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Comparison of Screening Results of Urban Cancer Early Diagnosis and Early Treatment Project in 2023 and 2022 in Wuwei City

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ABSTRACT

Objective: To compare the screening results of urban cancer early diagnosis and early treatment project in Liangzhou District of Wuwei City in 2023 and 2022, analyze the characteristics of screening population changes, and provide optimization suggestions for the future development of urban cancer project.

Methods: The 2022-2023 screening data were extracted from the urban cancer screening system and matched with the telephone follow-up results of the cancer population, and the characteristics of the two-year screening population were compared by gender and age. Chi-square test was used for comparison between groups.

Results: From 2022 to 2023, a total of 6098 people participated in questionnaire assessment and 4400 people participated in clinical screening. In 2023, 1587 people were at high risk, with a high-risk rate of 92.61%; In 2022, 3301 people are at high risk, with a high-risk rate of 80.06%. The two-year data comparison found that both the overall risk rate comparison and the gender comparison, the risk rate in 2023 was higher than that in 2022. However, by age group comparison, it is found that in 2022, the middle age group has a higher risk rate, and in 2023, the high age group has a higher risk rate. In 2023, 1,975 people will participate in assessment and 1,560 people will participate in clinical screening. The participation rate of clinical screening was 78.99%. In 2023, 36.35% men and 63.65% women will participate in clinical screening. In 2022, 33.06% of men and 66.94% of women participated in clinical screening. The sex composition ratio of the population participating in clinical screening at two years was similar. The proportion of people participating in clinical screening in 2022 and 2023 was compared by age group, and it was found that the three age groups of 50-64 years old accounted for the largest number of people, and the 70-74 years old group accounted for the least. Compared with 2022, the detection rate of cancer in all parts of 2023 has decreased, and the detection rate of other positive lesions besides cancer in liver, breast, colorectal and upper digestive tract has also decreased, but the detection rate of other positive lesions besides cancer in lung has increased by 17.98%.

Conclusion: There is still room for improvement in the participation rate of clinical screening, and more measures should be taken to encourage high-risk groups to complete clinical screening programs. In addition, the ability to detect diseases in staff still needs to be improved.

INTRODUCTION

In 2018, the incidence rate of malignant tumors in Wuwei City was 267.89/100,000, and the mortality rate of malignant tumors was 131.38/100,000. The top 6 cases of malignant tumors were gastric cancer, female breast cancer, lung cancer, esophageal cancer, liver cancer, and colorectal cancer Gao et al. (2019). It reflects that cancer is a major problem threatening the health of residents in this region and will bring great disease burden to residents. In the Key Tasks of Deepening the reform of the medical and Health system in the second half of 2023 issued in July 2023, it was mentioned that "adhere to prevention first, carry out healthy China action and patriotic health campaign, and continuously improve the health literacy of the masses" 2023. This shows the importance of disease prevention. Early cancer screening is a means of prevention. Regular cancer screening health physical examination for high-risk groups can achieve the goals of early detection, early diagnosis and early treatment, improve the survival rate of patients and reduce the burden of patients' families.

Based on this original intention, the state has introduced many policy programs. Among them, the national major public health special urban cancer early diagnosis and early treatment project was launched in 2012, and Wuwei City will carry out the screening work of five common cancers (lung cancer, breast cancer, liver cancer, colorectal cancer and upper

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digestive tract cancer) as the implementation point of the project in 2022. 2023 will be the second year for Wuwei City to carry out urban cancer screening. Compared with the screening results in 2022, we can summarize the measures that can be optimized and improved, analyze the changes in the characteristics of the screening population, and provide guidance and suggestions for the development of urban cancer projects in the future.

MATERIALS AND METHODS

Research object

People who have lived in Wuwei City for at least 3 years and are between 45 and 74 years old (based on the birth date of their ID cards) are selected as screening objects, and patients who have been diagnosed with tumors or are undergoing treatment for other serious medical and surgical diseases are excluded. All screening subjects signed informed consent forms.

