Using Incremental Cost-effectiveness Ratio to Analyze the Cost-utility Comparing Two Different Treatment Options for Colon Cancer in Chinese Mainland

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Abstract: Colorectal cancer exists as a major threat to human health. In mainland China, research analyzing the cost-utility of surgical treatments for patients with colorectal cancer is particularly scarce. The aim of this study is to fill the gap in study on cost-utility analysis of surgical treatment for colorectal cancer in mainland China. This study constructs a database by using secondary data obtained from searching published papers. The data is then analyzed and calculated to derive the Incremental Cost-Effectiveness Ratio (ICER) for laparoscopic surgery comparing with open surgery, and the ICER is then compared to the Willingness to Pay (WTP) threshold of Chinese patients. The results of the data analysis shows that the Quality-Adjusted Life Years (QALYs) for colorectal cancer patients in mainland China receiving laparoscopic surgery and open surgery are 6.85 years and 5.04 years respectively. The ICER for laparoscopic surgery compared to open surgery is 2866.54 China Yuan / QALY, which is much lower than the WTP threshold for treating advanced cancer in mainland China (i.e. 185753.06 China Yuan). The study finds that laparoscopic surgery has higher QALY and cost-utility in term of ICER comparing with open surgery when treating colorectal cancer in mainland China, making it a better treatment option. The findings of this study can serve as a guide for future patients, healthcare providers and policy-making departments.
***Keywords*:** colorectal cancer, health technology assessment, quality-adjusted life years, markov model, willingness-to-pay

1. Introduction

Cancer is one of the major threats to human health [1]. One of the commonly diagnosed cancers is colon cancer (also known as colorectal cancer), which is the occurrence of malignant tumors in the colorectum, and is ranked among the top three of all kinds of tumors in the United States in terms of incidence and mortality rates [2]. Most cancers have multiple treatment options to be chosen from. For example, in aspect of colon cancer, treatment can be divided into surgical removal of the tumor, chemotherapy and radiotherapy [3]. For the surgical removal of the tumor, treatment options are mainly subdivided into laparoscopic surgery and open surgery [4]. Laparoscopy surgery is a type of mini-invasive surgery that uses special tools and is technically less invasive than traditional surgery and allows for greater precision and accuracy [5]. Previous studies have mainly focused on the medical outcomes of the treatments, or the living quality or survival time of the patients. There are a limited number of studies on the cost-effectiveness between laparoscopic surgery and traditional open surgery, and most of them were conducted in the Western world. In mainland China, studies of this topic are found to be scarce.

2. Research questions / hypothesis

The aim of the study is to fill this gap by conducting a cost-utility analysis comparing laparoscopic and open surgery for colon cancer in mainland China. The objectives of the research are: (a) To construct a dataset that can be used to represent and analyze the cost-utility of colon cancer under different treatment options (i.e. laparoscopic surgery and open surgery); (b) To compare and analyze the ICER (incremental cost-effectiveness ratio) of the two treatment options; (c) To provide suggestions for medical practices and public health policies in mainland China based on the findings.

The following questions are addressed in this research:

(a) How do the outcomes differ between patients treated with laparoscopic surgery versus open surgery for colon cancer as measured by Quality-Adjusted Life Years (QALYs)?

(b) What is the difference in cost-utility in term of ICER between laparoscopic surgery and traditional open surgery for colon cancer in mainland China?

(c) From cost-utility perspective, which of the treatment methods should be priority chosen by Chinese healthcare participants when treating colon cancer?

The hypothesis of the study is: For colon cancer in mainland China, laparoscopic surgery has higher cost-utility in term

of ICER comparing with open surgery.

3. Significance of study

Mainland China has a large number of patients with colon cancer. For example, the estimation of new cases in 2019 is 607900, which places a heavy burden on both the healthcare system and patients [6]. According to studies, the proportion of out-of-pocket payment in China mainland's health care system is much higher than that in many Western countries [7], indicating that a large part of the burden of medical expenses is carried by patients. This means that studies on cost-utility of curing colon cancer are in urgent need in mainland China.

However, the current situation is that studies about the cost-utility of colon cancer are scarce in mainland China. Most studies on colon cancer found in mainland China mainly focus on the medical techniques of treatments, and the cost-utility is usually overlooked in these studies. Therefore, this study does not only provide a chance to fill the research gap regarding the cost-utility of colon cancer in mainland China, but also serves as a guiding reference for China's patients, health institutions and health policy makers in tackling this disease.

