

## **Optimized patient care-flow management-A process mining approach**

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### **Abstract**

All participants in the healthcare service have to face many difficulties due to the complexity of the healthcare processes and the lack of the resource especially in developing countries. Therefore optimization of patient healthcare processes (care-flow) is vital to provide better healthcare facilities. In this research we exercise a processes mining approach to a real world case in Sri-Jayawardhanapura Hospital. The main objective of this research is analyzing three different concerns of patient care-flows namely identifying frequently used care-flow, identifying bottlenecks and identifying delays of the care-flow. The research was carried out using the design science research methodology which encompasses seven guidelines.

The objective of using process mining is to discover, monitor and improve the business processes by extracting knowledge from event logs. As the first step of the research method we collect the events logs which contain lab investigations and treatment processes of cardiology unit in Sri-Jayawardhanapura hospital. The sample of data contains about 42 treated patients between 2015 June to 2015 September period. Using academic version of DISCO software which provides integrated functionality for filtering and loading of event logs, the data was preprocess and analyzed.

Identification of frequently used care-flow, bottlenecks and delays are the main findings of this research. The identified frequently used care-flow contains several laboratory investigations such as *Hematology* tests, *Serology* tests and *Cardiothoracic Surgeries* from the admission to discharge of a patient. By this analysis we identified two bottleneck points on cardiology treatment process. This output can be used for many business decisions in the hospital with different perspectives. As the limited space of the paper, the results which are visualized in pictures are not presented.

As a control experiment we considered a case of gynecologic oncology patients care process in AMC hospital in Netherland. Using a sample of records of gynecological oncology patients treated during 2005

and 2006 which contains all diagnostic and treatment activities, they analyzed the healthcare process from three different perspectives: (1) the control flow perspective, (2) the organizational perspective and (3) the performance perspective. Even though performance perspective on healthcare process was one concern of them, the researchers didn't discover the bottlenecks, delays and overflow processes. In our research we analyzed those aspects.

Our research focuses on the applicability of process mining in the healthcare domain using DISCO software. The main outcomes of this research are derivation of frequently used care-flows, and delays and bottlenecks. The output can be used to generate new business rules and also policy makers can use the results to enhance the services in the hospital. As a future work this research can be extended to social perspective of the selected community.

**Keywords:** Process mining, Care-flow management, DISCO software