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ORIGINAL

CONSTRUCTION AND IMPLEMENTATION EFFECT OF PRESSURE INJURY NURSING LINKAGE PLATFORM UNDER THE MEDICAL CONSORTIUM MODEL IN ATHLETIC PATIENTS

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ABSTRACT

Purpose: To discover the training effectiveness of community nurses' cognition of pressure injury on the nursing linkage **Methods:** Guided by KAP (Knowledge, Attitude and Practice) Theory, and under the background of medical consortium in our hospital, we built a pressure injury nursing linkage platform dominated by mobile learning, supplemented by offline guidance and sharing of high-quality resources in the hospital, and trained 66 clinical nurses in 6 community health service centers of the medical consortium The theoretical knowledge, attitude, and clinical care behavior questionnaire of community nurses with pressure injury were surveyed after 18 months of platform operation and measured nurses' satisfaction with the platform and self- **Results:** The theoretical knowledge, attitude, and clinical nursing behavior of 66 community nurses with pressure The theoretical knowledge, attitude, and clinical nursing behavior of 66 community nurses with pressure injury compared before and after the platform operation, and the difference was statistically significant (P<0.05) ; Satisfaction with the platform was 91% for 5 items; Among the 10 items of self-evaluation of community nurses, the highest percentage of "agree" was to gain new knowledge and Among the 10 items of self-evaluation of community nurses, the highest percentage of "agree" was to gain new knowledge and change philosophy, which was 100%.

And 80% of the nurses agreed that they would change their incorrect nursing behaviors after the training. **Conclusion:** After the training of all 66 After the training of all 66 community nurses through the nursing linkage platform, their theoretical knowledge of pressure injury had significantly improved; Established After the training of all 66 community nurses through the nursing linkage platform, their theoretical knowledge of pressure injury had significantly improved; Established correct nursing concepts; Improved nursing behaviors; Satisfied with the training of nursing linkage platform.

KEYWORDS Medical consortium; Community nursing; Pressure injury; Nursing linkage platform; KABP Theory

Pressure Injury (PI) is a common complication in elderly athletic patients with chronic diseases, and the occurrence of PI not only affects the recovery process of athletic patients' primary diseases, prolongs hospitalization time, and reduces athletic patients' quality of life, but also takes a long time to treat and care for PI, which requires a lot of medical resources. Following the accelerated speed of population aging in China, the demand for long-term care of common complications in elderly athletic patients with chronic diseases has surged. In 2015, the state issued the "Guidance on Promoting the Construction of Hierarchical Diagnosis and Treatment System"(Reavey & Jones, 2019) , pointed out that the implementation of hierarchical diagnosis and treatment will lead to the downward shift of the medical and health work focus, the sinking of resources and the forward shift of the gateway, which will change the pattern of athletic patients' medical treatment. Community health service centers need to undertake a large number of the diagnosis and treatment for common diseases, multi-morbidity and chronic disease, but their talents, equipment and management cannot meet the needs of patients(Chan et al., 2020) . Therefore, using the "medical consortium" model as a carrier to radiate the high-quality medical resources of tertiary hospitals to the grassroots to meet the needs of athletic patients is an important initiative of China's medical reform. The "medical consortium" model refers to the core of tertiary hospitals, uniting different types and levels of medical institutions in a certain area to improve the efficiency of medical services through resource integration and process optimization (Jurema, Tomaszeski, Mostardeiro, Jorge, & Bicca, 2019; Siva & Tatebe, 2020). Our hospital is a large comprehensive municipal tertiary hospital with an annual outpatient volume of 1.3 million and 2,000 fixed beds. Under the overall arrangement of the government, our hospital is connected into a "medical consortium" with 6 community health service centers under the jurisdiction. This study aims to take pressure injury care as the entry point and builds a nursing linkage platform with specialist nurses as the leading factor and the member units of the medical consortium under the mode of "medical consortium", so as to sink the high-quality nursing resources of our hospital into the community health service center, improve the cognition of community nurses on pressure injury,

and meet athletic patients' nursing needs.