4. Literature review

There have been a large number of comparative studies on the difference between laparoscopic surgery and open surgery for colon cancer. However, most of these studies mainly focus on the medical techniques, outcomes of the surgeries, or prognosis of the patients [8][9][10][11][12].

Most of the studies on the cost-utility of these two kinds of treatments for colon cancer were conducted in Western countries. A study conducted in 2006 used two different models to compare the cost-effectiveness of laparoscopic surgery and open surgery for colon cancer: the balanced sheet model, and the Incremental Cost Effectiveness Ratio (ICER) model [13]. A study of Swedish colon cancer patients emphasizes the importance of sick leave costs in cost-utility analysis [14]. A 2018 study suggests that Markov model should be used for cost-utility analyzation of these two different treatment methods for colon cancer [15]. A study of people with this disease in Spain used the ICER model for analysis [16]. One study in Taiwan analyzed the costs of open surgery, laparoscopic surgery and robotic surgery. In this study, costs were matched by their average and median value without further modeling or utility analysis, and data of patients from mainland China were not included [17].

In mainland China, very few studies are found relating to the cost-utility of treating colon cancer. Wang Kaixuan and his colleagues analyzed the cost-utility of treating colon cancer using different targeted drugs to treat colon cancer, but surgical treatment was not included in his study [18]. Gao Hanlu and other scholars analyzed the cost-utility of screening rather than curing of colon cancer [19]. Wang Dongyang and other scholars published a paper analyzing the difference in medical effects between laparoscopic surgery and open surgery for colon cancer [20]. Shu Yixiong's study simply used a t-test to compare the costs of the two treatment options, leading to a failure of modeling and analyzing it from cost-utility perspective [21]. Jia Shihuan and others analyzed the costs of different treatment methods for colon cancer without further categorizing surgery into laparoscopic surgery and open surgery [22]. Ren Yu and others did a systematic literature review to analyze the average numerical cost for tackling colon cancer patients in mainland China, but also failed in distinguishing laparoscopic surgery and open surgery [23].

5. Theoretical / conceptual framework

This study uses the ICER to represent cost-utility, which is calculated by the difference of Quality-Adjusted Life Years (QALY) divided by the difference of monetary cost of treatments [24]. The index QALY refers to the patient 's living quality combined with life expectancy, which can reflect the life and health status of patients in a balanced way, therefore it is widely used as an indicator in health utility analysis [25].

The scales that are commonly used include SF-36, EQ-5D, FACT C and EORTC [26]. SF-36 is pointed out by some scholars to be the most widely used questionnaire in academia, which consists of 36 questions across eight domains summing up to 100 scores in total, with higher scores indicating better health status of patients [27][28]. EQ-5D is another commonly used scale, which has both long and short versions. Similar to SF-36, the physical, psychological, and social health status of patients are evaluated comprehensively in this scale [29]. Another scale known as FACT C consists of 36 questions across five domains summing up to a total score of 136 points, where higher scores indicate better health status [30]. EORTC is also a commonly used scale that effectively assesses the quality of life of patients from multiple perspectives [31]. These scales are all considered to have good reliability, but they also have certain differences: among these scales, the SF-36 and EQ-5D are applicable to most disease types, while the FACT C and EORTC are more targeted at specific diseases, making

the questions in these scales more complicated and less accessible to patients [26].

The Markov analysis will be used to analyze the QALYs of the two treatment methods. This approach allows a flexible inclusion of different parameters and variables, rather than variables limited to numerical costs. Furthermore, it also has the advantage of being able to analyze long term-data [24].

Upon determining the ICER, it is common to analyze cost-utility by comparing ICER with a threshold value that is predetermined. If ICER is lower than this threshold, the corresponding treatment option can be considered cost-effective. This threshold is referred as the willingness to pay (WTP), which stands for the cost a patient is willing to pay to gain an additional QALY [32]. The World Health Organization suggests using a multiplier of a country's national GDP per capita as the threshold standard for WTP for that country [33]. A study in mainland China finds that the average WTP is 1.75 times GDP per capita [34]. Another study conducted in mainland China finds that specific WTPs classified by types of diseases varies, ranging from 1.76 to 2.06 times GDP per capita, in which the WTP for treating advanced cancer is 1.94 times GDP per capita [35].

