Innovative Evaluation and Management of the Medical Care Network in Taiwan

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Abstract

The medical care network plays a critical role within the health care system in Taiwan and consumes a huge amount of resources from budgets each year. However, very little study has been conducted to evaluate its performance. This study aims to conduct a performance evaluation and make suggestions for the innovative management of the medical care network.

A structured questionnaire was completed by health care professionals and administration staff working in southern Taiwan. The studied medical care network provides services to a metropolis and three rural areas, together with more than three million inhabitants. The questionnaire applied an importance-performance analysis (IPA) to measure respondents' perceptions regarding the importance of and satisfaction with 19 projects. Descriptive and inferential statistics were analyzed for the importance-performance analysis.

There were 380 valid questionnaires returned. Female respondents (75.5%) numbered considerably more than the male respondents. More respondents were aged 31-40 (31.8%). The occupation categories of the survey respondents included nurse (45.2%), clinicians (38.6%), and administrative staff and others (16.2%). More than 70% of the survey respondents had participated in related courses associated with the medical care network. The *t*-test results presented a significant difference between the average scores for the importance and satisfaction for each project ($p<0.05$). Projects associated with "patient safety and quality of care" had higher scores for importance and satisfaction. Projects associated with "community care" had lower scores for importance and satisfaction. Projects that "improve the quality of care for a disabled and vulnerable population" and that "prevent sexual harassment in health care facilities" have higher importance scores but lower satisfaction scores (located in quadrant II). It is necessary to concentrate more effort in these projects.

Based on our best knowledge, this is the first time in the literature that an importance-performance analysis has been applied to evaluate the performance of the medical care network in Taiwan. Study results showed the performance of the medical care network did not reach an optimum level. It is necessary to continuously evaluate the performances of the medical care network in order to develop effective strategies that enable innovative management policies for further improvement.

Keywords: Importance-performance analysis (IPA), medical care network, program evaluation

1. Introduction

In 1986, the Department of Health in Taiwan began a medical care network policy promotion plan that was introduced in different phases. Phases I, II, III and IV focused more on hardware construction and manpower planning. Phases V and VI were the "Holistic Health Care Project" and the "New Generation Health Navigation Project", respectively. Apart from enhancing the distribution of regional resources, the

plan includes the pursuit of high-quality medical care and patient safety. The embodiment of the six medical care regions in Taiwan is based on the medical needs of each district. The priorities are: to develop a medical care network, reinforce the exchange and cooperation between medical institutions within the region, and elevate the quality of regional medical care. The medical care network is classified as a major health policy. Therefore, achieving the effective allocation of resources whilst facing annual government budget cuts is critical.

Medical care networks play an essential role within the health care system in Taiwan and consume an enormous amount of resources each year. On average, the Taiwanese government has spent more than US$ 5.5 hundred million each year on the medical care network (Department of Health, 2009). However, little study has been conducted to evaluate its performance. Whether the medical care network is able to meet its goals and offer a good performance or not is an important research and policy question. This study aims to conduct a performance evaluation and make suggestions for the innovative management of the medical care network.

To encourage better resource allocation under the increasing pressure of budget cuts, public policies, such as medical care networks, need to understand more about the important project topics and their performances, enabling policymakers to make effective adjustments. Therefore, it is appropriate to apply an importance-performance analysis to evaluate the medical care network in order to gather the necessary information. The importance-performance analysis (IPA) method measures user satisfaction regarding a given service so as to identify necessary improvement areas (Miranda, Chamorro, Murillo, Vega, 2010). The IPA has been applied in many fields to provide an insight into survey respondents' evaluations of critical issues in service programs and as an effective method to set priorities (Abalo, Varela, and Manzano, 2007; Hemmasi, Strong, and Taylor, 1994; Martilla and James, 1977; Matzler et al., 2004). Examples of such fields are the automobile industry (Martilla and James, 1977), hotel selection (Chu and Choi, 2000), higher education (Lewis, 2004), banking services (Matzler, Sauerwein and Heischmidt, 2003), hospitality and tourism research (Oh, 2001; Deng, 2007), and government projects (Wong et al., 2011). The IPA method has also been extended to evaluate health care programs and provided useful improvement suggestions. Examples include primary health care service evaluations (Miranda, Chamorro, Murillo, and Vega, 2010), management of health care services (Lopes and Maia, 2012), the internal marketing of hospital management (Chen and Lin, 2013), health care system evaluation (Dolinsky and Caputo, 1991), and hospital analysis (Yavas and Shemwell, 2001). The importance perspective can be perceived as expectations and the performance perspective can be perceived as satisfaction that is analyzed by categorizing them into four quadrants (Figure 1). No previous study has applied the importance-performance analysis to measure the performance of the medical care network in Taiwan. This study will conduct such an innovative evaluation in order to assess the medical care network in detail.

