

Analysis of the Structure and Management of Nosocomial Infection in Traditional Chinese Medicine Hospital in Shaanxi Province

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Abstract: The infection monitoring and management systems in TCM hospitals in Shaanxi Province were found to be relatively adequate and the operation of the infection management agencies has been essentially established. Out of the 41 TCM hospitals, 39 were practically investigated. 74.36% of the TCM hospitals had established a separate nosocomial infection management department. The competent managers of the departments were in most cases the hospital deans or sub-deans (92.31%). Thirty-eight out of thirty-nine TCM hospitals had set up hospital infection management committees, and the members of these committees were meeting mostly two times a year (66.67%). Twelve assessments were executed in a year, accounting for the 43.59% of the TCM hospitals, while 5.13% performed no assessments. The proportion of pharmacy administration, medical record management, disinfection product procurement, and construction layout was 66.67%, 33.33%, 61.54%, and 58.97%, respectively. 17.95% of the TCM hospitals used the information monitoring system in nosocomial infection management. The effect of disinfection and sterilization was the highest (97.44%), followed by occupational exposure of medical staff (92.31%), sanitary science (89.74%), surveillance of nosocomial infection (79.49%), target surveillance (76.92%), microbiological inspection (43.59%), cross-sectional survey of nosocomial infection (35.90%), and special investigation or research on hospital infection (15.37%). The positive detection rate of microorganisms was 24.86% in 2014, and 20.46% in 2015, while the rate of performed cross-sectional surveys of nosocomial infections was 1.61% and 1.50%, respectively. However, the monitoring software for nosocomial infection management, microbiological inspection, cross-sectional survey of nosocomial infection, and special investigation or research on hospital infection need to be further improved.

1. Introduction

As the modern medical technology continuously develops, nosocomial infections have become more and more serious, critically affecting the quality of medical care and the safety of the patients. Nosocomial infection management in China has so far achieved great results, but the development has been unbalanced between the different regions. Compared to general hospitals, nosocomial infection management in TCM hospitals started later, developed slowly, and still lags behind [1]. The status of nosocomial infection management in Shaanxi province has been investigated and analyzed in a previous study [2], but only two out of the thirty-three surveyed hospitals were TCM

hospitals. As a result, this does not reflect the current status of nosocomial infection management in TCM hospitals. In the present study, 41 TCM hospitals were investigated in order to identify the present situation and structure of the nosocomial infection management system and its organization in TCM hospitals in Shaanxi Province.

2. Objective and methods

2.1 Objective

Forty-one TCM hospitals in Shaanxi Province were selected as research subjects using the stratified random sampling method in January 2017. The questionnaire for nosocomial infection management was formulated, and carefully filled by the head of each nosocomial infection management department. After filled out, the questionnaires were rechecked so as to ensure their validity.

2.2 Statistical methods

The data of the questionnaires were input using a double entry method and consistently checked via EpiData 3.0 in order to ensure the data accuracy. The Statistical Product and Service Solutions 17.0 (SPSS17.0) software was used to analyze the data with the descriptive analysis method. The obtained data groups were tested with the χ^2 test. Statistical significance was accepted when the P-value was lower than 0.05 ($\alpha=0.05$).

3. Results

3.1 General situation

Out of the 41 TCM hospitals, 39 were actually investigated in the research objectives, since one hospital was merged with another hospital, while the head of a hospital department withdrew from the study. There were 9 tertiary hospitals, which accounted for 23.08%, and 30 secondary hospitals, which accounted for 76.92%. From the 39 hospitals, 4 were provincial-level TCM hospitals (10.26%), 10 municipal-level TCM hospitals (25.64%), and 25 county-level TCM hospitals (64.10%).

3.2 The staffing situation of nosocomial infection management

There were 62 full-time, and 30 part-time nosocomial infection managers in the 39 TCM hospitals, accounting for 67.39% and 32.61%, respectively (Table 1). No statistical difference in the staffing situation of nosocomial infection management between secondary and tertiary hospitals was found ($\chi^2=0.925$, $P=0.336<0.05$).

