

## Implementation of Knowledge Management in Chinese Hospitals\*

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**Summary:** The implementation of knowledge management (KM) in hospitals affects efficiency and outcomes of hospitals. However, few studies explored the implementation of KM in China. Twenty-two questions were designed concerning KM implementation status in over 50 hospitals. In order to understand the KM level and attitude to KM of the hospital's managers, a random sampling survey was conducted among 138 managers from 50 different scales of hospitals in 15 provinces of China. The survey showed that overall level of KM implementation in Chinese hospitals was still low and differed among different scales of hospitals ( $P < 0.05$ , or  $P < 0.01$ ). In all the hospitals investigated, 63.8% did not implement KM yet, among which 46% even had not planned for that. 49.8% of the hospitals investigated had no training program about KM ever and the main source of hospital staff to get knowledge was internet. It suggested that hospital managers should make much more efforts to get to know and understand theories on KM, so that hospital KM could be promoted more rapidly.

**Key words:** knowledge management; hospital knowledge management; implementation

Hospital knowledge management (HKM) refers to the management process of collection, organization, application and innovation of knowledge in hospitals. The knowledge resources in hospitals can get the maximum level of acquirement and utilization to improve employees' motivation and increase core competitiveness of the hospitals. It was well known that medical service profession is knowledge-intensive, and the medical technology and medical service management are two core factors of medical institution management<sup>[1]</sup>. So the concept of medical KM system was proposed very early<sup>[2]</sup>. Besides, KM had achieved evidently benefits in developed countries. The advantages of KM in hospitals are beyond doubt. Furthermore, the implementation of KM for establishing a research-oriented hospital is an important topic now in the field of medicine and public

health management. As a kind of typical knowledge-intensive, skill-intensive and personnel-intensive institutions, research-oriented hospital has abundance of explicit and tacit knowledge assets<sup>[3]</sup>. Many studies have strongly suggested some topics need to be deeply studied, such as collaborative management mode of tacit and explicit knowledge, innovation resource system of collaborative knowledge, collaborative effect of KM, knowledge integration and collaborative decision-making<sup>[4]</sup>. However, the current situation of KM implementation in Chinese hospitals was rarely studied. The present status investigation is important foundation of most researches. So the understanding on Chinese overall implementation level of KM has important significance to make progress in this field.

From Feb. 2014 to Jan. 2015, the author investigates the conditions of KM in our country, and the results were reported below.

### 1 MATERIAL AND METHODS

#### 1.1 Sampling

China covers a large territory, which can be divided into three parts by longitude: eastern part, central part

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and western part. Considering of the geographical influence and difference scales of cities, we randomly selected 200 managers at 50 different hospitals from 15 provinces such as Beijing, Shanghai, Guangdong, Jiangsu, Zhejiang, Fujian, Shandong, Hubei, Hunan, Henan, Heilongjiang, Guangxi, Shaanxi, Xinjiang, Sichuan and other provinces and autonomous regions. Among all those provinces, 7 were from eastern part, 6 from central part and 2 from western part.

**1.2 Questionnaire Design**

Considering of the actual situation of Chinese hospitals, a questionnaire named “hospital knowledge management implementation status questionnaire” with 22 questions was designed on the basis of literature review and experts appraisal<sup>[5-9]</sup>. In case that survey objects have different understanding of the concept “hospital knowledge management”, a common and uniform definition was given in the foreword of the questionnaire. Besides, the questionnaire was designed, revised and completed by four experts on management science, two statisticians, and three medical professionals.

**1.3 Data Collection**

200 questionnaires were distributed face to face or online. Twenty paper questionnaires were conducted face to face and 20 of them were returned. 180 internet-based surveys were conducted and 118 of them were returned. 138 valid questionnaires were returned totally (at least 2 questionnaires were collected in each of 50 hospitals) and effective response rate was 69.0%. Data were analyzed by descriptive study via qualitative analysis, quantitative analysis and analytic hierarchy process.

**2 RESULTS**

After the statistics, the questionnaire passed the reliability and validity test, and the result was good and the data were credible.