Screening Process

Firstly, a risk assessment questionnaire was used to collect relevant information, including the participants' general situation, eating habits, living environment, lifestyle habits, past history, family history of malignant tumors, female physiology and reproductive history. Secondly, three biological tests including Hepatitis B surface antigen (HBsAg), fecal immunochemical test (FIT) and Helicobacter pylori (Hp) were completed. The questionnaire survey was completed by face-to-face inquiry, and the questionnaire and test results were evaluated by the evaluation system developed by the National cancer Center based on the "Harvard cancer risk index" Zeng et al. (2018). Finally, the assessed high-risk population was mobilized to participate in the clinical examination of the corresponding cancer type. Screening methods, screening procedures and diagnostic criteria for various types of cancer are carried out in accordance with the Technical Plan of Urban Early Diagnosis and Early Treatment of Cancer Project. Screening for each cancer type includes low-dose spiral CT of the lung, ultrasound and alpha-fetoprotein of the liver, ultrasound and X-ray of the breast, upper gastrointestinal endoscopy and indicative biopsy, colonoscopy and indicative biopsy.

Statistical Analysis

SPSS 27.0 was used to organize and analyze the data. The counting data were distributed according to the frequency and percentage response data, and Chi-square test was used for comparison between groups. $P < 0.05$ was considered statistically significant. High risk rate = (number of cases assessed as high risk for any cancer/total number of cases participating in the evaluation) *100%, screening rate = (number of cases assessed as high risk and participating in clinical screening/number assessed as high risk) *100%, positive lesion detection rate = (number of positive lesions in clinical screening/number of clinical screening) *100%.

RESULTS

Basic information on screening in 2023

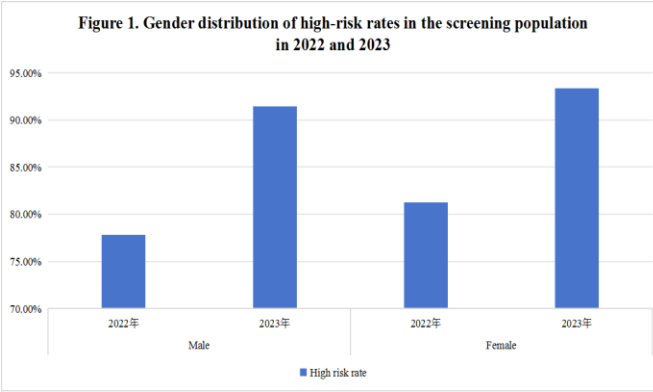
In 2023, 1,975 people will participate in assessment and 1,560 people will participate in clinical screening. The participation rate of clinical screening was 78.99%. There were 52 high-risk patients with one type of cancer, accounting for 2.63%; 249 patients with high risk of 2 types of cancer, accounting for 12.61%; There were 629 high-risk patients with 3 types of cancer, accounting for 31.85%; 604 patients were at high risk of 4 types of cancer, accounting for 30.58%; 295 patients were at high risk of 5 types of cancer, accounting for 14.94%. Among them, 1080 patients had a high risk of lung cancer (high risk rate 54.68%), and 861 patients participated in clinical screening, including 371 males (clinical screening participation rate 78.44%) and 490 females (clinical screening participation rate 80.72%), with statistical significance ($\chi2=38.251$, $P < 0.001$). There were 603 patients with high risk of liver cancer (high risk rate 30.53%), and 399 patients participated in clinical screening, 179 males (clinical screening participation rate 63.48%) and 220 females (clinical screening participation rate 68.54%), the difference was statistically significant ($\chi2=14.826$, $P < 0.001$). There were 1005 patients with high risk of breast cancer (high risk rate 50.89%), and 814 patients participated in clinical screening, all of whom were female, with a participation rate of 81.00%. There were 882 patients with high risk of colorectal cancer (high risk rate of 44.66%), and 579 patients participated in clinical screening, 278 males (clinical screening participation rate of 63.04%) and 301 females (clinical screening participation rate of 68.25%), the difference was statistically significant ($\chi2=54.599$, $P < 0.001$). There were 1076 patients with high risk of upper digestive tract cancer (high risk rate 54.48%), and 668 patients participated in clinical screening, including 264 males (clinical screening participation rate 59.86%) and 404 females (clinical screening participation rate 60.75%), with statistical significance ($\chi2=5.238$, $P < 0.05$). By age group comparison, it was found that lung cancer, liver cancer, breast cancer and colorectal cancer screening groups of all ages had statistical differences in whether to participate in clinical screening ($P < 0.001$) (Table 1).