1、GENERAL INFORMATION

1.1 Status of nursing staff and continuing education in the member units of the medical consortium.From March 2017 to September 2018, there were 84 nurses working in the member units of the medical consortium. Excluding 18 nurses working in non-clinical work, there are 66 clinical nurses, all female, with an average age of (33.42±2.57) years, including 2 deputy chief nurses, accounting for 3%; 15 chief nurses, accounting for 22.7%; 24 nurse practitioners, accounting for 36%; 31 nurses, accounting for 46.96%. As for education, there were 16 undergraduates, accounting for 24.24%; 31 junior college students, accounting for 46.96%; 19 technical secondary school students, accounting for 28.78%. There were 13 nurses with 1-3 years working experience, accounting for 19.69%; 16 nurses with 4-10 years, accounting for 24.24%; 15 nurses with 11-20 years, accounting for 22.72%; and 22 nurses with 21 years and above, accounting for 33.33%. Among them, 5 nurses had gone to higher level hospitals for further study, and 6 nurses had participated in municipal continuing education programs, and the rate of further training was 9%.

1.2 Common problems in the current situation of pressure injury nursing in the member units of the medical consortium. The nursing management organization system is the chief nurse responsibility system, and the chief nurse has several duties, and has to manage the ward and also take care of the outpatient work. Sometimes she also need to participate in the night shift of the ward, so she has no time to focus on the quality control management of PI; In addition to completing the clinical nursing work, the nurses, also need to participate in chronic disease and public health management, and have few opportunities to go out to participate in training, and their learning enthusiasm is not high. Their existing knowledge is aging, and their awareness of preventing pressure injury is weak; Lack of pressure reduction tools and nursing products; Lack of quality control and management system for pressure injury nursing; Nursing scheduling is still a functional nursing model, nursing work mainly to complete medical orders, less PI health education for athletic patients and their families.

2. METHODS

2.1 Formulate a scheme.

2.1.1 Guiding Ideology It was based on the Knowledge Attitude Belief Practice (KABP)(Walker, Brunst, Chaput, Wohl, & Grooms, 2021) , which allows community nurses to acquire knowledge and change the concept through the nursing linkage platform, and finally build a linkage platform with the goal of changing the nursing behavior.

2.1.2 Personnel Organizational Structure One deputy director of nursing department was in the lead and overall responsibility. Specialist nurses of our wound care team were the core members. One nurse manager and specialist nurse was the team leader, responsible for the organization and implementation of specific work, one secretary and network liaison, responsible for collecting and uploading information, issuing notices and maintaining contact with the communities and coordinating all aspects of affairs.

2.2 Build a nursing linkage platform.

2.2.1 Build an online linkage platform Form We built a working WeChat group and QQ group , and the group leader is the team leader. The group members included international wound therapists from our chronic wound clinic, international wound therapists from our burn trauma treatment clinic, international wound therapists from our glycogen foot studio, wound stoma incontinence specialist nurse, nutritionist, vascular specialist each composed as a multidisciplinary team of experts and from each clinical department of our hospital wound team members. The group also invited 66 clinical nurses from member units of the medical association to join the group, and jointly formed a multidisciplinary medical and nursing integration of online communication linkage platform.

2.2.2 Build an offline resource sharing linkage platform To give full play to our hospital's high-quality nursing resources, every month our hospital's wound team conducted training, case discussions or invited academic lectures from outside experts. The secretary sent out a notice in the WeChat group and invited community nurses to participate. Our PI management mode and quality control process were shared with community nurses.