**2.1 Basic Information of the Included Managers**

Table 1 shows positions of the hospitals’ management.

**Table 1 Position of survey respondents in hospitals**

| Positions                         | Total number (n=138) | Percentage (%) |
|-----------------------------------|----------------------|----------------|
| President                         | 9                    | 6.52           |
| Vice president                    | 33                   | 23.91          |
| President’s assistant             | 5                    | 3.62           |
| Director of administration office | 16                   | 11.60          |
| Division/Section chief            | 13                   | 9.42           |
| Head of clinic department         | 26                   | 18.84          |
| Head of nursing department        | 36                   | 26.09          |

**2.2 Understanding of HKM of Hospitals’ staff**

Table 2 shows the understanding of HKM of staff in hospitals. The ten questions are as follows:

- A. Do you hear of KM?
- B. Do you know about HKM?
- C. Do you think hospital management and HKM are similar?
- D. Do you think hospital information management is different from HKM?
- E. Do you think working experience of doctors and nurses are tacit knowledge?
- F. Do you think tacit knowledge in hospitals need more management?
- G. Do you think knowledge is strategic asset of hospitals?
- H. Do you think HKM has been implemented in Chinese hospitals?
- I. Do you think we need to implement HKM soon?
- J. Do you have strong willing to implement HKM in your hospital?

**Table 2 The understanding of HKM of hospital staff in different scales of hospitals**

| Questions | Grade III First-level hospitals* (n=112) | Grade III Second-level hospitals (n=5) | Grade II First-level hospitals (n=16) | Grade II Second-level hospitals (n=5) | x <sup>2</sup> | P     |
|-----------|--|--|---------------------------------------|---------------------------------------|----------------|-------|
| A         | 61.7                                     | 68.8                                   | 72.9                                  | 60.0                                  | 2.52           | >0.05 |
| B         | 51.5                                     | 81.3                                   | 77.1                                  | 60.0                                  | 15.66          | <0.01 |
| C         | 91.8                                     | 100.0                                  | 93.8                                  | 60.0                                  | 6.98           | >0.05 |
| D         | 88.6                                     | 87.5                                   | 87.5                                  | 80.0                                  | 0.40           | >0.05 |
| E         | 68.7                                     | 81.3                                   | 81.3                                  | 60.0                                  | 4.35           | >0.05 |
| F         | 52.9                                     | 81.3                                   | 58.3                                  | 80.0                                  | 6.53           | >0.05 |
| G         | 93.3                                     | 100.0                                  | 100.0                                 | 100.0                                 | 3.13           | >0.05 |
| H         | 92.1                                     | 100.0                                  | 100.0                                 | 60.0                                  | 5.70           | <0.05 |
| I         | 41.5                                     | 62.5                                   | 40.0                                  | 20.0                                  | 3.90           | >0.05 |
| J         | 90.9                                     | 93.8                                   | 97.9                                  | 80.0                                  | 3.70           | >0.05 |

\*Grade III hospitals are mostly provincial and city-level, and grade II mostly district-level and county-level which are usually smaller than grade III ones.

**2.3 Implementation Condition of HKM**

**2.3.1 General Condition of HKM Implementation**

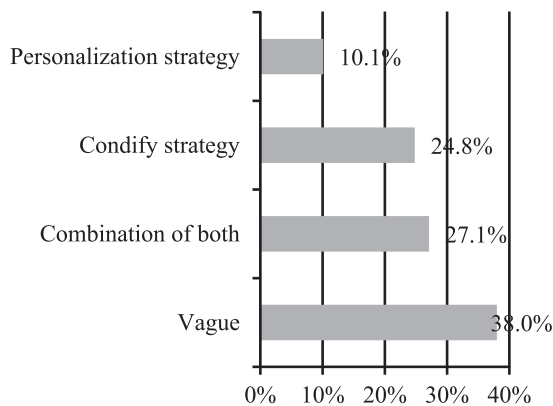
The survey results showed only 36.2% of hospitals investigated implemented KM. Among them, 72.1% set up institution of KM. But among those only 6.6% hospitals built a position of Chief Information Officer (CIO) or Chief Knowledge Officer (CKO). Table 3 shows the status of HKM.