Table 1 The staffing situation of nosocomial infection management (n, constituent ratio [%])

Classification	Number of hospitals	Full-time (%)	Part-time (%)	Total
Secondary hospitals	30	37 (63.79)	21 (36.21)	58
Tertiary hospitals	9	25 (71.43)	9 (28.57)	34

3.3 The structure of the nosocomial infection management organization system

As it can be seen in Table 2, 29 TCM hospitals (74.36%) had set up nosocomial infection management sections, and the competent managers were mainly deans or sub-deans, accounting for 92.31%. The 97.44% of the TCM hospitals had set up a nosocomial infection management committee, and they had all drew up the relevant rules and regulations for nosocomial infection management. However, only 17.95% of the TCM hospitals had applied information monitoring systems for the nosocomial infection management monitoring, while the 10.26% had applied infection management monitoring and microbiological monitoring software.

Table 2 The structure of the nosocomial infection management organization system

Item	Option	Number of hospitals	Ratio (%)
Department setting	Full-time organization	29	74.36
	Functions included in the preventive health care section	2	5.13
	Functions included in the medical department	3	7.69
	Functions included in the nursing department	2	5.13
	Other	3	7.69
Proper authorities	Deans	6	15.38
	Sub-deans	30	76.92
	Medical department	2	5.13
	Nursing department	1	2.56
Nosocomial infection management committee	Yes	38	97.44
	No	1	2.56
Regulations for nosocomial infection management	Yes	39	100.00
Information monitoring system	Yes	7	17.95
	No	32	82.05
Nosocomial infection management monitoring software	Yes	4	10.26
	No	35	89.74
Microbiological monitoring software	Yes	4	10.26
	No	35	89.74

3.4 The progress of nosocomial infection management work

The meetings of the nosocomial infection management committees held once every six months (66.67%). The 43.59% of the TCM hospitals performed at least 12 assessments a year, while only 5.13% performed none. The participating pharmacy management, medical record management, disinfection product procurement, and construction layout ratios were 66.67%, 33.33%, 61.54%, and 58.97%, respectively (Table 3).

Table 3 The progress of nosocomial infection management work

Item	Option	Number of hospitals	Ratio (%)
Nosocomial infection management committee meeting	Once per quarter	6	15.38
	Once every six months	26	66.67
	Held when necessary	7	17.95
Frequency of assessment	0 times	2	5.13
	1 time	5	12.82
	2 times	3	7.69
	4 times	12	30.77
	12 times	17	43.59
Pharmacy management	Yes	26	66.67
	No	13	33.33
Medical record management	Yes	13	33.33
	No	26	66.67
Disinfection product procurement	Yes	24	61.54
	No	15	38.46
Construction layout	Yes	23	58.97
	No	16	41.03

3.5 Nosocomial infection monitoring

The nosocomial infection monitoring results demonstrated that the sterilization effect monitoring reached up to 97.44%, and the occupational exposure monitoring for the medical staff accounted for 92.31%. Thirty-five TCM hospitals (89.74%) carried out environmental hygiene monitoring (air, object surface, and hand surface), thirty-one TCM hospitals (79.49%) carried out nosocomial infection cases monitoring, thirty TCM hospitals (76.92%) carried out targeted monitoring of nosocomial infection, while catheter-related bloodstream infection, urinary catheter-related urinary tract infection, surgical site infection, intensive care unit, and ventilator-associated pneumonia monitoring was carried out by 30.00%, 73.33%, 86.67%, 16.67%, and 6.67% of the TCM hospitals, respectively. The 43.59% of the TCM hospitals submitted microbiological specimens for censorship, with the positive detection rates of microbial specimens in 2014 and 2015 being 24.86% and 20.46%, respectively (Figure 1). The top 5 pathogenic microorganisms in 2014 were respectively *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Escherichia coli*, *Pseudomonas aeruginosa*, and *Escherichia coli*, while in 2015 were *Klebsiella pneumoniae*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, and *Acinetobacter baumannii*. Fourteen hospitals carried out nosocomial infection cross-sectional surveys, and the nosocomial infection rates in 2014 and 2015 were 1.61% and 1.50%, respectively. Only 6 TCM hospitals (15.38%) carried out a special survey or research related to nosocomial infection.

