

THE USAGE AND FUTURE DEVELOPMENT OF MEDICAL INFORMATION SYSTEM IN TRADITIONAL CHINESE MEDICAL INSTITUTIONS

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Since Traditional Chinese Medicine is incorporated into National Health Insurance, medical information system is wildly used in Traditional Chinese Medical institutions to fulfill the need of insurance declaration. However, the difference between Traditional Chinese Medicine and Western medicine is great; and there is no medical information system specifically designed for Traditional Chinese Medicine. Therefore, the advantages of medical information system have not been fully presented yet. This study adopts Technology Acceptance Model theory to find out the present situation of medical information system applied in Traditional Chinese Medical institutions.

For this study, the questionnaires were delivered to 2794 Traditional Chinese Medical institutions; and 485 copies were received thereafter. The result shows that the main purpose for these medical institutions to apply the medical information system is to assist some medical tasks, such as the declaration of National Health Insurance. The accessibility and practicality of the medical information system usage in Traditional Chinese Medical institutions do not seem to be completely performed. Besides, more than seventy percent of these medical institutions think that standard coding system for diseases, symptoms and pattern differentiation, as well as the electronic medical records exchange system are the key development directions of Chinese medical information system in the future. Furthermore, eighty percent of the survey responders consider that the standard of Chinese medical information system is not well conducted; while ninety percent of the survey responders believe that the governmental subsidies to the related researches are insufficient. Accordingly, this study suggests that the government should help to develop a standard coding system for diseases, symptoms and pattern differentiation of Traditional Chinese Medicine, such as B-code system, to develop the nationally medical records exchange system, and to assist the application software vendors to build an information system specialized in Traditional Chinese Medicine.

Key words: Medical information system, Technology Acceptance Model, B-code

Introduction

Chinese medicine is a traditional medical science in Taiwan; and it stands side by side with Western medicine system in the major medical science. In 1995, the government made the Committee on Chinese Medicine and Pharmacy, which was originally under the jurisdiction of Department of Health, Executive Yuan, into an independently specializing organization. This organization is in charge of the supervision of nationwide Chinese medicine and pharmacy, as well as the development of research and the information of publications in Chinese medicine. It has gradually enhanced the domestic position of Chinese medical system¹. In addition, the White Paper of Health submitted by Department of Health, Executive Yuan in 1997, clearly pointed out that the goal of health advancement in Taiwan was to improve the development of medical technology and to enhance the cooperation with international medical science by promoting the modernization and scientificization of Traditional Chinese medicine (TCM)².

In order to improve the quality and condition of Chinese medicine, the Committee on Chinese Medicine and Pharmacy promotes the informationalization and digitalization of the ancient Chinese medical books and records. The Network of Chinese Medicine and Pharmacy is specially constructed for various TCM knowledge and publication inquiries. Instead of spending a lot of time on browsing ancient books and records, this website saves researchers a large amount of time searching data. This website also establishes the platform for Chinese medical doctors to exchange and discuss opinions, which makes a further step of the academy

of Chinese medicine³. In order to build a well-defined health safety protection system for patients and consumers, the Health Safety Protection Information Network of Traditional Chinese Medicine was set up in 2008, which aims to reduce the adverse drug reactions caused by TCM and herbal medicine, to put the management of medicine policy into effect, to promote service information, and to make the use of Chinese medicine and herbal medicine safer and more trustable⁴.

Accordingly, the government has paid a lot of attention to the promotion of the medical information system of TCM during these decades. However, since the domestic Chinese medical institutions began to apply medical information system into assisting the clinical medical treatment in 1999, it has simply been used as the payment declaration of National Health Insurance more convenient. With the information system, the automation of the medical treatment and hospital administrative operation procedure is expected to reduce the cost of hospital management and to raise the efficiency and efficacy of the hospital⁵. For this reason, the application software vendors began to develop and produce the medical information system for Chinese medical institutions. Nevertheless, current medical information system for Chinese medicine in the market are mostly revised from the mode using by western medical doctors, rather than specifically designed for the usage of Chinese medical institutions, for the reason that the application software vendors have no idea about the diagnosis system of Chinese medicine, and most of the Chinese medical doctors know not much about information technology. The clinical diagnostic procedures in TCM, such as history taking, physical examinations, prescription ordering or medication