**Table 3 The status of hospital knowledge management**

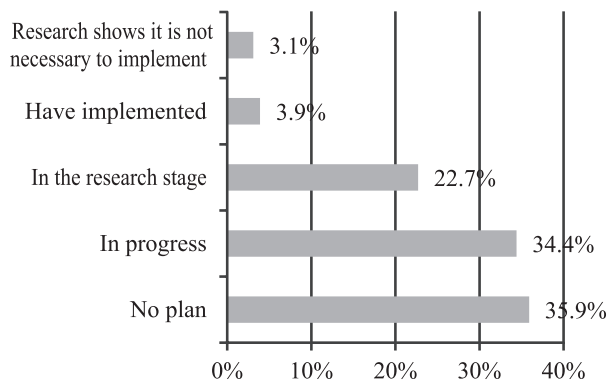
| Hospitals                                    | Hospital knowledgemanagement |        |
|--|------------------------------|--------|
|  | Yes                          | No     |
| Implementing knowledge management            | 63.80%                       | 36.20% |
| Building institution of knowledge management | 72.10%                       | 27.90% |
| Establishing CIO or CKO                      | 93.40%                       | 6.60%  |

**2.3.2 HKM Implementation in Details**

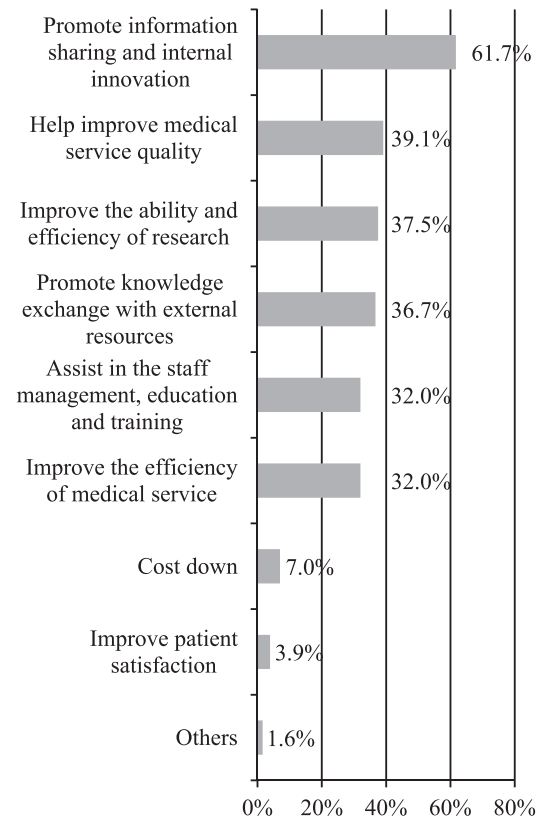
The details of investigation results about HKM implementation are shown in fig. 1–8.



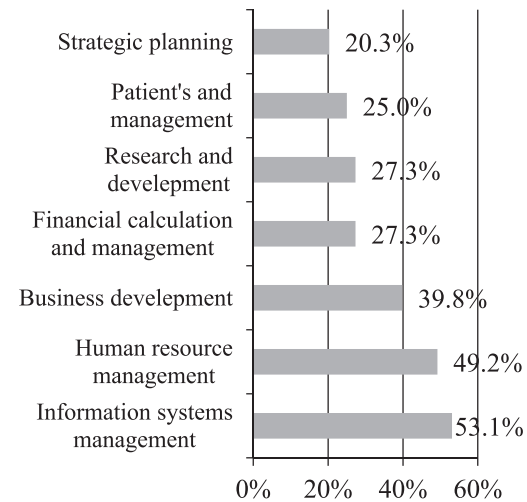
**Fig. 1 Strategies employed for hospital knowledge management**