6. Methodology

6.1 Study method

This study is conducted based on the secondary data collected from published papers. The data of patients used in this study is determined by the type and format of data included in the literature search. The target population of this study is patients in mainland China who are diagnosed with colorectal cancer, and are eligible for treatment by either laparoscopic or open surgery.

This study is proceeded firstly by collecting secondary data through scoping review. Raw data and other colon-cancer parameters necessary for data analysis are retrieved from the following three databases: Lingnan University 1-Search, CNKI Overseas, and PubMed. The dataset is then analyzed to get the QALYs of the patients, and the QALYs is used to calculate the ICER. Microsoft Excel is used in this study for data cleaning and most of the data analysis. SPSSAU is used for modeling and conducting Markov analysis.

6.2 Dataset construction

In order to search for secondary data related to cost effectiveness parameters that is contained in published studies, a scoping review is conducted using the following method: On Lingnan University 1-Search, CNKI Overseas and PubMed, search for articles dating from all times using the following keywords: "health economics laparoscopic open surgery colorectal cancer", "cost effectiveness laparoscopic open surgery colorectal cancer", "cost utility laparoscopic open surgery colorectal cancer", "quality adjusted life years laparoscopic open surgery colorectal cancer", "incremental cost effectiveness laparoscopic open surgery colorectal cancer".

All the results preserved in the initial search are then screened manually, and are excluded if the following conditions are found in the papers: (a). The paper is a repetition of existing search results or cannot be accessed; (b). The paper is not studying patients in mainland China; (c). The paper is not studying surgical curing of patients with colorectal cancer; (d). The paper does not distinguish between laparoscopic surgery and open surgery. In order to enhance the statistical reliability of the data, the included papers with the largest sample size corresponding to each parameter are regarded as the best data to be adopted for that parameter, and the bundle of these secondary data is regarded as part of the dataset that will be used in the subsequent process of analysis.

The procedure and results of the literature search is shown in Figure 1.

One of the cost effectiveness parameters is cost, which is the monetary loss related to the curing of colorectal cancer. This study divides monetary loss incurred by patients during colorectal cancer treatment into direct cost and indirect cost according to their sources and properties. Direct cost refers to the costs that can be directly classified into medical service category by receiving colorectal cancer treatment provided by medical departments, which mainly includes surgery fees, material fees, anesthesia fees, hospitalization fees, and drug fees. Indirect costs are income losses result from hospitalization for patients to receive medical treatment, as well as transportation, accommodation, and meal expenses spent by patients in the process of finding and approaching a medical service provider to receive treatment services [24]. Since data on transportation fees, accommodation fees, and meal expenses incurred by patients when seeking medical facilities are often difficult to collect and not specifically tracked, these costs are not included in the indirect cost parameters in this study. Indirect cost refers to income losses of patients during treatment, calculated by the days of hospitalization days multiplied by the corresponding daily income per capita.

