

# Supporting the Home Hospitalization Service through Process Mining\*

Roberto Aringhieri<sup>1</sup>, Guido Boella<sup>1</sup>, Enrico Brunetti<sup>1,2</sup>, Luigi Di Caro<sup>1</sup>,  
Chiara Di Francescomarino<sup>3</sup>, Mauro Dragoni<sup>3</sup>, Roger Ferrod<sup>1</sup>,  
Chiara Ghidini<sup>3</sup>, Alberto Guastalla<sup>1</sup>, Renata Marinello<sup>2</sup>,  
Massimiliano Ronzani<sup>3</sup>, and Emilio Sulis<sup>1</sup>

<sup>1</sup> University of Turin, Torino, Italy

{roberto.aringhieri,guido.boella,enrico.brunetti,  
luigi.dicaro,roger.ferrod,alberto.guastalla,emilio.sulis}@unito.it

<sup>2</sup> City of Health and Science, Torino, Italy

{ebrunetti,rmarinello}@cittadellasalute.to.it

<sup>3</sup> Fondazione Bruno Kessler, Trento, Italy

{dfmchiara,dragoni,ghidini,mronzani}@fbk.eu

**Abstract.** In this extended abstract we report about a real-life healthcare scenario, that is supporting the Home Hospitalization Service Team of an Italian hospital in making decisions about the home hospitalization of patients. We sketch the high-level idea of a solution leveraging Natural Language Processing and Process Mining for achieving the goal and report about some preliminary results, as well as about criticalities and challenges arisen so far.

**Keywords:** Healthcare processes · Predictive Process Monitoring · Natural Language Processing

## 1 Introduction

The literature related to Process Mining (PM) applied to the healthcare domain is not negligible and keeps on growing [4]. Process Mining (PM) techniques have already been leveraged for the discovery and analysis of both clinical and administrative processes in healthcare.

In this extended abstract we sketch the high-level idea of how to apply these techniques in a real-life scenario related to the Home Hospitalization Service (HHS). The HHS of the City of Health and Science (CHS) of Torino (Italy) manages, every year, about 500 admissions of patients [1] coming in most cases from the Emergency Department (ED). At the end of the treatment period, more than 80% of patients are discharged, 10.5% die during hospitalization, and about 8% is moved to hospital. The overall goal of this work is supporting the HHS team in the timely identification and notification of the patients that can be managed through the HHS, as well as in the efficient management of the HHS processes.

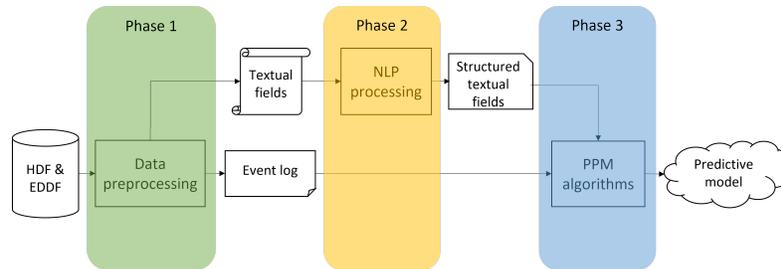
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## 2 Overall Idea and Challenges

In order to support the HHS team in making decisions on the home hospitalization of a patient, the high-level idea is applying existing approaches of Predictive Process Monitoring (PPM) [3] to the data automatically produced by the administrative and clinical management of ED patients.

Fig. 1 summarises the three steps of the pipeline. After a first phase, in which data are preprocessed, integrated and cleaned, textual data (e.g., clinical diary, diagnostic hypothesis) can be analysed through NLP techniques, so as to extract structured information from unstructured data. Finally, PPM approaches are applied to structured data (converted in an event log) and unstructured data transformed into structured ones.



**Fig. 1.** The overall pipeline

PM techniques can be used to strengthen the development of online optimization algorithms with lookahead to manage processes in real time, which is extremely important and challenging especially in hospitals [2].

From a technological viewpoint, the main challenges we have faced up to now are related to the quality of the unstructured data containing several typos and acronyms, as well as to the activity granularity. We plan (i) to leverage more advanced techniques that take into account contextual information and other medical texts in Italian to solve the issues related to unstructured data; and (ii) to use NLP and semantic knowledge to identify the right level of abstraction for activities.

## References

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