sex comparison of changes in high-risk rates in the 2022 and 2023 screening populations

In 2022, 3301 people are at high risk, with a high-risk rate of 80.06%. Among them, 1106 men were at high risk, with a high-risk rate of 77.83%, and 2195 women were at high risk, with a high-risk rate of 81.24%. There was a difference in the high-risk rate between men and women ($P < 0.05$). In 2023, 1587 people are at high risk, with a high risk

rate of 92.61%. There were 694 males with a high-risk rate of 91.44% and 1135 females with a high-risk rate of 93.34%. There was no statistically significant difference between the two groups (P=0.116). A comparison of two years of data found that both male and female populations had higher risk rates in 2023 than in 2022 (Figure 1).

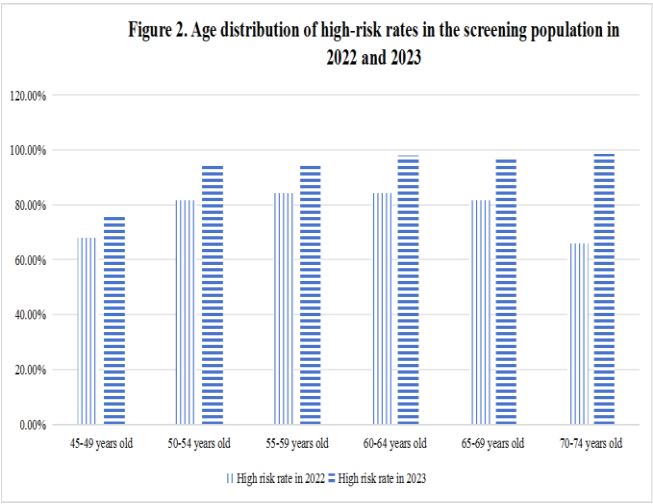
Figure 1: Gender distribution of high-risk rates in the screening population in 2022 and 2023



The change in the risk rate of the screened population in 2022 and 2023 was compared by 3 age groups

In the 2022 screening population, the highest risk rate was in the 55-59 age group (84.32%), followed by 60-64 years old (84.28%), 50-54 years old (81.69%), 65-69 years old (81.57%), 45-49 years old (68.04%) and 70-74 years old (65.94%). The difference of high-risk rate among different age groups was statistically significant (P < 0.001).

Figure 2: Age distribution of high-risk rates in the screening population in 2022 and 2023

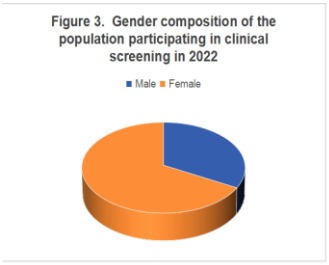


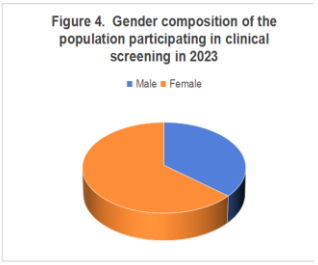
In the screening population in 2023, the statistical high-risk rates from high to low were 70-74 years old (98.48%), 60-64 years old (97.99%), 65-69 years old (96.60%),55-59 years old (95.28%), 50-54 years old (94.56%), and 45-49 years old (76.13%). The difference of high-risk rate among different age groups were statistically significant (P < 0.001). The two-year data comparison shows that the middle age group has a higher risk rate in 2022, and the high age group has a higher risk rate in 2023 (Figure 2).

