Optimum Information System Adoption for Improving Lower Limb Function after Artificial Joint Surgery

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Abstract

This paper measures the optimum information system adoption for improving lower limb function after artificial joint surgery. Experimental investigation carried out with 82 participants who visited orthopedic surgery of a general hospital located in C area from February 6 to April 21, 2017. The results of this study are as follows. Firstly, pain of lower limb function in experimental groups that have suffered from insomnia significantly decreased after applying the information system(t=3.17, p=.000). Secondly, for the improvement of lower limb function after artificial joint surgery, it was significantly much higher after applying of information system in the experimental group compared to the control group after time elapsed of 50 days (p<.05). These positive results will play an important role in the establishment of future medical system and data that provides invaluable insights in the effect of the information system.

Keywords : Artificial joint, Function, Information system, Low limb, Surgery

1. Introduction

Arthritis is caused by inflammation of the joints for several reasons. Typical symptom in join is pain[1],[2]. However pain can not be called arthritis unless it is swollen or accompanied by a sense of heat. The surgery method of degenerative arthritis is artificial joint surgery. The number of arthritis patients is increasing due to an increase in the number of elderly people in Korea[3],[4]. lf the cartilage is worn out, it requires knee replacement. If the complications of artificial joint surgery occur, it could have a fatal thing on the effects of artificial surgery[5],[6].

Thus, this paper measures the effectiveness of the information system adoption on the improvement of lower limb function after artificial joint surgery.

2. Materials and Methods

2.1 Establishment of Information System

The information system in patients after artificial joint surgery is as follows. At the first stage [1]in the information system is to build the necessity of a new system on the improvement of lower limb function after artificial joint surgery. At the secondary stage, it obtains derived data. At the third step, the method in the phase of modeling is to analyze data. At the fourth method in the phase of modeling, the data that is provided in the

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mediation information system presents the assessment as the effect of results. The fifth step is applied to medical care.in Figure 1.

2.2 Materials

The survey was conducted with 82 participants who visited orthopedic surgery of a general hospital located in C area from February 6 to April 21, 2017. The experimental groups are 41 members, comparative groups are 41. After researchers explained the paper contents in detail, participants were asked to complete the questionnaire directly. After applying the information system, the lower limb function was measured over time : 10, 30, 50 and 70 days.

2.3 Study methods

The pairwise t-test was taken to compare lower limb state before and after the application of mediation after artificial joint surgery. The collected data was examined the mean of lower limb state after artificial joint surgery by using SPSS 22.0.
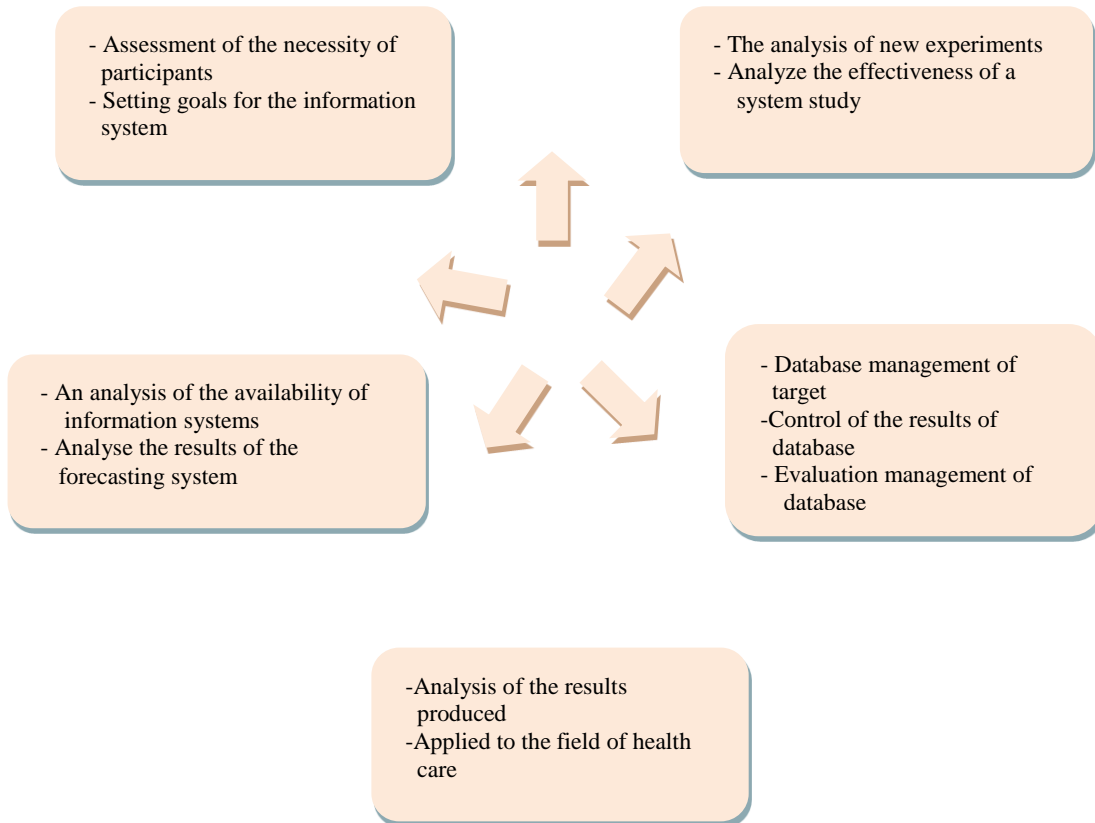