2. Methods

This study conducted survey research through a structured questionnaire. The questionnaire was designed and based on the literature review and the applied framework of the importance-performance analysis. The questionnaire has two main parts. The first part is associated with the socio-demographic information of the survey respondents. The second part measures the respondents' perceptions about importance and satisfaction for each project within the medical care network. The questionnaire was evaluated during several steps. First, experts were invited to review the questionnaire and conduct a content

validity analysis. Inappropriate words or sentences were removed or modified based on the experts' comments. Six experts reviewed the questionnaire and provided comments on the revision of items regarding the collection of respondent's background information (such as age group, hospital type) and project names (to be more specific) in the measurements. The experts were from different professional fields (one professor, three senior physicians working in different hospitals, one hospital president, and one hospital manager) and who had experience of projects undertaken by the medical care network. Second, a principal component analysis and the varimax method were used to conduct an exploratory factor analysis. Two major factors were extracted, namely "patient safety and quality of care" and "continued education and community care". The reliability test indicated that "patient safety and quality of care" and "continued education and community care" had a Cronbach's alpha value equal to 0.949 and 0.924, respectively. The closer the Cronbach's alpha coefficient is to 1.0 presents greater internal consistency of the scale items. Cronbach's alpha of 0.7 or above is considered adequate (Chen and Lin, 2013; Watson and Thompson, 2006).

The importance-performance analysis was applied to analyze the survey respondents' perceptions associated with different projects regarding the medical care network. A two- dimensional quadrant grid was drawn to indicate the associations between importance and performance from the respondents' perceptions. Within the quadrant grid, the perceptions of importance were measured on the Y-axis and the perceptions of performance (measured as satisfaction) were measured on the X-axis (Figure 1). Satisfaction is a proxy measurement of project performance. It is taken from the health care professionals' perspectives. If the project performs well, then the health care professionals will have higher satisfaction with such a project. A 5-point Likert scale was used to evaluate respondents' perceptions about the importance and satisfaction of each project within the medical care network. The questionnaire items were scored as "strongly agree/satisfied (5)", "agree/satisfied (4)", "not sure (3)", "disagree/unsatisfied (2)", and "strongly disagree/unsatisfied (1)". The mean scores for overall importance (3.83) and overall satisfaction (3.68) were used to split the axes. This is based on the suggestion by Martilla and James (1977) that cross-hair placement is a relative judgment, rather than an absolute measurement (Chen and Lin, 2013). Specific scores for the importance and satisfaction for each project were placed onto the quadrant grid accordingly.

The studied medical care network provides services to a metropolis and three rural areas totaling more than three million inhabitants. Eight hundred and fifty four questionnaires were sent to health care professionals and administrative staff working in health care facilities located in southern Taiwan. Four hundred and twelve questionnaires were returned with a 48.3% response rate. SPSS 17.0 statistical software was applied to analyze the descriptive and inferential analyses.