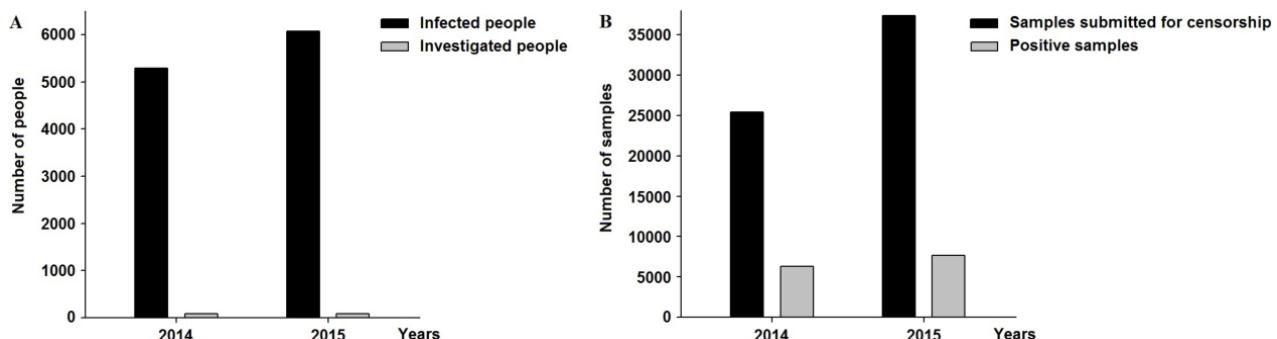


Figure 1 The results of the nosocomial infection cross-sectional survey (A) and microbiological specimens submitted for censorship (B).

Table 4 Nosocomial infection monitoring

Item	Number of hospitals	Ratio (%)
Nosocomial infection cases monitoring	31	79.49
Nosocomial infection cross-sectional survey	14	35.90
Environmental hygiene monitoring	35	89.74
Microbiological specimen submission for censorship	17	43.59
Occupational exposure monitoring for medical staff	36	92.31
Targeted monitoring of nosocomial infection	30	76.92
Catheter-related bloodstream infection	9	30.00
Urinary catheter-related urinary tract infection	22	73.33
Surgical site infection	26	86.67
Intensive care unit	5	16.67
Ventilator-associated pneumonia	2	6.67
Sterilization effect monitoring	38	97.44
Special survey or research results related to nosocomial infection	6	15.38

4. Discussion

Currently, the main problem in the management of nosocomial infection control in China can be described as follows [3, 4]: nosocomial infection management organizations are sound, but

grassroots work is weak. Management teams are becoming more and more reasonable, but the level of research needs to be improved. Both nosocomial infection information and monitoring networks need to be improved. Additionally, financial support is limited, and implementation of prevention and control is poor. In the present study, it was demonstrated that 74.36% of the TCM hospitals in Shaanxi Province have set up nosocomial infection management sections, and 97.44% of the TCM hospitals have set up nosocomial infection management committees. These levels were lower than the levels reported by Yuhui et al. (2014) for the Chinese medical institutions (90.59% and 97.65%, respectively) [5]. The competent managers of the nosocomial infection departments were mainly deans or sub-deans (92.31%), which was higher than that in Guizhou Province (79.42%) [6]. All selected TCM hospitals formulated the relevant rules and regulations for nosocomial infection management, and most TCM hospitals (82.05%) held at least one nosocomial infection management committee meeting every six months. These results demonstrated that the nosocomial infection monitoring and management systems of TCM hospitals in Shaanxi Province were relatively adequate.