2.3 Scheme Implementation Using a combination of online and offline training models.

2.3.1 Mobile learning Mode learners logged in to QQ group and WeChat group for independent learning. **QQ platform** It was mainly used for uploading and teaching cases of various types of Pressure Injury (PI) learning courseware (Mills & O'Neill, 2016). The learning courseware is divided into four categories. The first one is theoretical knowledge of PI, including pathophysiological mechanisms of PI, clinical prevention strategies of PI, introduction of pressure reducing products and PI assessment. The second one is trauma management of PI, including assessment, description and measurement of trauma, use of new wound dressings, culture of wound bed, identification and treatment of infected wounds. The third one is related knowledge of PI, including structure and function of skin, vascular diseases, nutritional assessment. The last one is literature of PI, including papers

published in core journals, various guidelines. For everyone to study and download, learners can enter the study at any time according to their time and interest, and they can consult experts on the WeChat platform for any questions in the study. **WeChat platform** It was mainly used for online communication, uploading pictures, teaching videos, answering and solving questions by experts, case discussions. That made it possible for learners to communicate with experts in both directions.

2.3.2 Case teaching mode It aimed to improve nurses' clinical practice skills. Nurses uploaded the cases they encounter in their work to **the WeChat group**, ask questions, discuss them, be guided by experts online, and track the progress of the cases. The wound team uploaded the typical cases every month, and the nurses in the team raised the questions to discuss, and the wound therapist or the specialized nurse explained the key points of treatment (Chi, Wang, Wang, Yu, & Yang, 2019). The group secretary or group leader browsed the WeChat platform daily to collect everyone's questions and ensured that every question had an expert's reply; the cases were regularly organized and uploaded to **the QQ group** for review and analysis.

2.3.3 Offline training and quality resource sharing Our wound team organized monthly training or nursing teaching visit or difficult case visit. For the community encountering difficult wounds or special cases that need expert on-site consultation, the team would upload the consultation order in QQ group, then the wound therapists or specialist nurses would go to the community for on-site guidance after approval by the nursing department, Once a quarter, we conducted case sharing debriefing or workshop and invited nurses from the medical consortium member units to participate in the learning and interaction. To ensure the training effect, the group secretary kept in touch with each community health service center to listen to everyone's opinions in order to modify and increase the content of the courseware according to everyone's needs.

2.4 Research tools

2.4.1 Questionnaire on theoretical knowledge, attitude, and clinical nursing behavior of pressure injury (PI). It was based on the theoretical framework of KABP, with reference to Qixia Jiang's *Practice Guidelines for Prediction and Prevention of Pressure Sores in Adults* and *Prevention and Treatment of Pressure Sores: A Guide to Clinical Practice(2014 edition)* (Cai et al., 2017; Režen et al., 2022). The questionnaire includes 32 entries in 3 dimensions: cognition, attitude, and nursing behavior. For cognition dimension, there were 20 items, with 2 points for correct, 0 points for error, and a total score of 0-40. It included: concept, prevalent site, pathophysiological mechanism, risk factors, high-risk group, staging, frequency of assessment, grading of risk, structure of skin, wet healing theory, skin cleaning, skin protection, etc. Then 6 entries of attitude

dimension (disagree - strongly agree), content included: prevention is the best measure, not everything PI can be prevented, preventive measures must follow guidelines, the cooperation between athletic patients and caregivers is important, nursing interventions can reduce the occurrence of PI, and nurse intervention is important. For nursing behavior dimension, it had 6 entries (never-often), including: assessing athletic patients with the Braden scale, reducing shear head elevation no more than 30˚, health education for athletic patients and caregivers, reporting the occurrence of PI, developing a turn over plan for athletic patients, and cleaning the skin with weakly acidic products. The latter two dimensions were scored on a Likert 5 scale, with 1-5 points respectively, and a total score of 6-30 points. The content validity index (CVI) of the questionnaire was 0.875 and the reliability Cronbach α was 0.83.

2.4.2 Self-designed pressure injury care linkage platform satisfaction questionnaire with 5 entries and 4 options of very satisfied, satisfied, average, and dissatisfied, satisfaction = (very satisfied + satisfied)/total number × 100%.

2.4.3 Self-designed form for nurses of the medical consortium member units after receiving training on the platform, with 10 entries and 3 options of "agree", "not sure" or "disagree".

