Research on Hospital-Based Health Technology Assessment in Clinical Application Management of Medical Technology in Public Hospitals in China: Hainan Province Sample

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Abstract: Though investigating the knowledge of professional personnel on medical technology management, this study aimed to explore the establishment of an electronic HB-HTA approach in clinical application management of medical technology in public hospitals. The study designed a questionnaire to collect data and recruited a total of 1089 professional staff from 16 hospitals in Hainan. Medical staff had limited awareness of medical technology clinical application management and the HB-HTA approach. The working years, education level, and professional title level of medical staff were positively correlated with the awareness of medical technology management ($P<0.05$). In addition, the professional titles of medical staff were positively correlated with awareness($P<0.05$). The higher the professional title level, the higher the awareness degree, followed by the correlation of working years. To increase the awareness and use of clinical applications of medical technology, the HB-HTA should be well organized. The electronic HB-HTA approach should be strongly formulated and undertaken by the medical staff in clinical application management of medical technology in public hospitals.

Keywords: HB-HTA, electronic approach, hospital personnel investigation, clinical application management.

1. Introduction

Hospital-based health technology assessment (HB-HTA) is an evidence-based multidisciplinary process, using systematic methods to assess the value of health technology in a hospital setting [1]. The evaluation of the nature of scientificity, safety, standardization, effectiveness, economy, social ethics suitability, and other comprehensive natures of different technologies, helps the decision-makers conduct supervision, procurement, configuration, pricing, payment, and reasonable application of medical technology.

With the accelerated development of economic globalization and the acceleration of population aging process, the spectrum of human diseases has changed observably. Consequently, the health demand has also increased significantly. Health technology is the basic condition of medical and health services, and its research, invention, application and promotion is an important symbol of the progress and development of medical science [2]. The traditional single and extensive administrative

empirical medical technology management mode can no longer fulfill the needs of hospital managers. In 2012, the European Union Hospital Health Technology Assessment Program (AdHopHTA) was launched, marking the full implementation of the European HB-HTA special study [3]. This project promoted the utilization of HB-HTA through research and providing practical information, knowledge, and tools. It also promoted the establishment of the European health technology evaluation system and management model used by hospitals. In recent years, HB-HTA has been used universally by countries all over the world. Some formal HTA procedures have been set up in most developed countries and regions [4].

In 2018, the National Health Commission of the People's Republic of China founded the first state-level HTA center called National Integrated Assessment Center on Medicines and Health Technologies [5]. The key driving factors of HTA in China include HTA research, related pricing, and payment of health technologies [4]. As a whole, in China HB-HTA is still in the exploratory period, and there are some difficulties such as a lack of decision-making awareness and HB-HTA evaluation personnel, especially a lack of localized health economic evidence [6].

"Administrative Measures for the Medical Technology Clinical Application" published in 2018 by The National Health Commission, clearly requires medical institutions to strengthen their main responsibility and gives them full autonomy of technical management [7]. It means clinical application management of medical technology in a hospital setting needs to be emphasized on the scientific, reasonable, standardized, and feasible access and process management.

Thus, this research aims to acquire the knowledge of various hospital professional personnel on medical technology management concerning the HTA in Chinese public hospitals and to analyze the correlation between each other. Measures and suggestions to strengthen and standardize the HB-HTA management, and the electronic approach of HB-HTA on the clinical application are put forward.

2. Methods

2.1. Study Design

A prospective survey was done at 16 public hospitals in Hainan Province within 3 months from September to November in 2023. The questionnaire online was disseminated through the Internet by the members of the Hainan Provincial Medical Management Commission, who selected candidates in their respective hospitals.

The participants were randomly selected in public hospitals, including physicians, nurses, and administrative personnel, who were involved in the process of the HB-HTA approach. They were given online questionnaires. And about 1050 of 1089 questionnaires were collected. The recovery rate was 96.42%.

2.2. Data Collection

A Windows Excel database was used to organize the data, and an Excel sheet was formed. There were 17 questions in the questionnaire, including five demographic details with age, working times, professional titles, education level, and personnel category. The contents were related to the correlation of awareness regarding the application of new technologies in public hospitals. The participants were asked to answer these considerations as "familiar", " known " and "unknown" items. A pre-test was conducted among 16 members of the Hainan Provincial Medical Management Commission, who were in charge of technology management in their hospitals, to validate the questionnaire.

2.3. Statistic Method

Statistical analysis was performed by SPSS 19.0. The composition ratio index is used for general data description and Kendall's tau-b method for the correlation analysis of two-level index. The test level is α =0.05 (double tail). P values were used to assess the statistical significance, with less than 0.05.

