Nursing Informatics 2014
K. Saranto et al. (Eds.)

doi:10.3233/978-1-61499-415-2-321

Physician and Consumer Acceptance of the Traditional Chinese Medicine Clinical Practice Support System (TCMCPSS)

Tsai-Ya LAI[a,1], Yu-Ting Tseng [a] and Chin-Ni LEE[a]
[a] *Industrial Technology Research Institute, Hsinchu, Taiwan*

Abstract. Although ICT-enabled clinical practices have been widely accepted by the Western medical society, informatics applications for traditional Chinese medicine (TCM) are under developed. An integrated traditional Chinese medicine clinical practice support system (TCMCPSS) has been developed to enhance data integration automation and treatment planning decision support of clinical practice of TCM. The acceptance of TCMCPSS had been assessed by 26 TCM physicians based on information clarity, clinical relevancy, and theoretical relevancy through a survey questionnaire using the 5-points Likert Scale. The average acceptance rate was 3.76. One hundred and fifty-four participants were recruited for the TCMCPSS feasibility study and reported the acceptance rate of 90%. The results indicated that while consumers were ready to embrace TCM practice assisted by informatics technologies, TCM physicians concerned more about the usefulness of the system and preserved caution to adopt TCMCPSS.

Keywords. traditional Chinese medicine, acceptance, clinical practice support system

Introduction

Traditional Chinese medicine (TCM) has been widely used in the oriental society for thousands of years. The philosophy of TCM has emphasized on the balance of the inner body of, and the environment around an individual. There are five diagnostic methods: inspection, auscultation, olfaction, inquiry, and palpation[1]. Different from the western medicine, TCM is usually practiced solely by TCM physicians without using any medical devices or examination equipment. Hence, lack of practice protocols and recording standards is the major problem identified in the 20th century. Information gap between the TCM physicians and consumers is considered huge.

In the past two decades, the Department of Health in Taiwan sponsored 162 research projects for the development of ICT-enabled TCM solutions, including medical devices, standards for recording, data mining, and diagnostic decision support systems[2]. Most of the efforts either stayed in the research laboratories or stopped as published journal articles. Some hospitals tried to adopt TCM examination devices to support the five diagnostic methods (i.e. tongue inspection system, auscultation system, and palpation meter). However, given lack of data integration and service flow reform, patients have to wait for seven days on average before a report could be generated to include all

[1] Corresponding Author. Email: e_lai@itri.org.tw

examination results, diagnoses and prescription from the physician. The last mile to reach the real world has not been accomplished.

An integrated traditional Chinese medicine clinical practice support system (TCMCPSS) has been developed in 2012 to enhance data integration automation and treatment planning decision support of clinical practice of TCM[3, 4]. Physician and consumer acceptance of TCMCPSS have been concluded and reported in this article.

1. Method

The traditional Chinese medicine clinical practice support system (TCMCPSS) was developed to assist real-time information integration from the four diagnostic examinations and designed to provide diagnostic decision support following the ontology-based data processing (Figure 1). Self-care educational information, including exercise and diet, would also be suggested by the system. The physician could confirm the final comments by using the editing function. The four diagnostic examinations included in the system for feasibility pilot study were tongue inspection, palpation, auscultation, and inquiry.

- Tongue inspection: The TCMCPSS had integrated 25 data items gathered by the tongue inspection system developed by Chiang, Chen and Lin[5, 6]. The tongue inspection system would take pictures of the surface and the back of the tongue during the examination of an individual. The basic analyses of the tongue include 12 characters such as size, color, shape, wetness, etc. The advanced analyses would further calculate the pattern according to the different portion of a tongue.
- Palpation: The ANSWatch[7] was chosen for palpation measurement to enhance data integration automation for TCMCPSS. Data for blood pressure and heart rate variability indexes were also been collected and produced at the same time by ANSWatch system.
- Auscultation: The auscultation system was developed by Chiu, Chang and Yang[8]. During the examination, si was evaluated by using voice analysis technology to advance the physical constitution trend of subjects.
- Inquiry: An interactive online assessment template with 62 questions developed by Wang[9] was used to reflect 9 different constitutions.

1.1. Acceptance of TCMCPSS – feasibility study participants

A feasibility study of TCMCPSS was conducted in November 2012(IRB: 121006). One hundred and fifty samples were planned to be recruited from staffs of Changhua Christian Hospital (CCH) and from Industrial Technology Research Institute (ITRI) through the institution intranet announcement to represent the in-hospital (50 participants) and on-site services (100 participants) environment. Recruitment criteria was limited to those aged between 20 and 65 years old, no physical disability to undermine performing the required tasks for the examinations, willing to joining the study, and agreeing to sign the informed consent form. On average, the participant could complete the process in 20 minutes. The consumer acceptance evaluation of TCMCPSS was conducted at the end of the feasibility study (Figure 2).