Figure 1. Development of the Information System for Improving Lower Limb Function

3. Results

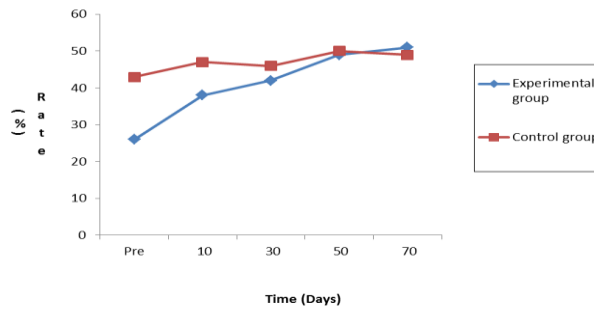### 3.1 Health Activities After Applying Information System

Table 1 shows the health activities before and after applying information system. The result verified the significance of lower limb function after applying the information compared to prior application of information system. Pain of lower limb function in subjects who have suffered from insomnia significantly decreased after applying the information system(t=3.17, p=.000).

**Table 1. Health Activities After Applying Information System**

Items	Before Mean±S.D	After Mean±S.D	t	P
Health activities				
Jogging	19.15±2.64	31.52±1.47	-3.64	.000
Eating garlic	28.73±0.69	36.14±0.83	-1.59	.136
Sun surfing	31.48±0.57	39.52±1.61	-4.82	.594
Egg intake	29.26±1.93	38.45±3.15	-0.51	.037
Stretching	23.64±0.35	35.31±1.46	-5.39	.000
Foot massage	17.62±4.28	31.67±0.38	-3.41	.000
Finger compression	20.37±1.56	39.15±4.29	-4.54	.000
Knee bending	23.08±3.29	28.73±0.36	-2.87	.152
Physical state				
Blood pressure	22.86±4.51	19.52±4.18	0.48	.795
Insomnia	24.14±0.76	13.47±1.95	3.17	.000
Depression	21.72±1.38	17.81±3.64	1.95	.045
Numbness in leg	23.50±3.45	19.63±0.72	5.16	.068
Leg pain	24.96±1.70	15.98±1.46	3.59	.000

3.2 State of Lower Limb Function and Health Activities Over Time

Figure 2 shows the state of lower limb function and health activities over time. For the improvement of lower limb function after artificial joint surgery, it was significantly much higher after applying of information system in the experimental group compared to the control group after time elapsed of 50 days(p<.05). However, for health activities, it significantly decreased after time elapsed of 50 days(p<.05).

A. Lower limb function
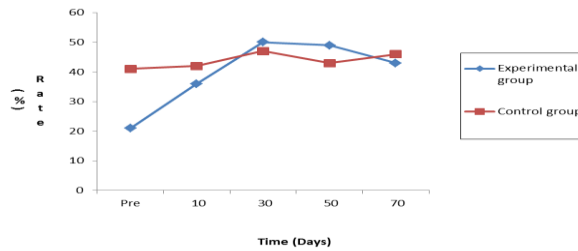
B. Health activities

Figure 2. State of Lower Limb Function and Health Activities Over Time

4. Discussion

This paper measures the effectiveness of the information system adoption for improving lower limb function after artificial joint surgery. This paper conducted the following experiment to examine change of lower limb function on empirical intervention to patients after artificial joint surgery. Lower limb function was measured by health activities and physical factors on comparative analysis of leg state after applying information system.