usage, are very different from western medicine. The Chinese medical doctors collect symptoms and signs from four examinations, including “inspection,” “listening/ smelling,” “inquiry” and “palpation.” They perform diagnosis and draw conclusions about patient pathological conditions in terms of “patterns” rather than identify diseases in terminology of the western medicine⁶. Moreover, there are several unique instruments specially used in assisting the TCM diagnosis process, such as sphygmometer, voice analysis instrument ...etc. Unnaturally adopting the system revised from the medical information system of western medicine is unable to meet the need and reach the expected efficiency of the medical information system of Chinese medicine⁷. Though the software vendors have made a lot of effort on different types of Chinese medical information systems, those systems might only have good technology background but cannot be accepted by the users⁸.

In order to understand the present usage of Chinese medical information system in the medical institutions, this study aims at analyzing the conciseness of the system and exploring the factors affecting the users’ attitudes and wills of using, from the collected questionnaires. Furthermore, from the result of the questionnaires, it helps to understand whether the government provides enough assistance to the development of Chinese medical information system, and to confirm the future development direction of Chinese medical information system.

Materials and Methods

I. Research objects

According to the statistics of domestic Chinese

medical institutions from Department of Health, Executive Yuan in 2008, there are total 2794 medical institutions, including Chinese medical clinics, Chinese medical specialized hospitals, and Chinese medical department of the general hospitals. A compressive general survey is conducted by mailing questionnaires to all these medical institutions on the list. Because there are questions about the governmental assistance and suggestion to future development directions of Chinese medical information system, the target of our mail is the persons in charge of Chinese medical institutions or the chief directors of Chinese medical department.

II. The format of questionnaire

The content of this questionnaire is aimed at the present situation of Chinese medical information system usage in Chinese medical institutions. It applies the theory of Technology Acceptance Model (TAM) proposed by Davis, which explores the factors that affect behavioral intention to use information systems and suggests a causal linkage between two key variables—perceived usefulness and perceived ease of use—and users’ attitude, behavioral intention, and actual system adoption and use⁹. If the Chinese medical information system is useful and ease of use, the attitude of users in the Chinese medical institutions would be affected and they would have higher intention to use this system. Thus, this study uses TAM model to explore the variables that influence the users’ internal faith, attitudes and wills in using Chinese medical information system, and furthermore to affect the usage of this technology¹⁰. The policy of health authorities and the standard form of the electronic medical record are also included in this questionnaire. Four major parts are contained in

this questionnaire, including “General information”, “Friendliness and usefulness of Chinese medical information system”, “User’s attitude, will and actual using status of Chinese medical information system”, and “Governmental assistance and suggestion to future development directions of Chinese medical information system”.

III. Research method

The data retrieved from mailing questionnaires are descriptively statistical analyzed via SPSS to state the characteristics of each item.

Results

This research carries on a comprehensive general survey by mailing the questionnaires to the Chinese medical institutions. 2794 questionnaires were released altogether in February 2008, and 485 valid questionnaires were retrieved by the end of March 2008. The effective retrieving rate is 17%.

The reliability test result for the variables in the questionnaire is shown in Table 1. Employed here is Cronbach’s alpha in order to find out if there is any inherent consistency between variables for the reliability test. Cronbach’s alpha value of 0.7 or above is deemed to be reliable by convention¹¹. All of the values except “actual using status of Chinese

medical information system” are above 0.7.

Analyzing the items of the construct “actual using status of Chinese medical information system”, the interrelatedness between each item is strong, except the item “I don’t know how to work without using Chinese medical information system”. This item is closely related to the characteristic of clinical Chinese medical care. Because most of the Chinese medical doctors are used to written prescriptions rather than using Chinese medical information system and the main purpose for taking Chinese medical information system is facilitating the declaration of National Health Insurance, these factors might strongly influence the user’s answer of this item.