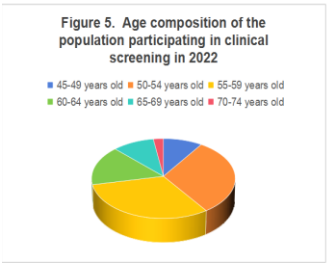
The changes in the composition of clinical screening program participants in the 2022 and 2023 screening populations were compared by age group and sex

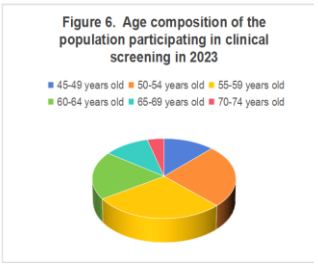
In 2022, 2840 people will participate in clinical screening projects, and in 2023, 1560 people will participate in clinical screening projects. In 2022, there were 939 males, accounting for 33.06%, and 1901 females, accounting for 66.94%; In 2023, there were 567 males, accounting for 36.35%, and 993 females, accounting for 63.65%. Two years of data showed similar sex composition ratios in the screening population (Figures 3 and 4).

Figure 3,4,5,6:









In 2022, according to the proportion of age groups participating in screening, the 55-59 age group has the largest number (31.27%), followed by the 50-54 age group (31.09%), the 60-64 age group (15.99%), and the 65-69 age group (9.96%). Last were those aged 45-49 years (9.30%) and 70-74 years (2.39%). In 2023, the proportion of people in different age groups participating in the screening in descending order was 55-59 years old (28.14%), 50-54 years old (25.45%), 60-64 years old (19.42%), 45-49 years old (12.12%), 65-69 years old (10.83%), and 70-74 years old (4.04%)). In 2022 and 2023, the population participating in the clinical screening program in different age groups has similar distribution, with the largest number in the 55-59 age group, the least in the 70-74 age group, and the middle in other age groups (FIG. 5 and FIG. 6).

Comparison of the detection of positive lesions of various cancer types in 2022 and 2023

In 2022, 3 cases of lung cancer were detected, the detection rate was 0.19%; Breast cancer was detected in 21

the detection rate was 1.74%. Colorectal cancer was detected in 5 cases, the detection rate was 0.61%. 13 cases of upper digestive tract cancer were detected, the detection rate was 1.21%. In 2023, 1 case of liver cancer (detection rate 0.21%), 1 case of colorectal cancer (detection rate 0.13%) and 6 cases of upper digestive tract cancer (detection rate 0.63%) were detected. In 2022, other positive lesions besides cancer were detected in lung 1023 cases (detection rate of 63.15%), liver 37 cases (detection rate of 13.45%), breast 315 cases (detection rate of 26.14%), colorectal 225 cases (detection rate of 27.41%), and upper digestive tract 849 cases (detection rate of 78.83%). In 2023, other positive lesions besides cancer were detected in 744 cases of lung (detection rate 81.13%), 19 cases of liver (detection rate 3.96%), 196 cases of breast (detection rate 22.66%), 152 cases of colorectal (detection rate 20.08%), and 457 cases of upper digestive tract (detection rate 48.00%). Compared with 2022, the detection rate of cancer in various sites in 2023 has decreased, and the detection rate of other positive lesions except cancer in liver, breast, colorectal and upper digestive tract has also decreased, but the detection rate of other positive lesions except cancer in lung has increased by 17.98% (Table 2).

Table 1: Participation in clinical screening by cancer group in 2023

Characteristics	Groups	Lung Cancer		Liver Cancer		Breast Cancer		Colorectal Cancer		Upper gastrointestinal Cancer	
		Number of Screening Cases	Participation rate	Number of Screening Cases	Participation rate	Number of Screening Cases	Participation rate	Number of Screening Cases	Participation rate	Number of Screening Cases	Participation rate
Total		861	55.12%	399	25.54%	814	52.11%	579	37.07%	668	42.77%
Sex											
	Male	371	78.44%	179	63.48%	0	0.00%	278	63.04%	264	59.86%
	Female	490	80.72%	220	68.54%	814	81.00%	301	68.25%	404	60.75%
χ2	-	38.251		14.826		-		54.599		5.238	
P	-	<0.001		<0.001		-		<0.001		0.022	
Age											
	45-49 years old	0	0.00%	17	53.13%	129	72.88%	72	63.16%	84	53.50%
	50-54 years old	229	76.59%	94	62.67%	235	79.93%	121	65.76%	172	57.33%
	55-59 years old	283	80.17%	128	69.57%	227	83.15%	151	67.11%	176	66.67%
	60-64 years old	191	80.59%	96	65.31%	147	85.96%	129	70.88%	117	64.29%
	65-69 years old	105	76.64%	49	69.01%	59	83.10%	75	58.14%	84	66.67%
	70-74 years old	53	98.15%	15	78.95%	17	89.47%	31	65.96%	35	74.47%
χ2	-	280.365		37.919		65.91		20.44		11.055	
P	-	<0.001		<0.001		<0.001		<0.001		0.05	