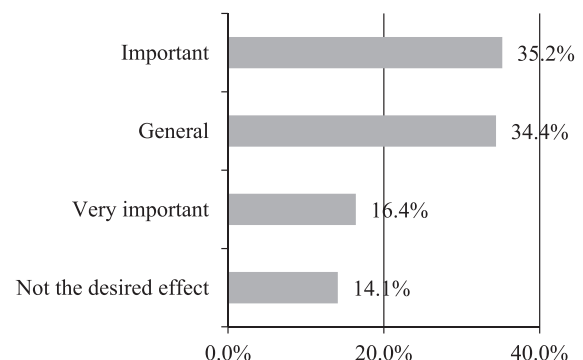
**Fig. 2 The system for implementing hospital knowledge management**



**Fig. 3 The roles of the knowledge management system**



**Fig. 4 The knowledge projects already carried out in the hospitals**



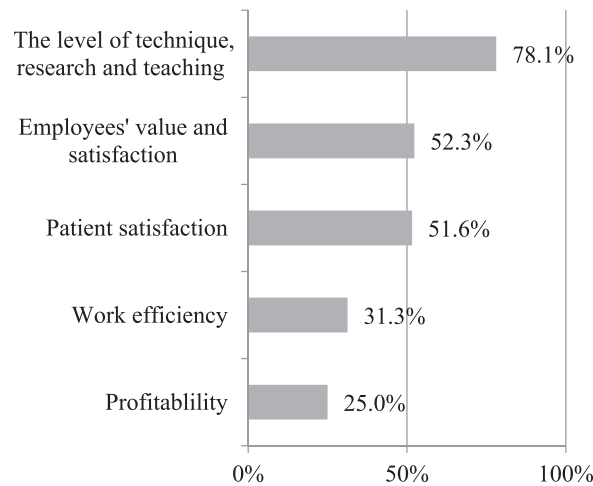


Fig. 6 Measurement indicators of the relationship between effective knowledge management and effects

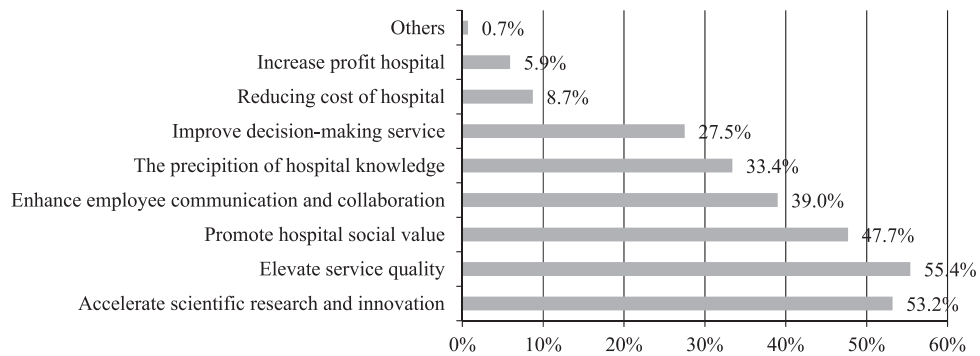


Fig. 7 Hospital staffs' understanding of the aim of knowledge management

Fig. 5 Satisfaction performance of knowledge management

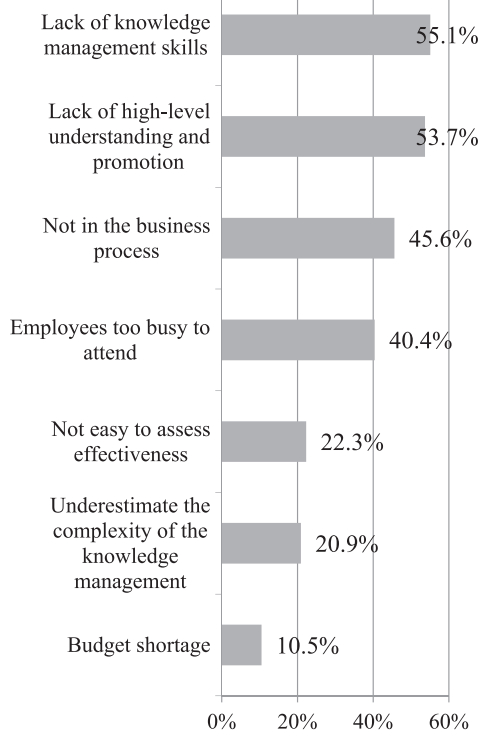


Fig. 8 Main causes of the difficulties in implementing knowledge management in hospitals

