeking screening. Our study made up for this deficiency. Our research suggest that medical staff engaged in health examinations should give full play to the role of health educators and service providers, do a good job of health education and follow-up services before and after prostate cancer screening, and prompt them to take the initiative to seek medical treatment. In addition, medical institutions should strengthen the assessment of the health risk factors of the physical examination population, and give them positive guidance and support after determining the key targets for prostate cancer screening, reduce the loss of referrals, so as to improve the screening rate, detection rate and re-examination rate of prostate cancer. In order to promote health management institutions to standardize the early screening of prostate cancer based on physical examination population, the physical examination center should cooperate with urology, carry out community-based early screening and health management of prostate cancer through multi-centers across the country, study and formulate comprehensive management plans for high-risk groups of prostate cancer, and establish a nationwide prostate health big data platform to maximize the detection rate.

The interview found that whether it is an individual physical examination or a unit group physical examination, the first consideration in choosing a physical examination item is the cost issue, which is consistent with the research results of Luo Jie et al. [12]. In addition, the low-priced routine physical examination items only include abdominal color Doppler ultrasound, and do not include the PSA test items of the prostate series. Few men will actively add this. Since cancer screening is a flexible demand, free, low-cost or third-party payment is considered necessary to promote cancer screening [27]. Therefore, in order to maximize the effect of health examinations and benefit the majority of subjects, Develop a personalized health check-up package that takes into account age, occupation, region, etc., and choose to add a series of prostate cancer test items as needed under the guidance of professionals, forming a physical check-up package that combines commonality and personality, basic and special needs It will become a major measure to promote prostate cancer screening in my country [28].

The limitation of this study is that the interviewees were recruited from the physical examination centers of top-tier hospitals with high medical standards in Liaoning Province. Most of them were urban residents with urban employee medical insurance or medical subsidies. The frequency of physical examinations was relatively high, and the health awareness was relatively high. High, so that the research results cannot be fully extended to male residents in the community or all middle-aged and elderly men in our country. However, it should be pointed out that the researcher uses purpose sampling to ensure the greatest difference and diversity of the sample, so that these interviewees come from the general population. Class, to a certain extent, reduces bias. In addition, this research is a qualitative study, so the theoretical framework and intervention measures formed are only preliminary explorations, which need to be further explored, verified and improved in the future.

Conclusion

This study has identified the barriers and facilitating factors for middle-aged and elderly men to undergo prostate cancer screening. It shows that middle-aged and elderly men in my country have problems of lack of awareness of prostate cancer and low willingness to screen, which will provide information for new implementation strategies and methods. We urgently need to conduct risk-based prostate cancer screening and prevention integrated interventions at multiple levels. It is recommended that middle-aged and elderly men and the public understand prostate cancer screening through community health education, and medical and health institutions formulate early prostate cancer prevention programs and the state provides corresponding health care policies to eliminate screening barriers. In addition, this study recommends conducting surveys and interviews with middle-aged and elderly men in urban and rural communities, further carrying out relevant cross-sectional and longitudinal studies, and cooperating with healthcare teams to develop links with treatment strategies to ensure follow-up their prostate cancer screening behavior.

Declarations

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Conflicts of interest/Competing interests

All authors declare that they have no competing interests.

Availability of data and material

All data generated or analyzed during this study are included in this published article.

Code availability

Not applicable.

Authors' contributions

All authors made substantial contributions to the design of the work. All authors have made some contributions to conceptualization, project administration, and methodology. S.T Hao conducted the interviews. S.T Hao, J Zheng and M Ju performed the analysis and funding acquisition. S.T Hao drafted the work. J Zheng, M Ju and L.F Sun substantively revised it. All authors approved the submitted version and agreed both to be personally accountable for the author’s own contributions and to ensure that questions related to the accuracy or integrity of any part of the work, even ones in which the author was

not personally involved, are appropriately investigated, resolved, and the resolution documented in the literature. All authors read and approved the final manuscript.

Ethics approval

Our study was approved by Ethics Review Committee of the First Affiliated Hospital of China Medical University under Approval Number 2020[360].

Consent to participate

All participants filled out an informed consent form.

Consent for publication

Not applicable.

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