Table 2: Comparison of positive lesions detected by various cancer types in 2022 and 2023

	Cancer		Other positive lesions	
	2022	2023	2022	2023
Lung cancer	3 (0.19%)	0 (0.00%)	1023 (63.15%)	744 (81.13%)
Liver cancer	0 (0.00%)	1 (0.21%)	37 (13.45%)	19 (3.96%)
Breast cancer	21 (1.74%)	0 (0.00%)	315 (26.14%)	196 (22.66%)
Colorectal cancer	5 (0.61%)	1 (0.13%)	225 (27.41%)	152 (20.08%)
upper gastrointestinal cancer	13 (1.21%)	6 (0.63%)	849 (78.83%)	457 (48.00%)

DISCUSSIONS

The significance of cancer screening is to detect early cancer, provide more treatment options for patients and improve the survival rate Wang et al. (2023), Wang et al. (2023), Chen et al. (2023), Liu Naijia et al. (2023), Zhang et al. (2023). Some early lesions can also be found, and timely treatment measures can be taken to avoid the development of mild lesions to the direction of cancer; Through regular cancer screening physical examination, residents can have a clearer understanding of their own health status, develop a healthy lifestyle and behaviour habits, and help reduce the anxiety about the sudden disease Chen et al. (2023), Chen et al. (2020), Song et al. (2019), Li et al. (2018). However, early screening does not guarantee 100% accuracy and the improvement of survival rates, and many factors such as the age of patients, genetic inheritance, and lifestyle will also have an important impact on survival rates. Therefore, in the early screening of cancer, it is necessary to weigh various factors and formulate personalized screening and treatment plans after comprehensive consideration He et al. (2022), He et al. (2022), Zhang et al. (2020).

The urban cancer screening data of Nanchang City, Jiangxi Province from 2018 to 2022 shows that the overall population has a high-risk rate of 54.12% Zhao et al. (2023), while the local research data show that the overall risk rate of the screening population in 2022 and 2023 is above 80%, which is much higher than the screening results of residents in Nanchang City. The results of cancer screening in Xinjiang cities from 2014 to 2018 show that the cancer risk rates from high to low are respectively upper digestive tract cancer, lung cancer, female breast cancer, colorectal cancer and liver cancer Song et al. (2019), while the cancer risk rates of the screened population in 2023 are ranked from high to low as lung cancer, upper digestive tract cancer, breast cancer, colorectal cancer and liver cancer. Except for lung cancer and upper digestive tract cancer, the other cancers were ranked the same. These results indicate that the two cities in Northwest China have similar high risk of cancer, and the prevention and treatment of cancer should be paid attention to by the policy makers and health workers in both regions. The screening results of five common cancers among permanent urban residents in Nantong Development Zone from 2019 to 2020 show that the high-risk rates of the screening population are lung cancer, colorectal cancer, breast cancer, liver cancer, and upper digestive tract cancer in order from high to low Shen et al. (2019), which indicates that there are differences in the ranking of high-risk cancers between the southern and northern populations. It is suggested that the health workers should make cancer prevention measures and cancer health education work plan according to the characteristics of the high incidence of diseases in the local population, and cannot be generalized. In addition, the data in this paper show that the high-risk rate of the screening population in 2023 is about 12% higher than the overall high-risk rate of the screening population in 2022. The screening staff conducted a qualitative interview on this phenomenon during the mid-year screening process, and the interview results found that some people who participated in the initial project in 2022 filled in the health questionnaire based on the facts. There will be indications that the high-risk cancer types are less or do not meet the requirements for free screening, or the assessment results do not meet the residents' own screening expectations, and the residents who come for screening again in 2023 can achieve the purpose of more free screening programs for as many high-risk cancer types as possible. There will be false reporting of their own disease history and family history or based on memory to guess the illness of family members. From the perspective of screening workflow, such situations are also unavoidable, unless patients admitted to our hospital can be directly inquired whether their current physical condition meets the inclusion and exclusion criteria, and other family history contents fabricated by patients cannot be verified and corrected, and all relevant contents related to screening can only be patiently and carefully informed before starting assessment. As far as possible to guide the