The results showed that 47.5% of medical staff held the negative opinion that patients' knowledge was an important source of hospital knowledge, 29.8% of them were positive and 22.7% of them were vague. 76.6% of medical staff did not think learning was part of hospital knowledge management, only 13.3% of them thought it was and 11.1% of them were vague.

**2.4 Condition about Hospitals without HKM**

Hospitals having the plans to implement knowledge management items accounted for 54.0%, and those having no such plans accounted for 46.0%. Fig. 9 showed knowledge management projects or HKM relative projects performed in hospitals. Fig. 10 showed the main channels of obtaining knowledge. Fig. 11 shows the largest barriers in hospitals perception formation and information sharing.

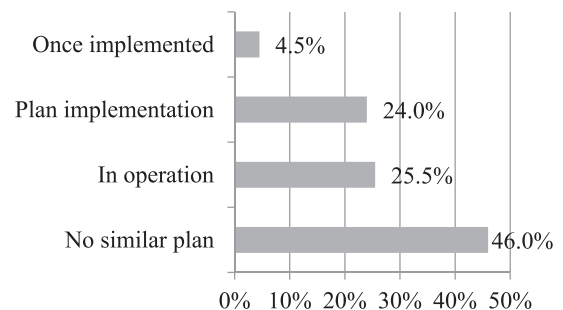


Fig. 9 Hospital implementing knowledge management project/similar project

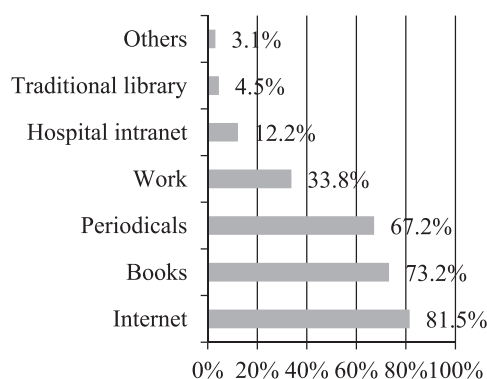


Fig. 10 Main approaches to get knowledge for staffs in hospitals

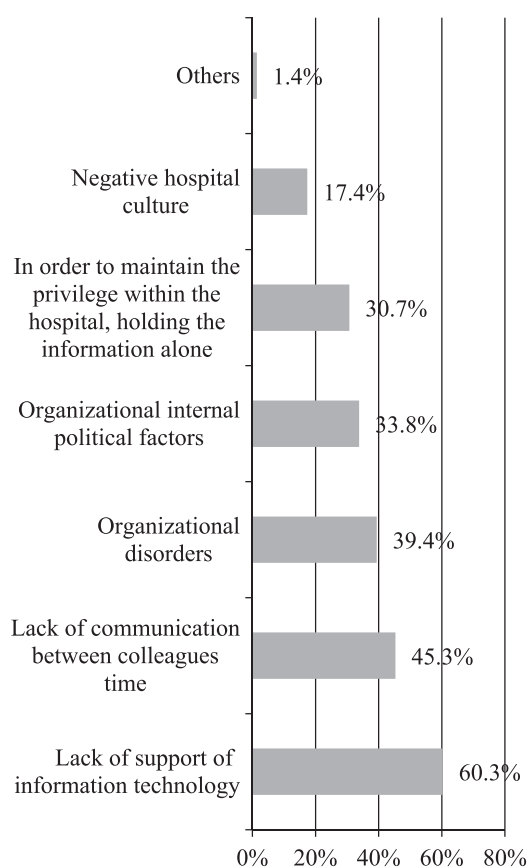


Fig. 11 Hospital awareness and information sharing the biggest obstacle

### 3 DISCUSSION

#### 3.1 Estimation of the Status of HKM in China

According to the results, accounting for 36.2%, medical staff had admitted KM implementation, but most of them had not realized a meaningful KM. HKM was distributed in the process of hospital management. It is a state of no rules to constrain, no expert to manage, no plan to implement and no norm to follow.