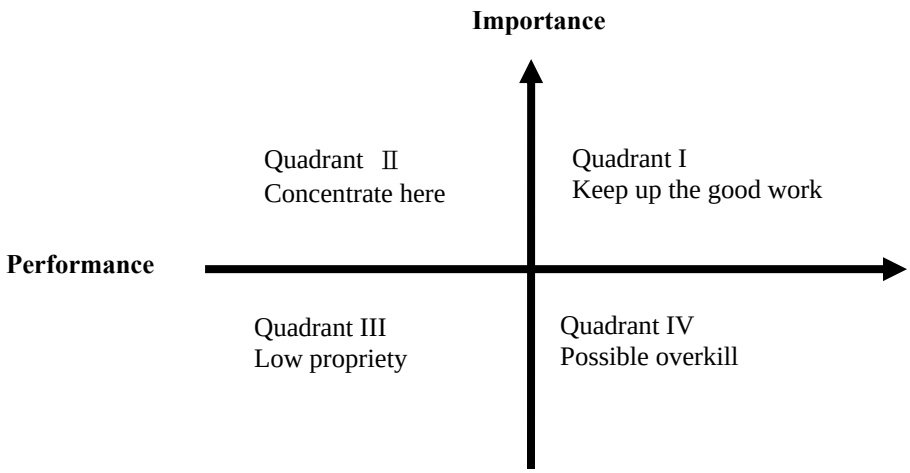

Figure 1: Importance – Performance Analysis

3. Results

The major study results include descriptive analyses and importance-performance analysis. After excluding the incomplete questionnaires, there were 380 valid questionnaires. Table 1 presents the demographic factors of the survey respondents. Female respondents (75.5%) numbered more than the male respondents. A large number of respondents were aged 31-40 (31.9%). Among the respondents working in different hospital types, community hospitals accounted for the largest number of participants (36.2%), followed by clinics (31.5%), regional hospitals (18.3%), medical centers (12.4%), and long term care facilities (1.6%). The majority of facilities were in private ownership (62.5%). The occupation categories of the survey respondents included nurses (45.2%), clinicians (38.6%), and administrative staff and others (16.2%). More than 70% of the survey respondents have participated in related courses associated with the medical care network, such as continued education, patient safety, patient-centered care, quality of care, community care, and early intervention for children with developmental problems.

Table 2 presents the average scores and standard deviations of importance and satisfaction for each project. All of the average scores for importance are higher than the average scores for satisfaction. A paired *t*-test was conducted to evaluate whether or not the mean importance scores differed significantly from the mean satisfaction scores. The *t*-test analyses indicated a significant difference in the average scores between importance and satisfaction ($p<0.05$). The gap scores between importance and satisfaction for each project were also estimated and all had positive values.

This study evaluated the importance and performance of the medical care network by collecting survey respondents' viewpoints about importance levels and satisfaction levels associated with different projects. The average scores of the importance levels for different projects were used as the Y values with the average scores of the satisfaction levels used as the X values in order to ascertain the IPA figures (Figure 2). Quadrant I of Figure 2 indicates "keep up the good work", which implies these projects have a higher importance and satisfaction within the respondents' viewpoints and should continue to be maintained. Projects located in quadrant I include: continued education for health care professionals and non-health care professionals in the Kaohsiung area (project 1), the setting-up of goals for patient safety among different health care

facilities (project 3), education courses and benchmark learning for patient safety (project 4), medical care models for stroke and acute myocardial infarction (project 5), workshops on health education and ethics (project 7), promotion of the quality of primary care (project 11), building a community care network (project 12), the integration of regional medical care resources (project 18), and website performance of the medical care network (project 19).

Table 1: Backgrounds of Survey Respondents (N=380)

Variables	Frequency	%	Cumulative %
Areas			
Kaohsiung	302	79.5	79.5
Ping-Tung	74	19.5	99.0
Peng-Hu	4	1.0	100.0
Gender			
Men	93	24.5	24.5
Women	287	75.5	100.0
Age			
≤30	105	27.7	27.7
31-40	121	31.9	59.6
41-50	93	24.5	84.1
51-60	42	11.1	95.2
≥61	18	4.8	100.0
Health Care Facilities			
Clinics	119	31.5	31.5
District hospitals	137	36.2	67.7
Regional hospitals	69	18.3	86.0
Medical centers	47	12.4	98.4
Long term care	6	1.6	100.0
Ownerships of health care facilities			
Public	38	10.0	10.0
Private	237	62.5	72.5
Not-for-profit	81	21.4	93.9
Non-profit associations	23	6.1	100.0
Health care facility department			
Administration	48	12.8	12.8
Medical care	146	38.6	51.4
Nursing	171	45.2	96.6
Other	13	3.4	100.0
Have participated in courses or activities in the medical care network			
Yes	269	70.8	70.8
Continued education	208	29.3	29.3
Patient safety	100	14.1	43.4
Patient-centered care	138	19.4	62.8
Quality of care	127	17.9	80.7
Community care	71	10.0	90.7
Early intervention for children with development problems	21	3.0	93.7
Emergency medical care	45	6.3	100.0
No	111	29.2	100.0