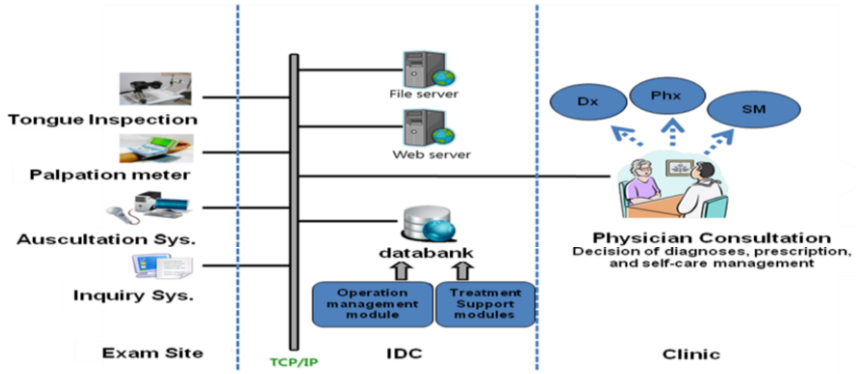

Figure 1. System Deployment of TCMCPSS

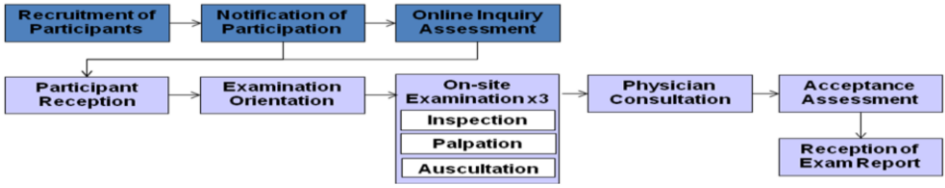

Figure 2. Examination process of TCMCPSS feasibility study

The acceptance assessment used a self-report questionnaire to collect demographic information (gender, age), background information (prior TCM experience and reasons to participate in the study), acceptance to each examination (tongue inspection, auscultation Exam, online inquiry, palpation exam, physician consultation), and overall impression of acceptance. Participants were asked to rate whether the experience was good(1), acceptable(2), or not good(3). Comments to TCMCPSS were collected through an open question. Descriptive analyses were used for the data evaluation.

1.2. Acceptance of TCMCPSS – TCM physicians

The TCM physician acceptance of TCMCPSS was conducted in December 2012 after the feasibility study. Physicians were recruited by using the snowball techniques through TCM physician representatives from 5 medical centers. A survey questionnaire for TCMCPSS acceptance was developed. The major purpose was to evaluate the acceptance of information presentation (65 items) for four diagnostic methods employing the five-points Likert Scale (5: strongly agree to 1: strongly disagree) by the three indexes: information clarity, clinical relevancy, and theoretical relevancy (Table 1). The TCMCPSS system screenshots, the final report for consumer, and a five minutes feasibility pilot study video were sent to the survey participants to enhance the understanding of TCMCPSS (Figure 3).

Table 1. Items included in TCM physician TCMCPSS acceptance

Type of Exam	# of Overall Acceptance	# of Basic Info	# of Advanced Info	Total items
Tongue Inspection	1	13	12	26
Auscultation Exam	1	1	5	7
Inquiry	1	1	0	2
Palpation Exam	1	16	13	30

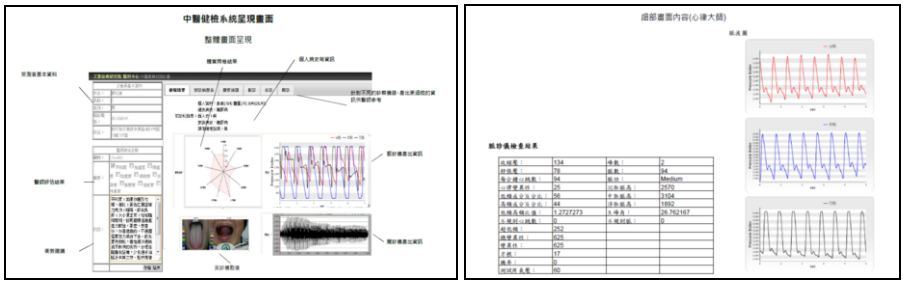

Figure 3. Samples of information provided to TCM physician

2. Result

2.1. Acceptance of TCMCPSS – feasibility study participants

A total of 154 individuals had completed the feasibility study. Forty-nine participants were from CCH and 115 were from ITRI. One-third of the participants were female and younger population was more willing to join the pilot study (Table 2). Only 18.83% (29/154) of the participants had reported past experience with TCM clinic practice. Regarding reasons to join the feasibility study, 92.86% (143/154) of the participants would be willing to receive ICT-enabled TCM services in general and 25.97% (40/154) of the participants were interested to learn the examinations of TCM through participated in the study.