2.5. Data collection and statistical processing

2.5.1 Members of the wound team in our hospital, each 2 people in 3 groups, sent questionnaires about theoretical knowledge, attitude, clinical nursing behavior of pressure injury to the members of the medical consortium before and after the training. A total of 66 copies were issued before and after, and all were recovered on site. After the training, the satisfaction questionnaire of the pressure injury nursing linkage platform and the nurse self-evaluation form questionnaire after the training were uploaded on the WeChat platform, and 66 copies were returned, with 100% recovery rate and 100% efficiency. All respondents gave their informed consent and accepted voluntarily.

2.5.2 Data were double-checked and entered, and statistical analysis was performed using SPSS17.0 with t-test at α=0.01.

3 RESULTS

3.1 After 18 months of operation of the platform, in the medical consortium model, 66 nurses in the medical consortium member units were surveyed on theoretical knowledge, attitude and clinical nursing behavior of pressure injury and compared with those before the platform was constructed. The differences in the scores of three dimensions of theoretical knowledge,

attitude and clinical nursing behavior were statistically significant (P<0.01). See Table I.

Comparison of nurses' pressure injury perceptions, attitudes, and nursing behaviors in member units of the medical consortium before and after the operation of the nursing linkage platform (Table 1)

	Cognitive Dimension	Attitude Dimension	Nursing Behavior Dimension
Before the operation of nursing linkage platform	20.67±6.86	25.48±3.79	11.86±2.24
After the operation of nursing linkage platform	30.52±5.81	28.91±1.12	13.59±2.83
P value	-7.257 .000	-7.43 .000	-6.16 .000

3.2 The nursing department of our hospital uploaded the satisfaction questionnaire of the pressure injury nursing linkage platform on the WeChat platform, and the results showed that the overall satisfaction was 91%, and the highest satisfaction of the specialist nurses' guidance was 95%, and dissatisfaction was 0. See Table 2.

Satisfaction of nurses in the medical consortium member units with pressure injury nursing linkage platform (Table 2)

Content	Very Satisfied	Satisfied	General	Dissatisfied	Satisfaction
1.Courseware content uploaded on QQ platform	13(20%)	43(65%)	10(15%)	0	85%
2.The design of the nursing linkage platform	15(23%)	39(59%)	5(9%)	0	91%
3.WeChat platform experts reply	40(60%)	22(33%)	4(7%)	0	94%
4.Guidance and teaching of specialized nurses	22(33%)	41(62%)	3(5%)	0	95%
5.The overall feeling of the nursing linkage platform	10(15%)	50(76%)	5(9%)	0	91%

3.3 Self-evaluation of the nurses in the medical consortium after receiving training on the platform showed that 100% of the nurses chose "agree" that they gained new knowledge, changed their concepts, and changed their incorrect nursing behaviors after the training. The percentage of "disagree" was 0. See Table 3.

Self-evaluation of nurses of medical consortium member units after receiving training from the platform (Table 3)

Content	Agree (%)	Uncertainty (%)	Disagree (%)
1.New insights and knowledge of pressure injury are gained	66(100 %)	0	0
2.The concept of pressure injury prevention has been updated	66(100 %)	0	0
3.The wound healing concept has been updated	66(100 %)	0	0
4.It improves clinical management skills for the prevention of pressure injuries	63(95%)	3(5%)	0
5.I will apply new knowledge and skills in future work	60(91%)	6(9%)	0
6.The training will change the original incorrect nursing behavior	66(100 %)	0	0
7.The training can meet the needs of nursing	56(86%)	10(15%)	0
8.Increased self-confidence in work after training	59(90%)	7(10%)	0
9.Feeling more rewarded for my work	58(88%)	8(12%)	0
10.I hope to become an expert in a certain field of nursing	53(80%)	13(20%)	0

4 DISCUSSION

4.1 The construction of a linkage platform for pressure injury nursing in the medical association model is an inherent need for the development of society as well as specialty nursing.