However, judging by the experts’ opinions that this item could help to identify the user’s dependence of Chinese medical information system, the result of this item was still used.

The questionnaire of this study was initially constructed by literature review and expert consultation, and then reviewed by the experts of healthcare administration and health economics for assessment of content validity and relevance. Therefore, the validity of the content is adequate.

Based on the four main parts of questionnaire, statistical analysis was performed, and the result is as follows:

Table 1. Assessment of the construct reliability

Construct	Number of items	Cronbach's α
Friendliness of Chinese medical information system	6	0.870
Usefulness of Chinese medical information system	6	0.920
User’s attitude for Chinese medical information system	6	0.945
User’s will in Chinese medical information system	4	0.730
Actual using status of Chinese medical information system	3	0.541
Governmental assistance in the development of Chinese medical information system	5	0.735
Future development directions of Chinese medical information system	9	0.905

I. General information

According to Table 2, the questionnaires were mainly retrieved from Chinese medical clinics, up to the amount of 472 institutions (97.52%). Five Chinese medical specialized hospitals (1.03%) and seven Chinese medical departments of the general

hospitals (1.45%) also respond to the questionnaire.

Current Chinese medical information system usage in these hospitals or clinics are mainly purchased or authorized by the application software vendors (97.93%). Only few of these Chinese medical institutions developed Chinese medical information

Table 2. The statistic analysis of Chinese medical information system

	Options	Number of times	Percentage (%)
Medical institution classification			
	Chinese medical clinics	472(2735*)	97.52(17.3 [§])
	Chinese medical specialized hospital	5(23*)	1.03(21.7 [§])
	Chinese medical department of the general hospital	7(17*)	1.45(41.2 [§])
What kind of Chinese medical information system is used in your hospital or clinic?			
	Information system purchased or authorized by the application software vendors	474	97.93
	Information system developed by yourself	10	2.07
Is there any assisted diagnostic instrument in your hospital or clinics?			
	No	416	87.21
	Yes	61	12.79
How much budget per year is used in your hospital for constructing Chinese medical information system(include hardware, software, internet facilities, and maintenance fee...etc.)			
	Under \$100,000NTD	346	73.15
	\$100,000-200,000NTD	104	21.99
	\$200,000-300,000NTD	14	2.96
	\$300,000-400,000NTD	7	1.48
	Above \$400,000NTD	2	0.42
User's interface of Chinese medical information system (Multiple choices)			
	Words form	129	28.48
	Windows form	378	83.44
	Bounces form	41	9.05
	others	4	0.88

* The number represents the total number of the questionnaire delivered.

[§] The number represents the effective retrieving rate of each kind of medical institutions.

Table 2. (continued) The statistic analysis of Chinese medical information system

	Options	Number of times	Percentage (%)
Input system of Chinese medical information system	(Multiple choices)		
	Keyboard	439	92.03
	Selection by classification	129	27.04
	initial consonant input system	79	16.56
	The suite (macro) input system	48	10.06
	Bar code input system	29	6.08
	Hand-written identification input system	15	3.14
	Pronunciation identification input system	1	0.21
	Others	1	0.21
The assisted diagnostic instruments used in your hospital or clinic	(Multiple choices)		
	pulse signal measurement (sphygmometer)	18	30.00
	The automatic reflective diagnosis system (ARDK)	12	20.00
	Tongue diagnosis instrument	9	15.00
	Voice analysis instrument	6	10.00
	others	23	38.33
The main purpose for your hospital in using Chinese medical information system	(Multiple choices)		
	To facilitate the declaration of National Health Insurance	427	88.41
	To facilitate the retrieve of medical records	402	83.23
	To facilitate the appointment registration system	401	83.02
	To save the time used in writing prescription	294	60.87
	To reduce the budget curtailment of National Health Insurance	276	57.14
	To improve the medical quality	265	54.87
	To alert the redundant medication	256	53.00
	To enhance the accuracy of prescription dispensing system	228	47.20
	To enhance the accuracy of paying system	226	46.79
	To enhances the security of medical records	182	37.68
	To alert interaction of the prescription drugs	140	28.99
	To analyze medical expense	123	25.47
	To do medical research	51	10.56
	As a platform for the staff learning	33	6.83
	others	12	2.48

system on their own (2.07%). The windows form is the main interface applied in Chinese medical information system (83.44%); while words form (28.4%) and pop-out form (9.05%) are the auxiliary. As for input system, key-in with keyboard is the commonest method (92.03%); and other methods include selection by classification (27.04%), initial consonant input system (16.56%) and the suite (macro) input system (10.06%).