Table 2: Assessment of Importance, Satisfaction and Gap

Projects	Importance		Satisfaction		Gap		*t-test*
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	
01. Continued education for health care professionals and non-health care professionals in the Kaohsiung area	4.04	0.703	3.88	0.722	0.16	-0.019	.000
02. Continued education for health care professionals and non-health care professionals in the Ping-Tung and Peng-Hu areas	3.74	0.826	3.67	0.751	0.07	0.075	.043
03. Setting-up of goals for patient safety among different health care facilities	3.96	0.754	3.79	0.767	0.17	-0.013	.000
04. Education courses and benchmark learning for patient safety	3.98	0.731	3.78	0.772	0.2	-0.041	.000
05. Medical care models for stroke and acute myocardial infarction	3.9	0.736	3.69	0.778	0.21	-0.042	.000
06. Improve the quality of care for disabled and vulnerable population	3.87	0.772	3.67	0.808	0.2	-0.036	.000
07. Workshops on health education and ethics	3.89	0.741	3.76	0.765	0.13	-0.024	.000
08. Health care workshops for the vulnerable population	3.77	0.802	3.63	0.803	0.14	-0.001	.000
09. Prevention of sexual harassment in health care facilities	3.84	0.789	3.67	0.795	0.17	-0.006	.000
10. Promote electronic medical records system in health care facilities	3.76	0.838	3.66	0.825	0.1	0.013	.006
11. Promotion of quality of primary care	3.84	0.786	3.68	0.833	0.16	-0.047	.000
12. Building a community care network	3.87	0.777	3.72	0.798	0.15	-0.021	.000
13. Patient referral system	3.81	0.772	3.64	0.764	0.17	0.008	.000
14. Comprehensive evaluation center for children's development in the Ping-Tung area	3.65	0.9	3.56	0.792	0.09	0.108	.020
15. Early intervention for children with developmental problem in the Peng-Hu area	3.63	0.882	3.56	0.815	0.07	0.067	.104

Projects	Importance		Satisfaction		Gap		*t-test*
	Mean	SD	Mean	SD	Mean	SD	
16. Enhance emergency care for remote areas	3.68	0.897	3.55	0.835	0.13	0.062	.003
17. Integration of patient referral systems in remote areas	3.77	0.837	3.62	0.821	0.15	0.016	.000
18. Integration of regional medical care resources	3.88	0.821	3.71	0.822	0.17	-0.001	.000
19. Website performance of the medical care network	3.85	0.817	3.69	0.826	0.16	-0.009	.000

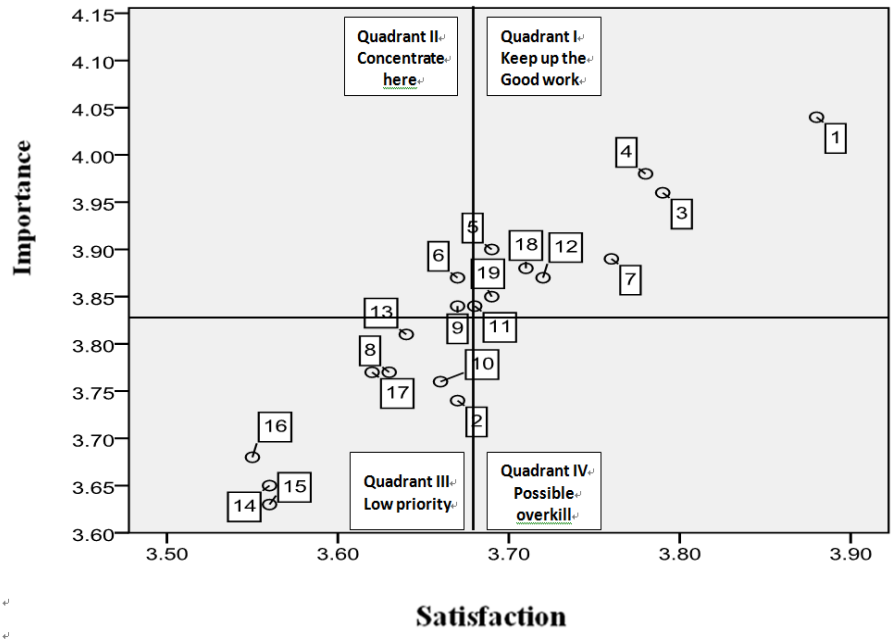

Figure 2: Results of the Importance-Performance Analysis

Quadrant II of Figure 2 indicates "concentrate here", which implies that projects located here have higher importance but lower satisfaction from the respondents' viewpoints. Projects in quadrant II include: improve the quality of care for the disabled and vulnerable population (project 6), and prevent sexual harassment in health care facilities (project 9). These projects need to put more effort toward improving their performances.