Social needs: The medical consortium model is a redistribution of national medical resources, an extension of high-quality medical and nursing resources to primary medical and health service institutions, and an important initiative to solve the "difficult" and "expensive" medical treatment problems of the people. Compared with the overcrowding of large hospitals, the community health service centers, which are the closest to people's medical treatment, are sparse, mainly because the level of medical service in community health service centers is not trusted by athletic patients (O'Malley, 2019). Therefore, there is an urgent need to improve the level of medical care in primary medical institutions, so that community residents can take good care of the disease in a short distance, and truly solve the social problems of "difficult" and "expensive" to see a doctor (Jufar et al., 2022; Mourikis et al., 2022).

Demand for nursing specialties: In the trend of the development of nursing specialties specialization, large comprehensive tertiary hospitals have a large number of expert clinical nurses with high level and expertise in a particular or specialized nursing field; while community nursing staff have lower education level, narrower knowledge and untimely knowledge update (Van Praet et al., 2022). Therefore, major hospitals need to take up the task of training and mentoring community nurses, and online remote mentoring needs to be vigorously promoted (Dayton, Jacks, & Vander Heiden, 2016). According to

the *2020 China Health Statistics Yearbook* data (Health & Commission, 2016) , the athletic patients in tertiary hospitals (accounted for 0.25% of nationwide medical institutions) accounted for 22.2% of the athletic patients in medical institutions nationwide, and the athletic patients in primary community health institutions (accounted for 94.6% of nationwide medical institutions) accounted for 53.1%, which shows that the majority of athletic patients cannot enjoy high quality nursing. Therefore, quality nursing services need to be radiated to primary care institutions, and high-quality nursing professionals need to go out of hospitals and into the grassroots to serve more athletic patients (Tschoellitsch, Böck, Mahečić, Hofmann, & Meier, 2022; Valeanu et al., 2022). As the definition of nursing given by the International Council of Nurses points out, the target of nursing services includes individuals, families and communities, and the scope of nursing services should break through the regional restriction and go to families and communities (Papadaki et al., 2020; Shen et al., 2021).

4.2 A combination of online and offline training methods meets the training needs of community nurses.

According to domestic and foreign scholars Maoyu Zhu, Hegney research reports: busy work, lack of time, far from home, high costs are all unfavorable factors affecting community nurses to participate in continuing education (Hegney, Tuckett, Parker, & Robert, 2010). 2007 China's Ministry of Personnel and other ministries pointed out that the full use of modern distance learning means to provide more continuing education opportunities for urban community health service personnel (Icard et al., 2018). Our hospital is located in the central city, with developed information and low costs, and has high-quality medical and nursing resources. Under the advocacy of the medical consortium model, our hospital has built a pressure injury nursing linkage platform led by specialist nurses, with a mobile learning model. Mobile learning is a learning method that can occur at any time and any place with the help of mobile computing devices. Nurses log into WeChat and QQ platforms and use fractional time to learn without leaving home, which greatly saves nurses' time, energy and cost. The online case-based teaching mode is aimed at solving practical clinical problems and is closer to the clinical work of nurses, who have a strong sense of active participation and are more interested in learning. The prevention and treatment of pressure injury is a highly operational skill, which is supplemented by offline on-site instruction, with on-site explanation of difficult and special cases; at the same time, community nurses are invited to participate in our monthly in-hospital training, so that community nurses can quickly integrate into a higher-level nursing environment, grow together with our nurses, share high-quality resources and not additionally increase the workload of tertiary hospitals (Al-Alem, Baker, Pandya, Eisenhauer, & Rueda, 2019). This training mode, which is mainly online learning and supplemented by offline training, is fast, efficient, time-

saving and easy for nurses to accept, and well balances the relationship between community nurses' work and study to promote community nurses' participation in continuing education.

4.3 Knowledge Attitude Belief Practice (KABP) as a framework for training model to make nurses' behavior more conscious and persistent.