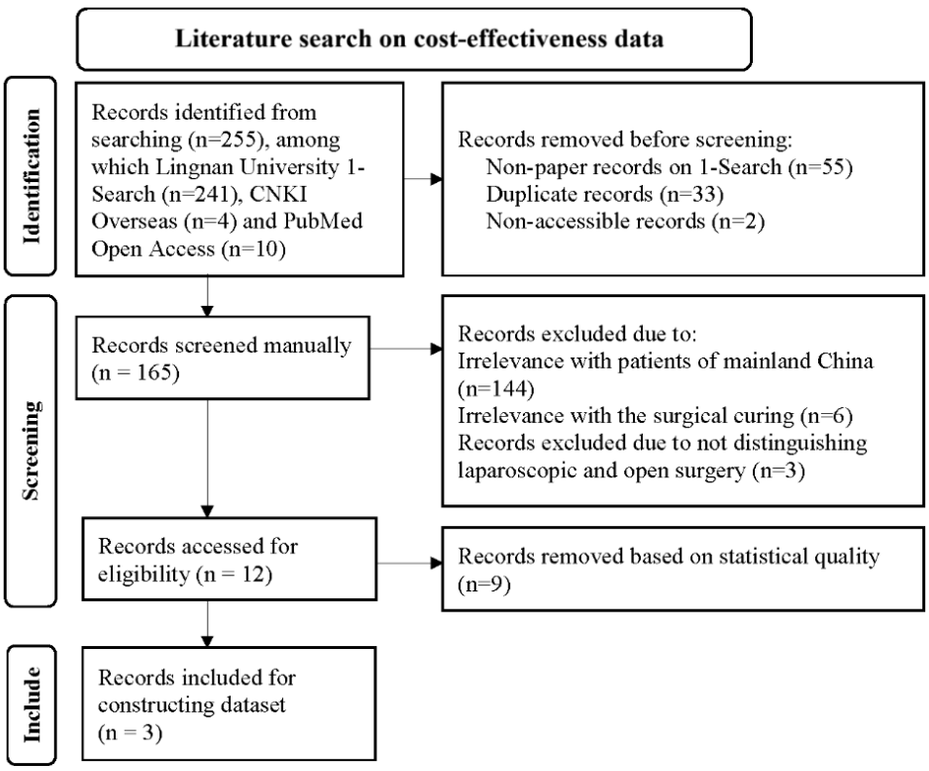

Figure 1. The procedure and results of the literature search on cost effectiveness parameters

Among the studies that are included, Yin's meta-analysis study is selected as the parameter for calculating direct cost [36]. It should also be noticed that, the different pairs of direct cost comparison data regarding colorectal cancer patients in China recorded in Yin's study are collected from different years. Since the nominal value and purchasing power of currency vary across different years, the numerical cost in these data cannot analyzed directly. They are influenced by the price levels and inflation rates of the respective years in which they were collected, which means that is necessary to adjust these data using inflation rates to eliminate the impact of inflation on costs across different times. The adjustment method used in this study is as follows: obtain the annual growth rates of the Consumer Price Index (CPI) data from the National Bureau of Statistics of China, and then use the cumulative inflation rate to convert direct cost from each pair of data in the dataset to their corresponding costs at present. The calculation formula is:

$$DDC_{now} = \prod_{i=y}^{2024} I_i \times DDC_y \tag{1}$$

Where DDC_{now} is the mean difference of direct cost (laparoscopic surgery minus open surgery, the same applies below) at present that has been inflation-adjusted, y is the year of data, DDC_y is the mean difference of direct cost recorded, and I is the growth rate of CPI each year (the statistics dimension is I = (CPI/100)×100% and regard the year before as a baseline of 100%). The data of CPI is shown in Table 1a., and Table 1b. shows the data of DDC_y, y, as well as inflation-adjusted DDC_{now}. The average value of DDC_{now} is calculated to be 5347.6 China Yuan.

Table 1a. Annual growth rate of CPI of China

y	CPI (Previous year = 100)	Data Source	I
2024	100.2	[37]	100.2%
2023	100.2		100.2%
2022	102		102.0%
2021	100.9		100.9%
2020	102.5		102.5%
2019	102.9		102.9%
2018	102.1		102.1%
2017	101.6		101.6%
2016	102		102.0%
2015	101.4		101.4%
2014	102		102.0%
2013	102.6		102.6%
2012	102.6		102.6%
2011	105.4		105.4%
2010	103.3		103.3%
2009	99.3		99.3%
2008	105.9		105.9%
2007	104.8		104.8%
2006	101.5		101.5%
2005	101.8		101.8%

Table 1b. Data of DDC_y and inflation-adjusted DDC_{now}.

No.	y	DDCy	Sample size	Data source	DDCnow
1	2018	4000	104	[36]	4450.94
2	2016	9100	194		10493.66
3	2016	2000	80		2306.30
4	2014	3000	86		3578.04
5	2013	5000	80		6118.45
6	2012	-240	146		-301.32
7	2012	500	48		627.75
8	2011	2893	40		3828.31
9	2011	13900	34		18393.90
10	2011	900	35		1190.97
11	2010	930	51		1271.28
12	2009	847.75	87		1150.74
13	2009	6000	104		8144.42
14	2009	4000	102		5429.61
15	2008	512.87	30		737.25
16	2008	-1800	57		-2587.48
17	2008	2000	454		2874.98
18	2006	1921.5	173		2938.14
19	2014	21400	160		25523.34
20	2013	323	166		395.25
21	2012	-306	87		-384.18
22	2012	3656	116		4590.13
23	2012	20386	145		25594.73
24	2005	1270.2	64		1977.21
				Average DDCnow	5347.6

In terms of indirect cost, this study uses the number of days of hospital stay to represent the loss of working days when patients are receiving medical treatments. This figure is then multiplied by the latest data on China's daily income per capita to calculate income loss. The study conducted by Tang and his colleagues is included, as it is found to have the largest sample

size (n=243) of data on hospital stays [38]. The data on the daily income per capita is calculated by dividing the annual income per capita issued by China's National Bureau of Statistics by the number of days in the year. The above data and the derived indirect costs are listed in Table 2. The indirect costs of laparoscopic surgery and open surgery are 1585.96 China Yuan and 1739.48 China Yuan respectively.