Quadrant III of Figure 2 indicates "low priority", which implies that projects in this area having lower importance and lower satisfaction from the respondents' viewpoints. The medical care network needs to reconsider the efficiency of putting resources toward them. Projects in quadrant III include: continued education for health care professionals and non-health care professionals in the Ping-Tung and Peng-Hu areas (project 2), health care workshops for the vulnerable population (project 8), promotion of electronic medical records system in health care facilities (project 10), patient referral system (patient 13), comprehensive evaluation center for children's development in the Ping-Tung area (project 14), early intervention for children with developmental problems in

the Peng-Hu area (project 15), enhance emergency care for remote areas (project 16), and the integration of patient referral systems in remote areas (project 17).

Quadrant IV of Figure 2 indicates possible overkill", which implies projects in this area as having lower importance but higher satisfaction from the respondents' viewpoints. The priority of providing resources for these kinds of projects needs to be reviewed. However, there is no project in this study that is located in this quadrant.

4. Discussions

The medical care network plays a significant role in the health care system of Taiwan. However, little research has studied its performance to date, nor made suggestions for effective management. This study aims to fill this research gap. Based on our best knowledge, this is the first time in literature that an importance-performance analysis has been applied to measure the performance of the medical care network in Taiwan. To enable better policy evaluations and suggestions, it is necessary to understand the importance of the network and how it performs from the health care professionals' perspectives. Because health care professionals are directly involved in various projects in the medical care network, their experiences and opinions can provide valuable insights for network improvements. The IPA was conducted as an analysis approach, which is the innovative evaluation of the medical care network. Meanwhile, based on the study results, recommendations are proposed for management improvements, which have not been properly undertaken in previous years. The study results for the importance-performance analysis indicated that not every project presents high importance and high satisfaction from the viewpoints of health care professionals. Some projects have higher importance but lower satisfaction. Some projects even have lower importance and lower satisfaction. It is necessary to look at the characteristics of these projects in details.

The health care professionals expressed significantly higher importance scores than the satisfaction scores for every project within the medical care network ($p<0.05$). These results are similar to previous studies (Chen and Lin, 2013; Miranda, Chamorro, Murillo, and Vega, 2010). The results also imply that there is room for improvement across all projects. With limited resources, the medical care network may look at the discrepancies between the importance and satisfaction scores and give a higher priority to those projects with greater differences in scores (Miranda, Chamorro, Murillo, and Vega, 2010). Project 5 (medical care models for stroke and acute myocardial infarction) and project 6 (improve quality of care for a disabled and vulnerable population) were the two projects with the highest differences in scores. It is necessary to place more effort into these projects in order to decrease the differences. For example, the survey respondents recorded a much higher importance score (3.90) for project 5. The satisfaction score of project 5 is slightly higher than average (3.69). Project 5 involves medical care models for cardiovascular and heart diseases. These diseases are among the top ten causes of death in Taiwan. This implies that even though health care professionals are satisfied with project 5, they still wish for it to be continuously improved because they think project 5 is very important. It is necessary to review the current medical care models for these diseases in order to ascertain areas for improvement. The benchmark learning process and shared experiences form good models that will assist the network to have better medical care models for these diseases.

Nine out of the nineteen projects (9/19=47%) are located in the "keep up the good work" quadrant. In quadrant I, the health care professionals expressed higher importance and higher satisfaction with these projects. These projects are more associated with patient safety and patient-centered care. This could due to the

increase in the awareness of quality of care in recent years. The health care delivery system in Taiwan has employed numerous resources to improve its quality when providing health care services. Several projects in the medical care network focus on providing related educational programs and workshops for health care professionals. Health care professionals will be able to receive necessary information on important topics. Thus, they presented higher satisfaction with higher importance perspectives for those projects.