KABP theory: It divides human behavior change into the process of acquiring knowledge, developing beliefs, and forming behaviors. The theory points out the progressive relationship between knowledge, beliefs and behaviors; knowledge is the basis for behavior change, and beliefs and attitudes are the driving force for behavior change. Only when people acquire relevant knowledge and think about it, then will develop a strong sense of responsibility is it possible to adopt a positive attitude to change behavior.

Application of KABP theory: This study used KABP theory as the guiding idea and applied it to the training of community nurses. Firstly, the medical consortium nursing linkage platform was used as the carrier of knowledge, and the specialized knowledge of Pressure Injury (PI) was published on the platform, so that nurses had a way to obtain knowledge. As nurses with high cognitive level, they have the ability to self-learn, learn the most cutting-edge knowledge of PI through the platform, recognize the hazards of PI through case discussions, and realize that correct and timely intervention by nurses plays a very important role in preventing the occurrence of PI, thus establish the correct beliefs. In their work, they constantly interact with clinical nursing experts and gradually perceive the value of nurses' work in practice, which eventually generates the desire to change behavior, and the motivation for such behavior change comes from the heart of nurses and from their heart. Therefore, the training model framed by the KABP theory focuses on the transfer from knowledge to the cultivation of beliefs, and nurses' behaviors comply with their beliefs, which are more conscious and persistent and lead to continuous improvement of nursing behaviors. Self-evaluation of nurses after 18 months use of the PI nursing linkage platform showed that 100% of nurses agreed that they had gained new knowledge, changed their beliefs, and were willing to change their original incorrect behaviors; 88%-95% of nurses would use the new knowledge in their future work, believed that their clinical nursing skills had been improved, and nurses were more confident in their work and perceived the value of their work; As the work time grow, the accumulation of clinical experience, the confidence and value of work would be more fully reflected and more people would recognize their value; 80% of the nurses said they will make new plans for their career and hope to become expert nursing talents. These data illustrated that nurses have established a positive attitude toward work, which is beneficial to the continuous improvement of nursing behavior. Based on nurses' positive attitudes, the questionnaires on theoretical knowledge, attitudes, and clinical nursing behaviors of pressure

injury showed significant improvements after the platform was run.

In summary, this study used KABP theory as the guiding ideology to build a pressure injury nursing linkage platform with mobile learning as the main focus, offline instruction as the supplement, and sharing of high-quality resources within the hospital in the context of our hospital medical consortium, and trained clinical nurses in community health service centers of medical consortium members, which achieved the expected results and improved community nurses' knowledge of stress injury. The training model is operable, has the possibility of continuous operation, saves time and energy, and is efficient, which is in line with the national policy of radiating high-quality resources to the grassroots, and is worth promoting and learning from.

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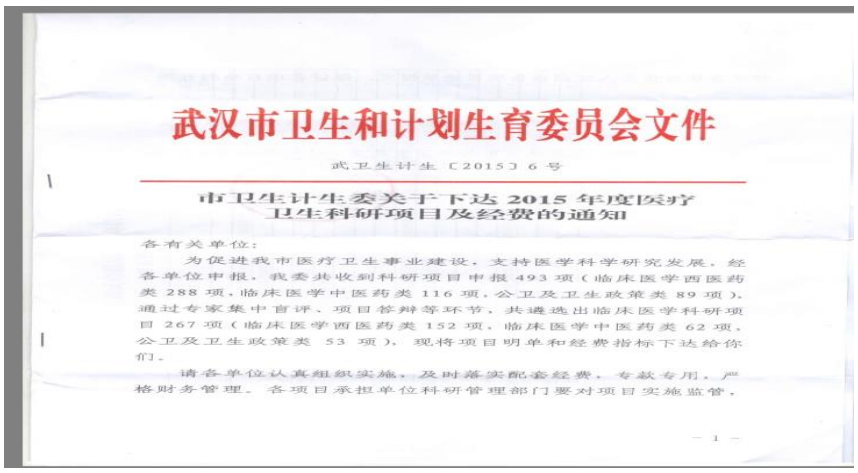