Table 2. Loss of working days, income per capita of China, and the calculated indirect cost

Loss of working days		Data Source
Laparoscopic surgery	Open surgery	[38]
14.05	15.41	
Annual income per capita		[39]
41314		
Daily income per capita		
112.88		
Indirect cost		
Laparoscopic surgery	Open surgery	
1585.96	1739.48	

Also, data on both the health score of the patients in different health states and the probability of patients being in that state are required. Given that no secondary data on health-related score is identified in the previous literature search, an additional scoping review is conducted using the following methods: On Lingnan University 1-Search, CNKI Overseas and PubMed, search for articles dating from all times using the following keywords: "SF 36 colorectal cancer laparoscopic", "EQ 5D colorectal cancer laparoscopic", "FACT C colorectal cancer laparoscopic", "EORTC colorectal cancer laparoscopic". The screening and including standards of this scoping review is the same as the one mentioned previously.

The procedure and results of this literature search is shown in Figure 2.

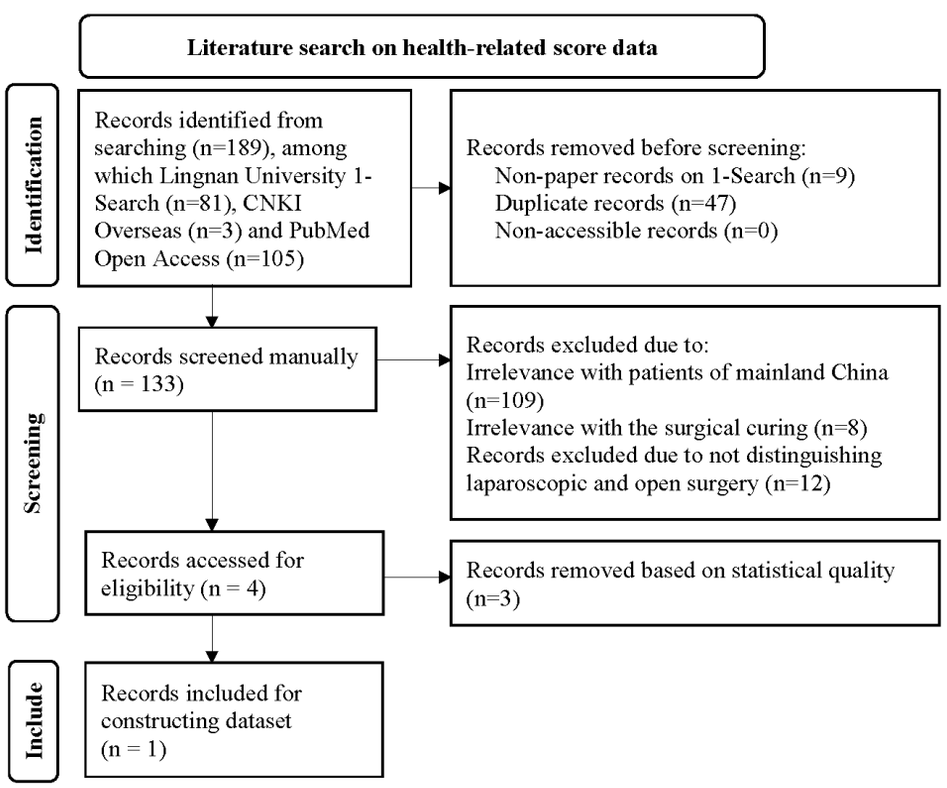

Figure 2. The procedure and results of the literature search on health score parameters.

Zhu's SF-36 data is included as the assessment standard for health scores [40]. The SF-36 score data and the average health qualities calculated are shown in Table 3. The average health quality of laparoscopic surgery and open surgery are 0.69 and 0.53 respectively.