3. Result Analyse

3.1. General Demographic Characteristics

As shown in Table 1, the online questionnaire was answered by 1,050 participants, including 538 physicians (51.24%), 380 nurses (36.1%), 77 technicians (7.33%), and 55 administrative staff (5.24%). In the education background category, it shows that 736 people have bachelor's degrees (70.10%), and 196 with graduate degrees (18.67%). In the professional title category, it is shown that 314 people are with junior titles (29.9%), 477 with intermediate titles (45.43%), and 227 with senior professional titles (21.62%). When it comes to working time, there are 160 people under 5 years (15.24%), 322 people between 5 and 10 years (30.67%), 376 people between 10 and 20 years (35.81%), 192 people between 20-30 years (18.29%).

Table 1: General demographic characteristics

Demographic characteristics	N	Proportion (%)
Occupation		
Physicians	538	51.24
Nurses	380	36.1
Technician	77	7.33
Administrative staff	55	5.24
Education level		
Bachelor degree	736	70.1
Graduate degree	196	18.67
Others	118	11.23
Professional title		
Senior title	227	21.62
Intermediate title	477	45.43
Junior title	314	29.9
No title	32	3.05
Working time		
Under 5 years	160	15.24
5-10 years	322	30.67
10-20 years	376	35.81
20-30 years	192	18.29

3.2. Participant Standpoints Regarding the HB-HTA Content and Organization

Analyzed from Table 2 and Table 3, only 13.24%—17.62% of the participants agree that they are not familiar with the HB-HTA organization unit and certain administrative staff of HB-HTA. It shows that most of the medical personnel with different titles pay high attention to the department in charge of the hospital medical technology management and the specific management personnel for the

medical technology management of the hospital. Besides, 26.19% of medical staff do not know the types of national restricted technologies, of whom 51.2% with intermediate professional titles; 20.67% of medical personnel do not know the restricted technologies of their specialties, among which 50.2% have intermediate professional titles. It shows that the primary and intermediate medical personnel pay less attention to HB-HTA regarding the restricted technology of the country and the specialty.

Table 2: Evaluation of HB-HTA awareness about HB-HTA content (%)

Regarding the HB-HTA content	Awareness		
	Familiar	Know	Do not know
Awareness regarding the types of specialty-restricted technologies	27.04	52.29	20.67
Awareness regarding the types of nationally restricted technologies	22.48	51.33	26.19
Awareness regarding the organizer of HB-HTA	29.81	52.57	17.62
Awareness regarding "Administrative Measures for the Clinical Application of Medical Technology"	30.09	54.86	15.05
Awareness regarding the HB-HTA department	34	52.76	13.24

Table 3: Evaluation of HB-HTA content awareness by people with different professional titles (%)

Professional titles	Do not know	
	Awareness regarding the types of specialty-restricted technologies	Awareness regarding the types of national restricted technologies
Primary	32.1	32.36
Intermediate	50.2	51.2
Senior	17.5	16.3

3.3. Participant Standpoints Regarding the HB-HTA Approach

Hospitals usually use HTA to select new technologies to allocate their resources based on multidisciplinary evidence. As seen from Table 4 and Table 5, 27.4% of medical staff do not understand the appraisal process of new technology permission within each clinical department, among whom people with primary professional titles, intermediate professional titles, and senior titles account for 45.4%, 49.6%, and 4.8%. 29.1% of medical staff do not understand the hospital authorization process for new technologies. Among them people with primary professional titles, intermediate professional titles, and senior titles account for 44.3%, 48.6%, and 6.8%. Besides, 31.9% of medical staff do not know how to apply for new technology, among whom people with primary professional titles, intermediate professional titles, and senior titles account for 40.8%, 50.1%, and 8.9%.

Table 4: Evaluation of HB-HTA approach awareness (%)

Regarding the HB-HTA approach	Awareness		
	familiar	know	Do not know
Awareness regarding the appraisal process of new technology permission within each clinical department	23.81%	48.76%	27.43%
Awareness regarding the hospital authorization process of new technology	22.95%	47.91%	29.14%
Awareness regarding application of new technology	20.67%	47.43%	31.9%

Table 5: Evaluation of HB-HTA approach awareness by people with different professional titles(%)

Professional titles	Do not know		
	Regarding the appraisal process of new technology permission within each clinical department	Regarding the hospital authorization process of new technology	Regarding application of new technology
Primary	45.4	44.3	40.8
Intermediate	49.6	48.6	50.1
Senior	4.8	6.8	8.9

3.4. Correlation Analysis Regarding Factors Affecting Medical Personnel's Awareness of Medical Technology Management

As shown in table 6, the awareness of medical personnel on medical technology management is mainly positively correlated with their working years, education level, and professional title level. Among them, the professional title level has the strongest correlation with the awareness degree of medical technology management work. The higher awareness degree is connected with the higher professional title level, followed by the correlation of working years.