The total budget used in constructing Chinese medical information system is basically under \$100,000NTD (73.15%), secondly under \$100,000-200,000NTD (21.99%). The main purpose for taking Chinese medical information system includes facilitating the declaration of National Health Insurance (88.41%), hastening the retrieving medical records (83.23%), and speeding up the appointment registration system (83.02%). Medical

research (10.56%) and staff learning platform (6.83%) are the least two purposes for the usage of Chinese medical information system. Regarding the assisted diagnostic instruments, there are only 12.79% of the medical institutions utilizing these instruments. Most of them are the pulse signal measurement (sphygmometer) (30%) and the automatic reflective diagnosis system (ARDK) (20%).

II. Friendliness of Chinese medical information system

According to Table 3, the sum of people who agree or very agree with these four items, “Chinese medical information system is easy to use”, “I won’t spend too much time on memorizing the operation method of Chinese medical information system”, “The interface of Chinese medical information system is clear and easy to understand”, and “Chinese

Table 3. The descriptive statistics of friendliness of Chinese medical information system.

	Very agree	Agree	Acceptable	Disagree	Very disagree	Median	Mean
Chinese medical information system is easy to use	11.42	57.72	28.96	1.69	0.21	4	3.78
I won’t spend too much time on memorizing the operation method of Chinese medical information system	9.15	61.91	26.17	2.55	0.21	4	3.77
The interface of Chinese medical information system is clear and easy to understand	9.13	60.51	27.81	2.34	0.21	4	3.76
Chinese medical information system is easy to learn	9.09	57.93	30.23	2.54	0.21	4	3.73
Chinese medical information system actively reminds me how to correctly operate the system	4.05	44.56	37.10	11.94	2.35	3	3.36
Chinese medical information system does not crash frequently and the operation speed won’t suddenly slow down	4.03	42.68	38.22	12.10	2.97	3	3.33

medical information system is easy to learn”, is close to seventy percent. On the contrary, people for “Chinese medical information system actively reminds me how to correctly operate the system” and “Chinese medical information system does not crash frequently or the operation speed won’t suddenly slow down” are below fifty percent. The Median is also lower than the other items.

III. Usefulness of Chinese medical information system

According to Table 4, the sum of people who agree or very agree with “Chinese medical information system can accelerate my work” and “Chinese medical information system can make the medical record more complete” is near eighty percent. The percentage of the item “Chinese medical information system can enhance the correction of medical tasks” is also as high as 74.57%, which indicates that nearly 80% of the medical institutions

are in favor of the current system. However, there are only 58.72% of the people who agree or very agree with the item “Chinese medical information system can save more expenditure”, which shows that more than 40% Chinese medical institutions think that the use of Chinese medical information system probably has no help in saving the expense.

IV. User’s attitude for Chinese medical information system

From Table 5, the sum of people who agree or very agree with “It is a wise decision to use current Chinese medical information system”, “Using current Chinese medical information system is worthy to my career”, and “Using current Chinese medical information system is helpful to my working performance” is close to sixty percent, which proves that Chinese medical information system is helpful to Chinese medical doctor’s career. Nevertheless, people for “Using current Chinese medical information

Table 4. The descriptive statistics of usefulness of Chinese medical information system