residents to fill in the assessment questionnaire according to the facts. Although the recall bias and reporting bias caused by this point are unavoidable, they are also one of the limitations of this paper. In the future screening work, we should find ways to avoid or reduce the occurrence of such bias in order to improve the quality of screening data.

From 2014 to 2018, the screening results of urban cancer early diagnosis and early treatment project in Quzhou City, Zhejiang Province showed that the positive lesion detection rates of various cancer types were female breast cancer, lung cancer, liver cancer, colorectal cancer and upper digestive tract cancer in order from high to low Lei et al. (2021). From 2014 to 2017, the cancer risk assessment and screening results of the early diagnosis and treatment program of urban cancer in Guangxi showed that the detection rates of cancer-related positive lesions were ranked as grade 4-5 breast BI-RADS, suspected lung cancer, colorectal cancer, upper gastrointestinal cancer and suspected liver cancer Zhu et al. (2019). In the screening population of Wuwei City, the detection rate of cancer in 2022 was ranked from high to low as breast cancer, upper digestive tract cancer, colorectal cancer, lung cancer and liver cancer. The three regions had the highest detection rate of breast cancer, but the other four cancer types had different detection rates. In 2023, the detection rate of cancer in Wuwei was ranked from high to low as upper digestive tract cancer, liver cancer, colorectal cancer, lung cancer and breast cancer. In the same order as the detection rate of various cancers in 2022, colorectal cancer and lung cancer ranked third and fourth, while the detection rate of breast cancer ranked first in 2022 and fifth in 2023. The reason for this difference may be the different incidence of breast cancer in the screening population, or the difference in the composition of the screening population, such as age and gender.

From 2014 to 2020, males accounted for 48.34% and females accounted for 51.66% of the urban cancer screening population in Qingdao. The population participation rate in 2023 was 78.99%, which was much higher than the population participation rate of 39.34% in the cancer screening clinical screening program in Qingdao Li et al. (2019). Residents of Qingdao 60. The participation rate of 65-year-olds was the highest (18.01%), while that of 70–75-year-olds was the lowest (6.42%). In 2023 and 2022, the participation rate in the 55-59 age group was the highest, and the participation rate in the 70-74 age group was the lowest. It is necessary to develop screening mobilization measures for older age groups in order to increase participation in clinical screening programs in the overall population.

Wuwei City began to undertake the urban cancer screening project in 2021. As a subordinate screening institution, it did not export the survey data of the residents' health assessment questionnaire from the urban cancer screening system, and it was unable to deeply analyze various factors affecting the screening results. At present, this is a great limitation. However, the available data in this paper are collected on the basis of the Chinese residents' Cancer Prevention and Control Action work platform, and the data standards are unified and standardized, which is easy to compare with research results in other regions. This is the advantage of this paper.

DECLARATIONS

Consent

All screening subjects signed informed consent forms.

The ethics declaration

According to the Declaration of Helsinki, this study was reviewed by the Drug Clinical Trial Committee of Wuwei Cancer Hospital of Gansu Province (Ethics Review No. 2023-28).

Conflicts of Interest

No conflict of interest.

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Research data declarations

All data generated or analysed during this study are included in this published article. The datasets analysed during the current study are not publicly available due [REASON WHY DATA ARE NOT PUBLIC] but are available from the corresponding author on reasonable request.

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