Table 3. Mean SF-36 scores and the calculated average health quality

Mean SF-36 score	Laparoscopic surgery	Open surgery	Data source
Physical function	75.1	55.4	[40]
Role physical	70.8	42.2	
Body pain	71.3	68.8	
General health	69.5	67.9	
Vitality	70.6	40.5	
Social function	73.4	63.5	
Emotional performance	50.4	35.2	
Mental health	71.6	50.1	
Sum of the scores	552.7	423.6	
Full Score	800	800	
Average health quality	0.69	0.53	

In order to perform Markov analysis, three parameters need to be determined: (a). the type, development and outcome of different states, (b). the initial distribution, and (c). the probability of transition between different states within each Markov cycle. In this study, two Markov states are established: survival state and death state. This study assumes that all patients are alive upon completion of laparoscopic surgery or open surgery. Given that the QALYs to be calculated in this study are expressed in a year basis, each Markov cycle in this study is set to be one year. The study conducted by Chen, et al. is selected as the data source for calculating the mortality rate [41]. The secondary data from Chen and his colleagues are recorded as five-year survival of patients, which needs to be converted to annual mortality rates using the following formula:

$$M = 1 - \left(\frac{N_S}{N_T}\right)^{\frac{1}{5}} \quad (2)$$

Where M is the annual mortality rate, N_T is the total number of patients, and N_s is the number of patients who survives to the fifth year. The data on patients and the calculated annual mortality rate can be found in Table 4. The annual mortality rate of patients receiving laparoscopic surgery and open surgery are 6.7% and 7.2% respectively.

Table 4. Data on five-year survival and the calculated annual mortality rate

No.	Laparoscopic surgery		Open surgery		Data source
	Survival	Total	Survival	Total	
1	112	167	112	172	[41]
2	134	191	126	191	
3	87	113	96	123	
N	333	471	334	486	
N_S/N_T	70.7%		68.7%		
M	6.7%		7.2%		

As for the number of cycles in the Markov analysis, this study assumes that patients diagnosed with colorectal cancer will all choose to receive laparoscopic surgery or open surgery upon diagnosis, and will continue to survive afterwards until natural death, which means that the number of cycles of the Markov analysis is the difference between average life expectancy and the average age for patients to receive surgeries. The latest data on national average life expectancy published by China's National Bureau of Statistics is found to be approximately 78 years [42]. Therefore, this study assumes that patients survive until the age of 78 after surgery on average. Regarding the average age of receiving colorectal cancer surgery, no study is found directly reporting the precise average age of onset of all colorectal cancer patients in China. There are statistics indicate that the incidence of colorectal cancer in China begins to rise rapidly from 45 to 59 years of age, with the highest incidence rate among those aged 60 to 74 [43]. Wan reports that the median age of colorectal cancer diagnosis in several major Chinese cities ranges from 61 to 65 years [44]. A small-scale study found that the average age of colorectal cancer patients admitted to hospitals was 59.26 years [45]. Therefore, this study assumes that the average age at which colorectal cancer patients receive surgery is 60 years old, and the number of Markov cycles is set to be 78–60=18 cycles.

As for WTP, this study uses the most relevant data available that aligns with the research context [46]. This data indicates that for Chinese patients receiving treatment for advanced cancer, the WTP for an additional QALY is 1.94 times of annual GDP per capita. The latest annual GDP per capita obtained from the National Bureau of Statistics (2025) is 95749 China Yuan, thus this study sets WTP to be 185753.06 China Yuan [47].

6.3 Data analysis

The data analysis process is presented in Figure 3.