	Very agree	Agree	Acceptable	Disagree	Very disagree	Median	Mean
Chinese medical information system can help accelerate my work	14.16	66.38	15.64	2.75	1.06	4	3.90
Chinese medical information system can make the medical record more complete	13.74	64.27	17.34	3.38	1.27	4	3.86
Chinese medical information system can enhance the correction of medical tasks	11.65	62.92	22.46	2.12	0.85	4	3.82
Chinese medical information system can make the cooperation of different medical department better	9.15	58.51	27.87	3.40	1.06	4	3.71
Chinese medical information system can provide higher quality of medical care	9.17	55.86	27.93	5.54	1.49	4	3.66
Chinese medical information system can save more expenditure	7.02	51.70	28.09	10.85	2.34	4	3.50

Table 5. The descriptive statistics of user's attitude for Chinese medical information system

	Very agree	Agree	Acceptable	Disagree	Very disagree	Median	Mean
It is a wise decision to use current Chinese medical information system	8.09	53.83	33.62	2.98	1.49	4	3.64
Using current Chinese medical information system is worthy to my career	6.60	55.96	33.19	3.19	1.06	4	3.64
Using current Chinese medical information system is helpful to my working performance	6.60	55.11	33.40	3.62	1.28	4	3.62
Using current Chinese medical information system is a pleasurable experience	5.96	47.02	41.70	4.26	1.06	4	3.53
Current Chinese medical information system makes me satisfied	6.61	38.81	46.27	5.76	2.56	3	3.41
Using current Chinese medical information system make my working performance easier to be praise	5.13	38.89	47.65	7.26	1.07	3	3.40

system is a pleasurable experience” and “Current Chinese medical information system makes me satisfied” are below fifty percent; while the Median is also low.

V. User's will in Chinese medical information system

64.76% people approve “I am willing to use current Chinese medical information system” and 62.66% people agree with “If there is new function developed for the system, I would like to try instantly”. It points out that more than 60% Chinese medical institutions are willing to use the system, and would accept new functions provided. However, there are only nearly fifty percent people very agree or agree with the item “Even if there are promotions of other software vendors, I won't consider purchasing a new Chinese medical information system”. The Median is low as well.

VI. Actual using status of TCM information system

In the actual using status of TCM information system, people who agree or very agree with the item “The frequency of using Chinese medical information system is very high for me” is about 69.96%, which reveals the high utilization ratio of Chinese medical information system. As to the item “I will learn other related knowledge after work to make the operation of Chinese medical information system more efficient”, people who agree or very agree are 46.58%. Moreover, 34.97% of people agree with “I don't know how to work without using Chinese medical information system”. The above two items are both below fifty percent; and the Median are low.

VII. Governmental assistance in the development of Chinese medical information system

There are 70.99% people who agree or very agree with “The promotion of informationalization

Table 6. The descriptive statistics of user's will in Chinese medical information system

	Very agree	Agree	Acceptable	Disagree	Very disagree	Median	Mean
I am willing to use current Chinese medical information system	8.49	56.26	30.79	3.61	0.85	4	3.68
If there is new function developed for the system, I would like to try instantly	9.01	53.65	31.12	4.72	1.50	4	3.64
I will recommend other medical institutions to purchase current Chinese medical information used in my hospital.	6.62	44.02	39.53	7.05	2.78	4	3.45
Even if there are promotion of other software vendors, I won't consider purchase a new Chinese medical information system	5.53	43.83	32.13	15.96	2.55	3	3.34

and digitalization of ancient Chinese medical books and records by the Committee on Chinese Medicine and Pharmacy is helpful for the development of Chinese medical information system". To informationalize and digitalize the ancient books and to establish an integrated information system can help everyone browse the information, as well as enhance the level of Chinese medical information system. Besides, people who agree or very agree with the item "The Bureau of National Health Insurance set up an experimental plan, and ask to build a standard operation procedure for Chinese medical assisted instruments is helpful for the development of Chinese medical information system" are about 55.44%, which means over a half of the medical institutions approve the establishment of a standard operation procedure for Chinese medical assisted instruments. Nevertheless, there are only 17.73% of people who agree with the item "The policy of governmental standard formulation in Chinese medical information system is definite", which declares that eighty percent of these medical institutions consider the governmental policy not being clear enough. Besides, the agreement to "The subsidy used for Chinese

medical information system used in Chinese medical institutions is sufficient" and "The research funds provided by the government for the development of Chinese medical information system is sufficient" is below ten percent; while the Median is only two.