As a result, insomnia was significantly decreased after applying information system in respondents compared with before applying information system. In addition, the results showed that the information model was a significant effect in reducing leg pain and in increasing the satisfaction of daily life in the experimental group. The finding was consistent with the results of earlier researches[7],[8]. This finding suggests that it has to perform an information system in organ program rather than a short program. Moreover, constant intervention studies should be established in order to prove results of this study.

The present research showed that the practice rate of health activities by applying information system was increased from 24.5% to 36.1% by applying information system, which is similar to data reported in the previous studies[9],[10]. These positive results will play an important role in the establishment of future medical system and data that provides invaluable insights in the effect of the information system.

5. Conclusion

This paper measures the optimum information system adoption for improving lower limb function after artificial joint surgery.

The results of this study are as follows. Firstly, pain of lower limb function in experimental groups that have suffered from insomnia significantly decreased after applying the information system(t=3.17, p=.000). Secondly, for the improvement of lower limb function after artificial joint surgery, it was significantly much higher after applying of information system in the experimental group compared to the control group after time elapsed of 50 days (p<.05). Thirdly, for the improvement of lower limb function after artificial joint surgery, it was significantly much higher after applying of information system in the experimental group compared to the control group after time elapsed of 50 days(p<.05). However, for health activities, it significantly decreased after time elapsed of 50 days(p<.05).

These positive results will play an important role in the establishment of future medical system and data that provides invaluable insights in the effect of the information system.

References

[1] C. L. Fischer, C. W. Gill, M. G. Forrester and R. Nakamura, Quantitation of Acute Phase Proteins Postoperatively Value in Detection and Monitoring of Complications, Am J Clin Pathol. 66, 817, 823 **(2013).**

[2] C. S. Estes, C. P. Beauchamp, H. D. Clarke and M. J. Spangehl, A Two Stage Retention Debridement Protocol for Acute Periprosthetic Joint lnfections. Clin Orthop Relat Res. 468, pp. 2020- 2022 **(2010).**

[3] F. Y. Chiu and C. M. Chen. Surgical Debridement and Parenteral Anti-biotics in lnfected Revision Total Knee Arthroplasty. Clin Orthop Relat Res. 461,132, 134 **(2007).**

[4] C. Dupont, J. Rodenbach and E. Flachaire. The Value of C-reactive Protein for Postoperative Monitoring of Lower Limb Arthroplasty. Ann Readapt Med Phys. 51, 336, 3338 **(2008).**

[5] K. H. Koo, J. W. Yang, S. H. Cho, H. R. Song, H. B. Park and Y. C. Ha, Impregnation of Vancomycin, Gentamicin, and Cefotaxime in A Cement Spacer for Two Stage Cementless Reconstruction in lnfected Total Hip Arthroplasty, J Arthroplasty, 16, 875, 877 **(2001).**

[6] Y. S. Suh, H. S. Choi, J. H. Nho, S. H. Won, J. W. Choi, K. E. Piper, M. J. Jacobson, R. H. Cofield, T. W. Sperling, J. Sanchez-Sotelo, and D. R. Osmon, Microbiologic Diagnosis of Prosthetic Shoulder lnfection by Use of lmplant Sonication, J Clin Microbiol. 47, 1871, 1873 **(2009).**

[7] F. Vilchez, J. C. Martinez-Pastor, S. Garcia-Ramiro, G. Bori1, F. Macule, and J. Sierra J, Outcome and Predictors of Treatment Failure in Early Post-surgical Prosthetic Joint lnfections Due to Staphylococcus Aureus Treated with Debridement, Clin Microbiol Infect, 17, 430, 433 **(2011).**

[8] A. Enquobahrie, D. Gobbi, W. T. Matthew, P. Cheng, Z. Yaniv. Frank L. and K. Cleary, Designing Tracking Software for Image-guided Surgery Applications: lGSTK Experience, International Journal of Computer Assisted Radiology and Surgery, 3, 5, 395, 401 **(2008).**

[9] R. Seemann, F. Bruckner, M. Figure l, A. Wagner, K. Schichl, and W. Elmenreich, Applying A Real-time Interface to An Optical Tracking System, In Proceedings of the Workshop on Augmented Reality in Computer Aided Surgery, 87 **(2003).**

[10] T. Jon, Dane W. Aron M. Michael A. Peshlin, C. Kenzle and D. Stulberg, Registration and Immobilization in Robot-Assisted Surgery, International Symposium on Medical Robotics and Computer Assisted Surgery, 80, 87 **(2005)**.