Table 2. Gender and age distribution of participated consumers

	Male			Female			
	CCH	**ITRI**	**Sum**	**CCH**	**ITRI**	**Sum**	**Total**
20-29	5	6	11	20	12	26	37
30-39	11	16	27	5	43	32	59
40-49	1	6	7	4	27	25	32
50-59	0	7	7	1	22	16	23
60 and	0	0	0	2	1	3	3
Total	17	35	52	32	70	102	154

As shown in Table 3, ninety percent of the participants considered TCMCPSS as either good (64.67%) or acceptable (25.33%). Not surprisingly, almost all participants reported that the physician consultation was most acceptable. Among the four diagnostic examinations, palpation exam (93.38%, 141/151), auscultation exam (92.11%, 140/152) and online inquiry (88.82%, 135/152) received quite close rating regarding "good", as opposed to tongue inspection(42.55%, 40/94). On the other hand, few participants were not satisfied with the online inquiry (9.21%, 14/152) and tongue inspection (4.26%, 4/94).

Table 3. Acceptance of TCMCPSS reported by participated consumers

	Good (1)	Acceptable (2)	Not Good(3)	Total
Tongue Inspection	40	50	4	94
Auscultation Exam	140	12	0	152
Online Inquiry	135	3	14	152
Palpation Exam	141	10	0	151
Physician Consultation	150	0	1	151
Overall Experience	97	38	15	150

2.2. Acceptance of TCMCPSS – TCM physicians

Twenty-six TCM physicians from 8 hospitals returned the survey questionnaire of TCMCPSS acceptance. The participating physicians were mainly male (n=16, 61.54%) with no other graduate degree (n=20, 76.92%). Forty-six percent (n=12) of them were residents in the hospital and another 46% were visiting staffs.

Table 4. Acceptance of TCMCPSS reported by TCM physicians

	# of Items	Theoretical Relevancy	Clinical Relevancy	Information Clarity	Average
Tongue Inspection	1	4.31	4.19	3.88	4.07
Basic analyses	13	4.41	4.22	3.91	4.18
Advanced analyses	12	3.74	3.62	3.73	3.70
Auscultation Exam	1	3.64	3.23	3.46	3.44
Basic analyses	1	3.64	3.19	3.42	3.42
Advanced analyses	5	3.14	2.78	3.11	3.01
Inquiry	1	4.44	4.15	4.19	4.26
Advanced analyses	1	4.16	3.92	4.19	4.09
Palpation Exam	1	4.04	3.68	4.04	3.92
Basic analyses	16	3.94	3.66	3.98	3.86
Advanced analyses	13	3.48	3.26	3.65	3.46

The overall acceptance rate of TCMCPSS was 3.76 (3.01~4.26). Regarding theoretical relevancy, inquiry (4.44) was the most accepted examination method, followed by tongue inspection (4.31) and palpation exam (4.04). Auscultation exam was the least accepted one. While considering clinical relevancy, tongue inspection became the most accepted one (4.19) and auscultation (3.23) was still the least. The three diagnostic

examinations all demonstrated that basic analyses were more accepted by TCM physicians than advanced analyses.

3. Discussion and Conclusion

Regarding the consumer acceptance of TCMCPSS, participants were more concerned about the comforts of the examination process particularly so for tongue inspection and palpation exam, and time consumed for each exam (i.e., palpation exam). Participants had paid less attention on why the examination devices were used or whether the information really made good sense to the condition under evaluation, as long as the clinicians were around to guide them through the process. The final consultation delivered by the TCM physicians reinforced the rationale to complete the examinations. On the other hand, physicians did not have to manage the details of the examinations in the design of TCMCPSS. Consequently, TCM physicians focused only on the information produced by these examinations. Information meant to repeat physician's evaluation was more accepted (basic analyses) than those produced only by machine computing (advanced analyses). A simple example was the pattern of tongue coating distribution percentage at different parts of the tongue surface. Some physicians commented that the clinical evidences were not sufficient to support any diagnostic decision, although the phenomenon was supposed to represent some inner condition of the body. Acceptance related to these advanced analyses became a domain challenge instead of a technical challenge. According to studies that followed the Technology Acceptance Model, when evaluating intention of use of a system, "ease of use" would be more predictable for lay people and "usefulness" was tended to be more dominant for professionals[10, 11].

Drawing on this study, we found that consumers seemed ready to embrace an efficient and easy-to-understand practice assisted by the TCMCPSS while physicians probably preserved caution to reach that conclusion. In order to be well-prepared, devices researchers should communicate more with the clinical professionals to reframe the functional design to support the real-life needs of clinical practice. Clinical practitioners should also initiate more integrated clinical trials to collect sufficient evidences to establish solid scientific foundations for advanced application of clinical examination data.

Acknowledgement

This project was sponsored by B301EA1300, MOEA, Taiwan. The authors would like to express gratitude to Ming-Hsien Yeh, MD, Hung-Jen Lin, MD, PhD, Lun-Chien Lo, MD, PhD, Yu-Chang Hou, MD, MBA, and Chien-Hsiung Lin, MD for their valuable advices and assistances.

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