VIII. Future development directions of Chinese medical information system

According to Table 9, over seventy percent of medical institutions consider the future development directions of Chinese medical information system being "Multiple human machine interface system", "TCM disease coding system standardization", "TCM pattern differentiation coding system standardization", "TCM symptom coding system standardization", "Patients' personal health monitoring", and "Cross-hospital electronic medical records exchange system".

Discussion

In recent years, the Committee on Chinese Medicine and Pharmacy actively promotes the development of Chinese medical information system by constructing The Network of Chinese Medicine

and Pharmacy and The Health Safety Protection Information Network of Traditional Chinese medicine. According to the study result, there is high agreement rate to the item “The promotion of informationalization and digitalization of ancient Chinese medical books and records by the Committee on Chinese Medicine and Pharmacy is helpful for the development of Chinese medical information system” and “The Bureau of National Health Insurance set up an experimental plan, and ask to build a standard operation procedure for Chinese medical assisted instruments is helpful for the development of Chinese medical information system”. It reveals that the effort the government made in the development of Chinese medical information system has already obtained the approval of the public, and the system has been widely used in clinic situation.

However, only 17.73% people agree with the item “The policy of governmental standard formulation in Chinese medical information system is definite”, which declares that eighty percent of these medical institutions consider the governmental policy not being clear enough. Besides, the agreement to “The subsidy used for Chinese medical information system used in Chinese medical institutions is sufficient” and “The research funds provided by the

government for the development of Chinese medical information system is sufficient” is below ten percent. This suggests that the government should pay more attention on the research of Chinese medical information system, and provide more subsidies to the users.

As to the item mentioned in Table 7, “I don’t know how to work without using Chinese medical information system”, there are about sixty percent participants against it, as Chinese medical doctors emphasize in the correlation of all four examinations, the inspection, listening and smelling, inquiry, and palpation. Besides, the use of written prescriptions is still inherited from the ancient times to the present. Nonetheless, from the analysis of the friendliness, the usefulness, the user’s attitude, and the user’s will, Chinese medical doctors think Chinese medical information system provides good auxiliary to the clinical work, especially in the declaration of National Health Insurance and the facilitation of medical tasks; except that they are not very satisfied in the operation interface and the stability of the system. In this case, the government should assist the software vendors coordinating with Chinese medical doctor's demand to develop a system specialized for Chinese medical clinics. By doing this, Chinese medical information

Table 7. The descriptive statistics of actual using status of Chinese medical information system

	Very agree	Agree	Acceptable	Disagree	Very disagree	Median	Mean
The frequency of using Chinese medical information system is very high for me	16.31	53.65	26.61	2.36	1.07	4	3.82
I will learn other related knowledge after work to make the operation of Chinese medical information system more efficient	5.13	41.45	41.88	9.83	1.71	3	3.38
I don’t know how to work without using Chinese medical information system	4.90	30.06	35.61	23.03	6.40	3	3.04

Table 8. The descriptive statistics of governmental assistance in the development of Chinese medical information system

	Very agree	Agree	Acceptable	Disagree	Very disagree	Median	Mean
The promotion of informationalization and digitalization of the ancient Chinese medical books and records by the Committee on Chinese Medicine and Pharmacy is helpful for the development of Chinese medical information system	14.41	56.58	23.38	5.01	0.63	4	3.79
The Bureau of National Health Insurance set up an experimental plan, and ask to build a standard operation procedure for Chinese medical assisted instruments is helpful for the development of Chinese medical information system	11.09	44.35	30.54	8.58	5.44	4	3.47
The policy of governmental standard formulation in Chinese medical information system is definite	1.27	16.46	43.67	28.27	10.34	3	2.70
The subsidy used for Chinese medical information system used in Chinese medical institutions is sufficient	0.43	8.49	36.81	35.11	18.72	2	2.37
The research funds provided by the government for the development of Chinese medical information system is sufficient	0.42	7.19	35.31	39.53	17.55	2	2.33

system can provide the clinical medical work with the greatest benefit.

