学位論文題目　　　Seamless Acquisition System of ID Information and Evaluation Method of the
　　　　　　　　　Performance for Surgical Instruments

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　　　The occurrence of medical malpractice is a problem all over the world, and the hospital is required to prevent it. The WHO guideline is referring to medical malpractice related to surgical instruments. Hospitals have performed attempts for the purpose of prevention of infection and the retained surgical items. However, it is difficult to operate a manual individual management of surgical instruments. In order to prevent the retained surgical items and infection, quality assurance and proper management of surgical instruments is required. Therefore, this study realized the traceability of surgical instruments. The number of surgical instruments was counted accurately, and the usage count of the surgical instruments was recorded. In addition, I have tried a quantitative evaluation of the work done by medical staff. This study tried to solve problems of surgical instruments management.

　　　To manage the surgical instruments for individual management, a RFID tag and tagged surgical instruments were developed. To adopt the RFID tag in the medical field, this study checked the following; that it be mounted in the tag does not inhibit surgical instrument manipulation by doctor, the tag and the attachment portion can withstand high temperatures and moisture, by washing that it can reduce the risk of contamination. As a result of the resistance test, RFID tags and surgical instruments with it were not defective. As a measurement result of the residual amount of protein of the RFID tag mounting portion, the amount met the reference value. The RFID-tagged surgical instruments developed in this study, and that using in medical institutions was efficient was suggested.

　　　To support the number count of the surgical instruments in the central supply department, our antenna unit of the reader/writer and the software recorded the information of the RFID tags with surgical instruments. To verify the effectiveness of our system in the medical field, this study was evaluated by a surgical tray assemblies. The verification was performed using the system at first trial, and the current methods and our management systems were compared. Time of the two methods were almost the same. During the process, our system had detected a mistake counting of surgical instruments that a subject had caused. That is the system support to safety count instruments. Further, in the present study, long-term test over 27 months was conducted. The system was evaluated by the learning curve. Mistake in total 94 times assemblies did not occur, and the present system was capable of performing a safe assemblies.

　　　For performing the number count of instruments during surgery, a system for operating room had been developed. New antenna unit of the reader / writer was developed, RFID tags that were placed in many directions were recognized. Multiple small antennas were combined, and had released

a magnetic flux in multiple directions. By the method of overlapping the small antenna in the horizontal direction, the structure was flat without irregularities, like traditional instruments stand.

To visualize the performance of medical staff, the information that had been automatically acquired by the RFID tag system was analyzed by the stochastic process. State transition model was obtained about the tray assembling of surgical instruments, and it had enabled the quantitative evaluation of the work. Medical staff did not require a viewer for the recording, and the system could evaluate information of real-time operation and routine work.

From the above findings, the system developed in this study revealed to be applicable in clinical environment.