As shown in fig. 12, hospitals achieving institutionalization of HKM accounted only for

1.6%, those generalizing and supporting KM system accounted for 7.7%, those constructing the KM system accounted for 11.6%, those planning KM accounted for 18.6%, and those in the initiation stage accounted for 60.5%. Apart from some incorrect data, the hospitals conducting KM system are not many in the present, which means the KM in Chinese hospitals is in the primary stage<sup>[10, 11]</sup>.

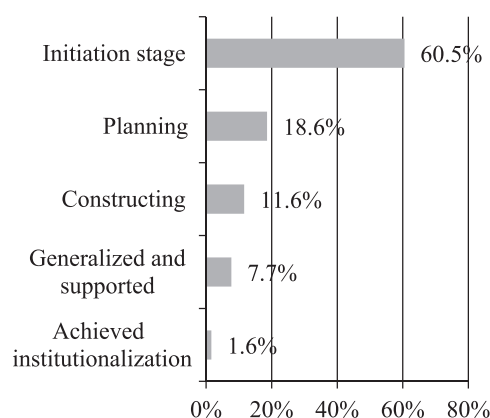


Fig. 12 Stages of HKM

#### 3.2 Access to Knowledge for Medical Staff

The survey showed that 81.5% of hospital personnel got knowledge from the internet, 73.2% from books, and 67.2% from periodicals (fig. 10), indicating that with its rapid development, internet has already become the main way for hospital personnel to get knowledge. Traditional library was not main provider of knowledge any more. But books and periodicals still occupy a large “market”.

It should be noted that tacit knowledge is often transmitted during the work, and working experience is the most important knowledge in the hospitals<sup>[12]</sup>. However, according to the survey, hospitals’ staff got only 33.8% of knowledge from the working experience, which was far from enough and fully showed that knowledge sharing was a prominent problem in the spread of hospital knowledge. In addition, the proportion of hospital personnel using internal network is relatively low, most of which relates to incomplete construction of enterprise internet. So the changing of staff’s knowledge collection behavior should be realized and hospital intranet and system could be established to become the knowledge warehouse for all staff in the hospitals. The results also showed that survey objects thought information technology support is the biggest obstacle to implement HKM in hospitals (60.3%). As shown in fig. 11, lack of communication between colleagues (45.3%), organizational structural disorder (39.4%), internal political factors (33.8%), owning information by oneself for keeping privilege in hospitals (30.7%) were also the important factors affecting HKM implementation. It indicated that it was



not an easy matter to implement KM in hospitals and there were many obstacles, among which information internet building, system construction, organizational building and cultural construction are more prominent.

### 3.3 Hospitals Having Implementation of HKM

KM strategies consist of coding strategies and individualized strategies. Coding strategies mainly process the overt KM, which is the knowledge elaborately coded and reserved in the data base<sup>[13]</sup>. Individualized strategies mainly process the covert KM, which is the knowledge encoded and saved in the brain. According to the survey, among the hospitals implementing HKM projects, those adopting combination of coding and individualization knowledge management strategies accounted for 27.1%; those adopting coding strategies accounted for 24.8%; those adopting individualized strategies accounted for 10.1% (fig. 1), suggesting overt KM stands the main portion and covert KM the second portion. As shown in table 3, however, those hospitals building a special institution of KM accounted for 27.9%, and those establishing CIO or CKO only accounted for 6.6%. Above all, the degree of KM in hospitals is low.