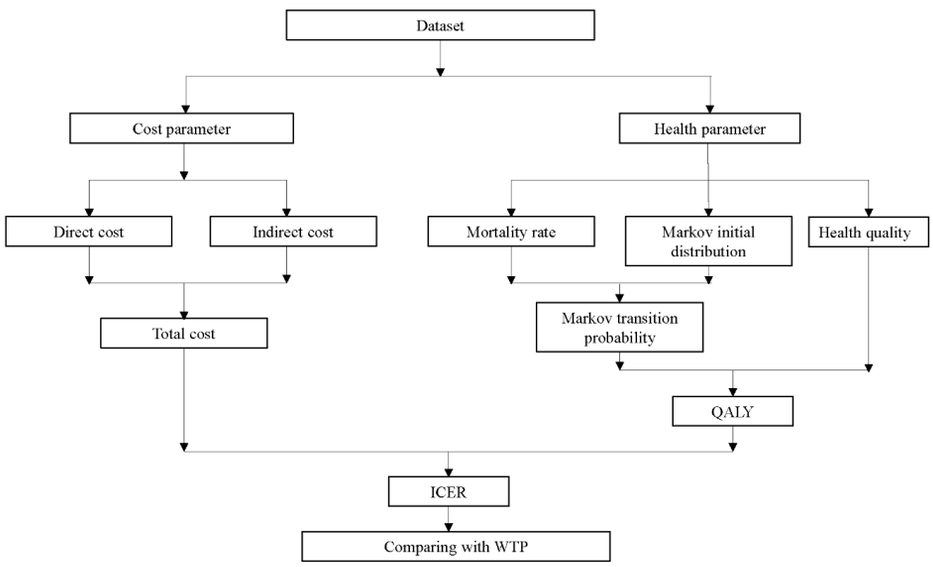

Figure 3. The process of data analysis

The difference in total cost between laparoscopic surgery and open surgery can be obtained through the following formula:

$$TC_L - TC_O = DDC_{NOW} + (IC_L - IC_O) \tag{3}$$

Where TC_L is the total cost of laparoscopic surgery, TC_O is the total cost of open surgery, IC_L is the indirect cost of laparoscopic surgery, and IC_O is the indirect cost of laparoscopic surgery.

The decision trees that illustrate the Markov transition analysis of patients receiving laparoscopic surgery and open surgery are shown in Figures 4a and 4b.

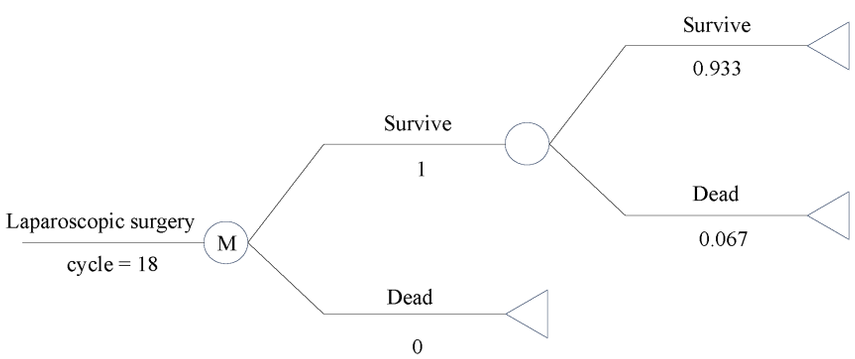

Figure 4a. The decision tree that illustrates Markov analysis of patients receiving laparoscopic surgery

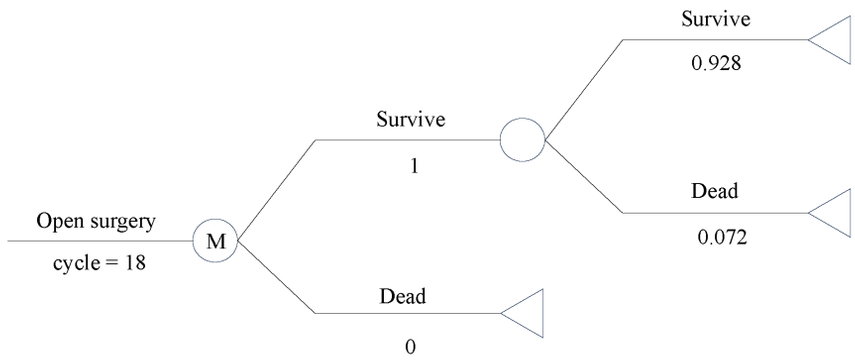

Figure 4b. The decision tree that illustrates Markov analysis of patients receiving open surgery.

The QALYs for laparoscopic patients and open surgery patients can be derived using the following formula:

$$QALY = \sum_{i=1}^{18} (P_{di} \times U_{di} + P_{si} \times U_{si}) \tag{4}$$

Where P_d is the probability of survival conversion to death in each cycle, U_d is the health quality of patients being in the death state, P_s is the probability of continuous of survive in each cycle, U_s is the health quality of patients being in the survival state. Due to the availability of the secondary data, this study assumes that the health quality of patients after surgery remains stable until death, and the health quality of patients after death should obviously remain at 0.

Based on the above data, ICER can be calculated using the following formula [24]:

$$ICER = \frac{TC_L - TC_O}{QALY_L - QALY_O} \tag{5}$$

Where $QALY_L$ is the QALY for patients receiving laparoscopic surgery, and $QALY_O$ is the QALY for patients receiving open surgery.