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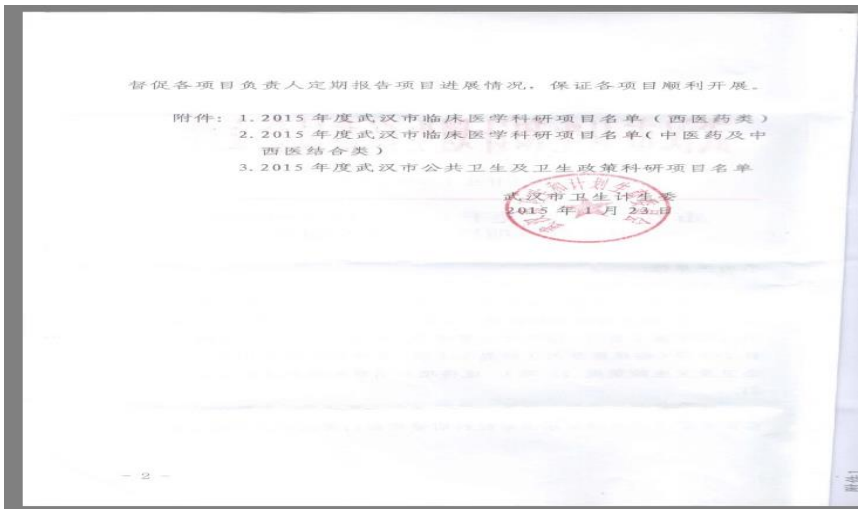
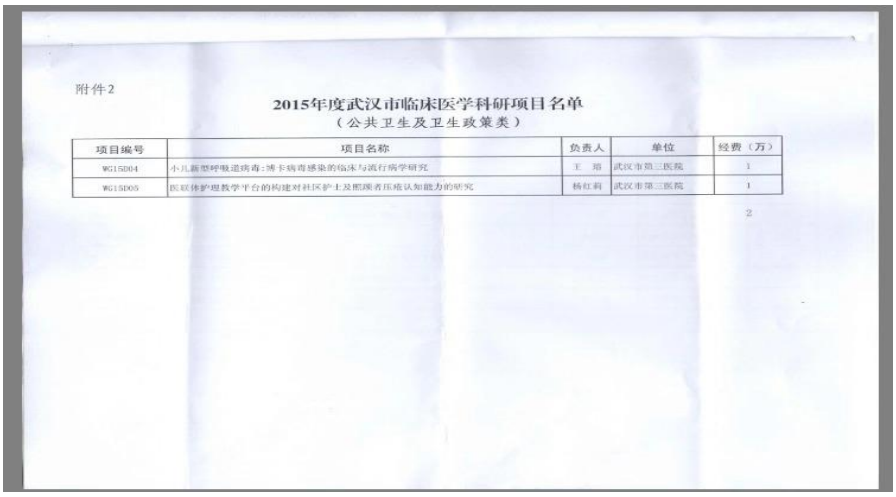


督促各项目负责人定期报告项目进展情况，保证各项目顺利开展。

附件：1. 2015年度武汉市临床医学科研项目名单（西医药类）
2. 2015年度武汉市临床医学科研项目名单（中医药及中西医结合类）
3. 2015年度武汉市公共卫生及卫生政策科研项目名单

武汉市卫生计生委
2015年1月23日



附件2

2015年度武汉市临床医学科研项目名单
（公共卫生及卫生政策类）

项目编号	项目名称	负责人	单位	经费（万）
WG15D04	小儿新型呼吸道病毒：博卡病毒感染的临床与流行病学研究	王 浩	武汉市第三医院	1
WG15D05	医联体护理教学平台的构建对社区护士及肥胖者压疮认知能力的研究	杨红科	武汉市第三医院	1

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Medical and Health Research Project of Wuhan Municipal Health and Family Planning Commission, Project name: Study on the construction of nursing teaching platform of medical association on community nurses' pressure sore cognitive ability, Project number: WG15D05, Project date: January 23, 2015, allocated funds: 10,000 Yuan