According to a national investigation of electronic medical records usage in medical institutions in 2005, the main purpose for Chinese medical clinics using Chinese medical information system is to assist appointment registration system, medical clinic system and National Health Insurance declaration system¹². The statistical result is still the same in this study, which reveals facilitating the declaration of National Health Insurance, hastening the retrieving medical records, and speeding up the appointment registration system are the three main purposes for taking Chinese medical information system. Nevertheless, Chinese medical information system should be able to provide more benefits.

This study also investigates the future development directions of Chinese medical information system suggested by the medical institutions. According to Table 9, more than seventy percent of the medical institutions think “Multiple human machine interface system”, “TCM disease coding system standardization”, “TCM pattern differentiation coding system standardization”, “TCM symptom coding system standardization”, “Patients’ personal health monitoring” and “Cross-hospital electronic medical records exchange system” are the future development directions in Chinese medical information system.

Diverse human-machine interface can simplify the operation of computers and electronic medical records, reduce the time of typing-in by keyboard,

Table 9. The descriptive statistics of future development directions of Chinese medical information system

	Very agree	Agree	Acceptable	Disagree	Very disagree	Median	Mean
Multiple human machine interface (Speech recognition system, writing recognition system...etc.) to simplify the usage of electronic medical records	15.51	58.28	22.01	2.31	1.89	4	3.83
TCM disease coding system standardization	13.29	61.18	21.73	2.53	1.27	4	3.83
TCM pattern differentiation coding system standardization	13.21	58.28	24.11	2.94	1.47	4	3.79
TCM symptom coding system standardization	12.39	59.45	23.32	3.15	1.68	4	3.78
Patients' personal health monitoring	12.58	57.65	23.90	4.61	1.26	4	3.76
Cross-hospital electronic medical records exchange system	13.89	55.98	23.93	4.27	1.92	4	3.76
Develop new diagnosis devices for home care system	13.29	54.01	25.32	5.91	1.48	4	3.72
Development of telemedicine to provide advice to patients or provide consultation for doctors	10.69	55.14	24.11	7.76	2.31	4	3.64
Combination of the assisted diagnostic instruments (pulse signal measurement, tongue diagnosis instrument ... etc.) to develop a decision-making support system for TCM doctors	10.67	46.44	28.45	10.04	4.39	4	3.49

and make the clinical work faster and smoother. Furthermore, doctors will be able to acquire the instant health conditions of patients and to provide appropriate assistance in an emergency, if Chinese medical information system can be combined with Chinese medical assisted diagnostic instrument with individual health monitoring function.

Besides, cross-hospital electronic medical records exchange system is also a main development direction. In addition to reducing medical service resources waste, avoiding the problem of paper medical record storage, and keeping highly medical record safety quality¹³, the patient's medical record, under the premise of patient's health, can be completely presented by electronic medical record

exchange system, so that the clinician can understand the patient's medical history and current condition in order to make the best treatment strategy.

Some medical informatics experts had proposed a standard called "The Taiwan Electronic Medical Record Template" that will provide an ontology and data schema to achieve semantic interoperability of electronic medical records for different hospitals in Taiwan. In this standard, some unified code sets are needed to make the exchange of medical records correctly and completely¹⁴. Hence, to build an unified coding system on Chinese medical information system is prior to the development of electronic medical record. Nowadays, the standard Chinese medical disease terminologies utilized in the application

system of National Health Insurance are provided by ICD-10 (The International Statistical Classification of Diseases and Related Health Problems 10th Revision). Compared with special terminologies of diseases and symptoms and pattern differentiation system of Traditional Chinese Medicine, it is often the case that the usage of ICD-10 can not sufficiently be applied into TCM pattern differentiation, which has caused communicative difficulties in clinical operation, or the worst communication interruption.