7. Results

Using Formula 3, it can be calculated that (TC_L - TC_O) equals 5194.08 China Yuan. After conducting the Markov analysis shown in Figure 4, the distribution of state transition probabilities is as follows:

Table 5. The result of Markov analysis

Laparoscopic surgery			Open surgery		
Cycle	Survive	Death	Cycle	Life	Death
1	0.933	0.067	1	0.928	0.072
2	0.871	0.130	2	0.861	0.139
3	0.812	0.188	3	0.798	0.202
4	0.758	0.242	4	0.741	0.259
5	0.707	0.293	5	0.687	0.313
6	0.660	0.340	6	0.637	0.363
7	0.615	0.385	7	0.591	0.409
8	0.574	0.426	8	0.549	0.451
9	0.536	0.464	9	0.509	0.491
10	0.500	0.500	10	0.472	0.528
11	0.466	0.534	11	0.438	0.562
12	0.435	0.565	12	0.406	0.594
13	0.406	0.594	13	0.377	0.623
14	0.379	0.621	14	0.350	0.650
15	0.353	0.647	15	0.324	0.676
16	0.330	0.670	16	0.301	0.699
17	0.308	0.692	17	0.279	0.721
18	0.287	0.713	18	0.259	0.741

It can be obtained that the QALYs for patients receiving laparoscopic surgery and open surgery are 6.85 years and 5.04

years respectively. ICER is calculated to be 2866.54 China Yuan per QALY. When this ICER value is compared with WTP (i.e. 185753.06 China Yuan), it can be found that ICER is much less than WTP.

8. Discussion

From the data analysis above, it can be concluded that the QALYs of colorectal cancer patients in China mainland who receive laparoscopic surgery and open surgery are 6.85 years and 5.04 years respectively. The ICER of laparoscopic surgery comparing with open surgery is found to be 2866.54 China Yuan / QALY, which means that patients choosing laparoscopic surgery instead of open surgery can have each year increase of QALY at a cost of 2866.54 China Yuan. This cost is much smaller than the WTP of Chinese patients (i.e. 185753.06 China Yuan), indicating that the treatment option of laparoscopic surgery exhibits high cost-effectiveness comparing with open surgery.

The results of this study corroborate and support previous Chinese studies [20][21]. The findings of this study are also consistent with a study conducted in Spain [16], which also found that laparoscopic surgery is more cost-effective than open surgery.

However, the findings differ from the study conducted by Murray and his colleagues in the UK [13]. The difference might due to the relatively small sample size in Murray's study, which included many surgeries performed by doctors who were not proficient in laparoscopic surgery, as well as higher medical costs in Europe compared to mainland China.

The data analysis in this study is limited by the quality and availability of the secondary data collected. Moreover, due to the scarcity of data on long-term follow-up of postoperative patients in China mainland, this study is unable to set a detailed mortality rate within each year, and thus have to assume that the mortality rate stays constant for every year. For the same reason, the long-term health scores of patients are rarely found in studies of Chinese patients, leaving this study to assume that the health scores of patients remain stable after the surgery. Nevertheless, it is still the best data that can be obtained for this study.

These limitations can be tackled in future studies through collecting more detailed and extensive patient data, especially data on monitoring the health status of post-surgery colorectal cancer patients in the long run.

9. Conclusion

This study compares the cost-utility of laparoscopic surgery and open surgery for colorectal cancer patients in mainland China through data analysis. The results shows that the QALYs of patients receiving laparoscopic surgery and open surgery in mainland China are 6.85 years and 5.04 years, which means that patients in mainland China who receive laparoscopic surgery enjoy a 1.81-year increase of QALYs compared to those who receive open surgery. Comparing with open surgery, treating colorectal cancer through laparoscopic surgery delivers an ICER of 2866.54 China Yuan / QALY, which is much lower than the WTP of cancer patients in mainland China (i.e. 185753.06 China Yuan). From the cost-utility perspective, laparoscopic surgery should be regarded as a prioritize for treating colorectal cancer in mainland China. This study fills the gap in research on the cost-effectiveness of colorectal cancer treatment in mainland China, and provides guidance for health decision-making in the future. The study is limited by the quantity and quality of the secondary data used for analysis. Broader and more wide-ranged survey should be conducted in future studies to obtain more comprehensive data.

Ethical approval

This study follows the ethics compliance guidelines of Lingnan University. An ethical approval was obtained before the conduction of data collection.

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