Two projects (2/19=10.5%) were located in the "concentrate here" quadrant. In quadrant II, health care professionals expressed higher importance but lower satisfaction for these projects. One is project 6 "improve the quality of care for the disabled and vulnerable population. Quality of care is an important issue in the medical care network and health care professionals have higher satisfaction with general projects. However, it still did not reach optimal goals for providing care to the disabled and vulnerable population. Taiwan introduced National Health Insurance with universal coverage for its residents in 1995. Over time, access to care had been greatly improved for different populations including a disabled and vulnerable population (Lu and Hsiao, 2003). Nevertheless, more efforts are needed for continuous improvements. A medical care network can provide more access to care for those people living in remote areas and set up appropriate community programs care delivery. A medical care network can also re-evaluate the care needs of the disabled population and provide feasible services, such as dental services. Through health care system modifications and the assistance of health care professionals, it is possible to improve the quality of care for a disabled and vulnerable population. The other project in this quadrant is project 9 "prevent sexual harassment in health care facilities". This topic is not only associated with health care professionals but also related to patients. The result implies that such a topic still has a lot of room for improvement. A medical care network can evaluate the causes of sexual harassment and conduct reasonable activities for effective prevention. The network can provide more educational programs regarding the correct perceptions of sexual harassment to health care professionals and patients. Continual promotions in health care facilities are also in great demand. Meanwhile, regulations using the law to stop or punish sexual harassment behavior can decrease the probability of such events.

Eight projects (8/19=42%) are located in the "low priority" quadrant. In quadrant III, health care professionals expressed lower importance and lower satisfaction with these projects. The project topics were varied and more associated with specific community care. For example, comprehensive evaluation and early intervention for children with developmental problems in rural and remote areas (project 14 and 15) had relatively lower scores for importance and satisfaction. This implies that such issues do not raise the attention of health care professionals and are not really a significant problem. It may also be because there is less awareness among health care professionals and this is worthy of further evaluation. The medical care network should reassess the priority of health care delivery in rural and remote area, and make further efficient resource allocations.

There is no project located in the "possible overkill" quadrant. This result suggests that the medical care network does not waste resources on project allocation. This is a good outcome when evaluating the medical care network and can be maintained for future projects.

The study results of this research can provide valuable insights and references for other medical care networks in Taiwan. For continuous improvements, more research on performance evaluations of the medical care network in different areas are in great need.

5. Conclusions

Health care systems around the world have a similar situation with resources. Efficiently allocating the resources to the appropriate fields so as to promote population health is critical for the health care system. The medical care network in Taiwan also tries to achieve such a goal. Nevertheless, the study results indicate that its performance has not yet reached the optimum level. It is necessary to continuously evaluate the performance of the medical care network in order to develop effective strategies that ensure there is an innovative management structure in place for further improvement.

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Appendix: Importance & Satisfaction Measurement

Items		Importance	Satisfaction
		1 ◄——► 5	1 ◄——► 5
		Very unimportant — Very important	Very dissatisfied — Very satisfied
01.	Continued education for health care professionals and non-health care professionals in the Kaohsiung area	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐
02.	Continued education for health care professionals and non-health care professionals in the Ping-Tung and Peng-Hu areas	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐
03.	Setting-up of goals for patient safety among different health care facilities	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐
04.	Education courses and benchmark learning for patient safety	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐
05.	Medical care models for stroke and acute myocardial infarction	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐
06.	Improve the quality of care for disabled and vulnerable population	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐
07.	Workshops on health education and ethics	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐
08.	Health care workshops for vulnerable population	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐
09.	Prevent sexual harassment in health care facilities	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐
10.	Promote electronic medical records system in health care facilities	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐
11.	Promotion of the quality of primary care	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐
12.	Building a community care network	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐
13.	Patient referral system	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐
14.	Comprehensive evaluation center for children's development in the Ping-Tung area	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐
15.	Early intervention for children with developmental problems in the Peng-Hu area	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐
16.	Enhance emergency care for remote areas	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐
17.	Integration of patient referral systems in remote areas	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐
18.	Integration of regional medical care resources	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐
19.	Website performance of the medical care network	☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