Nosocomial infection management is a discipline that focuses on business-oriented and management functions. It clearly stipulates that nosocomial infection management sections carry out specific responsibilities for prevention and control of nosocomial infection, such as organizational management, inspection and guidance, monitoring analysis, and scientific research training [7]. In the present work, it was found that nosocomial infection management of TCM hospitals in Shaanxi Province participated in pharmaceutical management, medical record management, disinfection product procurement, and construction layout, among others. Almost all departments were assessed every quarter of the year (30.77%) or month (43.59%). The order of the monitoring work carried out was found as follows: sterilization effect (97.44%), occupational exposure of medical staff (92.31%), environmental hygiene (89.74%), nosocomial infections (79.49%), target surveillance (76.92%), microbiological specimen submitted for censorship (43.59%), and cross-sectional survey (35.90%). Only 17.95% of the TCM hospitals developed an information monitoring system in the nosocomial infection management monitoring, while the proportion of the TCM hospitals that applied nosocomial infection management monitoring software was lower (10.26%). Both proportions were lower than in hospitals in Shaanxi Province (21.21%) [8]. Special survey or research results related to nosocomial infection accounted for 15.37%, which was lower than the Inner Mongolia Autonomous Region (18.18%) [9]. Our study illustrated that the operation of nosocomial infection management agencies in TCM hospitals in Shaanxi Province has been essentially established, while further improvements in microbiological specimen submission for censorship, nosocomial infection cross-sectional surveys, special surveys or research related to nosocomial infection are needed. The development of nosocomial infection management monitoring software requires financial support, which would eventually save more manpower to focus on key departments and targeted monitoring.

The microbiological specimen results demonstrated that the positive detection rates in 2014 and 2015 were 24.86% and 20.46%, respectively, and the top three pathogenic microorganisms were *Staphylococcus aureus*, *Klebsiella pneumoniae*, and *Escherichia coli* in 2014, and *Klebsiella pneumoniae*, *Escherichia coli*, and *Pseudomonas aeruginosa* in 2015. The nosocomial infection rates in 2014 and 2015 were 1.61% and 1.50%, respectively. The above-mentioned data provided the baseline for further investigation of microbiological specimens submitted for censorship and nosocomial infection cross-sectional surveys.

In conclusion, nosocomial infection monitoring and management systems of TCM hospitals in Shaanxi Province were found relatively adequate, and the operation of nosocomial infection management agencies has been essentially established, however there is still some management work to be improved. Moreover, close attention should be paid to the development and changes of the nosocomial infection monitoring and management systems, as well as to the status quo of the infection management personnel, in order to promote sustained and stable development of infection management in TCM hospitals.

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The authors have no conflicts of interest to declare.

References

- [1] CHEN Yuhua, WEN Ximao, FU Chenchao, et al. 2014. Status of healthcare-associated infection management in the grassroots medical institutes. Chin J Infect Control. Vol. 13(9).
- [2] LI Jinna, LIU Yanjun, QIN Xiaojin, et al. 2013. Investigation on nosocomial infection control in 33 hospitals in Shaanxi province. Journal of Nursing Science. Vol. 28(19).
- [3] YAO Hong, JIN Peng, LIU Fei. 2011. Comparative Analysis of Hospital Infection Control System Between China and the United States. Chinese Hospital Management. Vol. 31(12).
- [4] MIAO Liang, QIAO Hong, YAN Suzhen. 2012. Current status of infection control in hospital and its countermeasures. Chin J Nosocomiol. Vol. 22(9).
- [5] ZHANG Yuhui, ZHU Xiaoling, XIAO Yingying. 2017. Status of healthcare-associated infection management professionals in 85 traditional Chinese medicine institutions. Chin J Infect Control. Vol. 16(3).
- [6] MOU Xia, XU Yan, YANG Jinling, et al. 2013. Composition of nosocomial infections control departments in Guizhou province. Chin J Nosocomiol. Vol. 23(14).
- [7] LI Liuyi, LIU Yushu. 2010. Infection control. Beijing: People's education press.
- [8] LIU Fangfei, DONG Hongliang, FAN Shanhong, et al. 2016. Current situation of healthcare-associated infection management systems in Shaanxi province. Chin J Infect Control. Vol. 15(9).
- [9] LIU Weiping, HAI Yunting, JIAO Yueying, et al. Current situation of healthcare-associated infection management in Inner Mongolia Autonomous Region. Chin J Infect Control. vol. 15(9).