Table 6: Correlation analysis regarding factors affecting medical personnel's awareness of medical technology management

	Knowing about the appraisal process of new technology permission within each clinical department	Knowing about the hospital authorization process of new technologies	Knowing about how to apply for a new technology
Working years			
Kendall's tau_b	0.156	0.149	0.123
P value	<0.001	<0.001	<0.001
Education level			
Kendall's tau_b	0.124	0.109	0.086
P value	<0.001	<0.001	0.002
Professional title level			
Kendall's tau_b	0.268	0.255	0.224
P value	<0.001	<0.001	<0.001

4. Discussion

4.1. Lack of recognition of HB-HTA

China's "14th Five-Year Plan" construction puts forward new tasks and new requirements for health work. Medical reform should promote high-quality development by connotative, intensive, and efficient management. And HB-HTA has become a useful strategy for the development of public hospital [8]. Most of China's HB-HTA activities are based on committee decisions by experts [9]. There are different procedures between different hospitals, but application, evaluation, and voting are standard steps. Analyzed from this research, most professional personnel in public hospitals in the Hainan province of China do not know clearly about medical technology management and even are not involved in HB-HTA. For promoting the application of HB-HTA efficiently, recognition of HB-HTA is essential. Thus, it is very important to establish the application mechanism.

4.2. Standardizing the Organizational Structure and Process of HB-HTA

The HB-HTA is usually organized by a certain medical technology management committee, consisting of medical staff (physicians and nurses). Other representatives like law and ethics professionals, economists, and epidemiologists are recommended [10]. In fact, in a public hospital setting in China, the HTA committee includes physicians, senior clinical experts, nurses, and medical administrative managers.

Standardizing the organizational structure and process of HB-HTA can promote the HB-HTA development tremendously. An HB-HTA unit should be built to conduct committee meetings regularly for assessing new technology. The new technology should be presented by the physician or nurse who needs application at work. The integrated essential HTA principles consist of advantages, challenges, barriers, feasibility, costs, patient needs, price, insurance coverage, infrastructure requirements, and so on. Then new technology compared to the used one should be presented. At last, the suggestion about approval or not regarding the reported technology is recommended to the medical manager.

4.3. Promoting the Electronic Approach of HB-HTA

HB-HTA approach can be formulated differently in various hospitals. Different models can be influenced by each other at the national, or provincial levels [11]. Thus, shaping the electronic HB-HTA approach should be on the agenda. In the meantime, an HTA-sharing database should be built with a timely and high-quality data guarantee system [4].

The electronic approach of HB-HTA emphasizes the quality and efficiency of clinical application management of medical technology. The goal is to build fine, precise, whole-process, comprehensive, and intelligent management of the technology. The routine consists of clinical application, assessment, approval, monitoring, and assessment-transfer. The assessment criteria and related information should be embedded in the information system, which can help improve medical staff awareness of HB-HTA. An electronic approach to clinical application management of medical technology has been set up in the researcher's hospital recently for the use of authorization and effective supervision. In contrast, the utility and effectiveness needs to be further studied.

5. Conclusion

To promote HB-HTA in China, efforts should be enforced to propagate the knowledge about the theories, approaches, and guidelines of HTA in public hospitals, concentrating on the training of medical personnel. An HB-HTA evaluation criteria for new technology has been established in the

author's hospital. There are some dimensions including risk assessment, emergency plan, technical quality control, cost-effectiveness argument, and so on.

To raise people's awareness and use of clinical applications of medical technology, hospitals should organize HB-HTA well. At the same time, the author suggests that hospitals should use embedded information systems to establish scientific and rational electronic pathways to help self-regulation and self-regulation in the clinical application of medical technology.

In addition, the hospital where the author works invented a medical technology clinical application information system based on HB-HTA. The system includes the approval path for new technology review, can reflect the process of technology evaluation at the department level, hospital level, and the entire process of clinical application (including the occurrence of complications and adverse reactions). This new electronic technology management system is centrally controlled by the doctor. The new system integrates information and manages data to form an effective database.

At the same time, hospitals should encourage and support the development of high and new technology through objective and comprehensive evaluation. In the long run, the HB-HTA network and multi-stakeholder participation should be taken into consideration.

More research about the electronic approach of HB-HTA should be explored to help promote the clinical application management of medical technology.

Acknowledgment

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