Therefore, it is quite significant to develop a standard coding system for diseases, symptoms and pattern differentiations of Traditional Chinese Medicine. B-code system, proposed by Dr. Chang et.al in 2000¹⁵ and designed dependent on the characteristics of pattern differentiations of Traditional Chinese Medicine, is quite appropriate for the coding system of Traditional Chinese Medicine. This coding system has been applied into the research of rheumatoid arthritis¹⁶ and systemic lupus erythematosus⁷. Through an appropriate designed coding system, the description in pattern differentiations of Traditional Chinese Medicine can be more precise; the development of medical record can be easier and more complete; and the development of researches in Traditional Chinese Medicine will be more beneficial. Moreover, the new revision of the International Classification of Diseases established by World Health Organization is going to include the valuable knowledge of complementary medicine¹⁷. Obviously, it is a priority to develop a mature Chinese medical coding system for maximizing the efficacy of Chinese medical information system.

Furthermore, developing an intelligent system to manage the large-scale TCM clinical data and to

explore the experience of TCM experts has become a significant and vital research issue. A self-learning expert system for diagnosis in TCM had ever built by Dr. Wang et.al in 2004¹⁸, while a traditional Chinese medicine clinical data warehouse for medical knowledge discovery and decision support had been proposed by Dr. Zhou et.al in 2010¹⁹. These studies help efficient discovery of the hidden knowledge from those heterogeneous Chinese medical information sources and declare the accessibility and practicability of Chinese medical information system. Consequently, both the TCM clinicians and the government should pay more attention to the development of the Chinese medical information system.

Generally speaking, this study investigates the current usage situation of Chinese medical information system in the medical institutions by analyzing the conciseness of the system, exploring the factors affecting the users' attitudes and wills of using, and declaring the future development direction of Chinese medical information system. There are some limitations such as the effective questionnaire retrieving rate is not very high, the duration of usage of Chinese medical information system in each medical institution is not documented, the background of the questionnaire responders are not recorded and the opinions of medical informational technologists' are not included. Further comprehensive studies can be held to gather more opinions and analyze more aspects about Chinese medical information system.

Conclusion

So far, the Chinese medical information system in current medical institutions has been regarded as a

subsidiary for dealing with medical tasks such as the application of National Health Insurance, which is far from its merits of accessibility and practicability. This situation could result from the implicitly applied standards of Chinese medical information system given by the government, as well as insufficient subsidy for relative researches. In this case, this study suggests that the priority for the government is to help develop a standard coding system for diseases, symptoms, and pattern differentiations of Traditional Chinese Medicine, such as B-code system¹⁵, and further help to develop the nationally medical record exchange system. What is more, the government should assist the application software vendors to build an information system specialized for Traditional Chinese medicine, in order to infomationalize Chinese medical as well as to lead Traditional Chinese Medicine into modern and scientific paths.

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中醫醫療資訊系統使用現況及未來發展之探討

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為因應全民健康保險申報需求，中醫界開始廣泛使用醫療資訊系統，但中醫與西醫之醫療模式差異甚大，系統在使用上不如理想，本研究為瞭解中醫醫療資訊系統之使用現況及無法發揮預期效果之原因，運用科技接受模型之理論，設計問卷進行調查。

本研究發出問卷共2794份，回收485份。分析填答結果發現：目前醫療院所使用中醫醫療資訊系統的目的以輔助健保申報作業等醫事工作為主，尚未全面發揮醫療資訊系統功能。其中七成以上的醫療院所認為「中醫病名編碼」、「中醫辨證編碼」、「中醫症狀編碼」、「跨院際電子病歷交換」等應為中醫醫療資訊化之未來發展方向。此外，八成受訪院所認為政府對中醫醫療資訊的標準制定不夠明確，且九成受訪院所認為政府對相關研究之補助有所不足。本研究建議未來政府首應協助建立中醫症狀、辨證與病名之標準編碼，例如運用中醫疾病辨證分類編碼系統等，以進一步發展跨院際電子病歷交換系統，並協助廠商發展適於中醫臨床使用的醫療資訊系統。

關鍵詞：醫療資訊系統、科技接受模型、中醫疾病辨證分類編碼系統