As shown in fig. 2, only 3.9% of survey hospitals implemented HKM successfully. It reflected that the HKM application was in a certain degree of low level. A most important role of KM system played in a hospital is to promote information sharing and internal innovation (as high as 61.7%, fig. 3), which was basically the same with the results of KM2002 Chinese questionnaire “knowledge management” report released by the Shenzhen DAO economic research Co., LTD in China<sup>[14]</sup>. It proved that the use of the KM system could promote knowledge sharing greatly significantly and HKM played an important role in service and education too<sup>[15]</sup>. In fig. 4, information system (53.1%), human resource management (49.2%), and business development (39.8%) were the most common knowledge projects managed by hospitals, showing that KM can systematically manage the core projects, but the primary and secondary distribution needed to be balanced. At the same time, the R&D and service to patients need to be strengthened in further step. As shown in fig. 5, at present, the general status of HKM in China was not good enough and the cognition of HKM was still not clear enough for medical staffs. The results also showed that HKM could do great good to hospital business, especially to R&D organization, clinical technology development and the education function (fig. 6). Therefore, it can be concluded that KM is a driver or the hospital innovation ability, the core ability and competition ability<sup>[6]</sup>.

The fig. 7 demonstrated that the main goal of KM implementation is to accelerate innovation in research field, follows with improving service quality, gaining visibility and enhancing the communication

and corporation among staffs. It further illustrated that KM could enhance core competence of the hospitals, and it could improve hospitals' reputation and clients' satisfaction. In particular, it could enhance the hospital culture which means a lot to the public, which is similar to the results from other researchers' articles<sup>[17-19]</sup>.

Fig. 8 illustrated that the scarcest factors of HKM implementation were necessary KM skills (55.1%) and understanding and promoting from high-level managers (50.7%). It means that there is much resistance to carry out HKM at this stage. Implementation of HKM needs the following supports: supporting of information technology, facilities and skills, understanding and supporting of hospital leadership, making related policies and systems, accurately evaluating the cost and outcome of HKM projects, arousing the enthusiasm and activity of all departments and personnel, reasonably arranging working and learning, reasonably adjusting expenditure, and etc. The essential components include the guarantee of information technology facilities and skills, certification of hospital leaders, formulation of related policy and system, the difficulty level assessment on KM in the hospital to carry out, the motivation of all departments and personnel, reasonable arrangement of work and learning time, and reasonably adjusting expenditure issue, etc. Firstly and importantly, leadership should strengthen the understanding of KM, attach great importance to the role of KM, and constantly improve the implementation method of KM.

As shown in table 4, the survey showed that the medical staffs who believed patients were important knowledge source accounted for only 29.8%, though 76.6% of staff investigated thought that learning from patients is a part of HKM. It showed that hospital staff has not enough cognition about the concept of HKM. It should be realized that KM needs to combine the view of service and the need of clients. Only if the mutual sides have the same recognition, they can achieve the same goals and the clients can get satisfied with service.

### 3.4 No Implementation of HKM in Hospitals

Among hospitals without any KM program, 4.5% of them implemented KM projects before. Many hospitals implemented (25.5%) or planned to carry out (24.0%) some projects similar to KM (fig. 9), illustrating that KM is deeply rooted among the people, and is sought-after for managers. However, almost half of hospitals (46.0%) have no relevant plans.

The research also indicated that half of each (separately in 48.4% or 51.6%) intends or not intends convincing hospitals' decision layer to implement KM, on the one hand, it indicates that staffs of hospital lack cognition for KM and they are not sure about the benefit of KM to hospital; on the other hand, it indicates that most of staff thinks that KM belongs to the administrators, having little relationship to clinical staffs. So, education for KM needs to be strengthened,

arouse the enthusiasm of staffs adequately.

To sum up, the survey illustrated further that in the process of the KM implementation, first of all, information work should be paid attention to, followed by the conduction of humane management, a good communication environment should be built up<sup>[20]</sup>, and institutional mechanisms should be reformed at the same time.

### Conflict of Interest Statement

The authors declare that they have no conflict of interest in this study.

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