Towards EDM Framework for Personalization of Information Services in RPM Systems

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Abstract. Remote Patient Management Systems (RPM), besides monitoring the health conditions of patients, provide them with different information services that currently are predefined and follow a one-size-fits-all paradigm to a large extent. In this work we focus on the problem of knowledge discovery and patient modeling by mining educational data, motivational and instructional feedback provided to patients within RPM system.

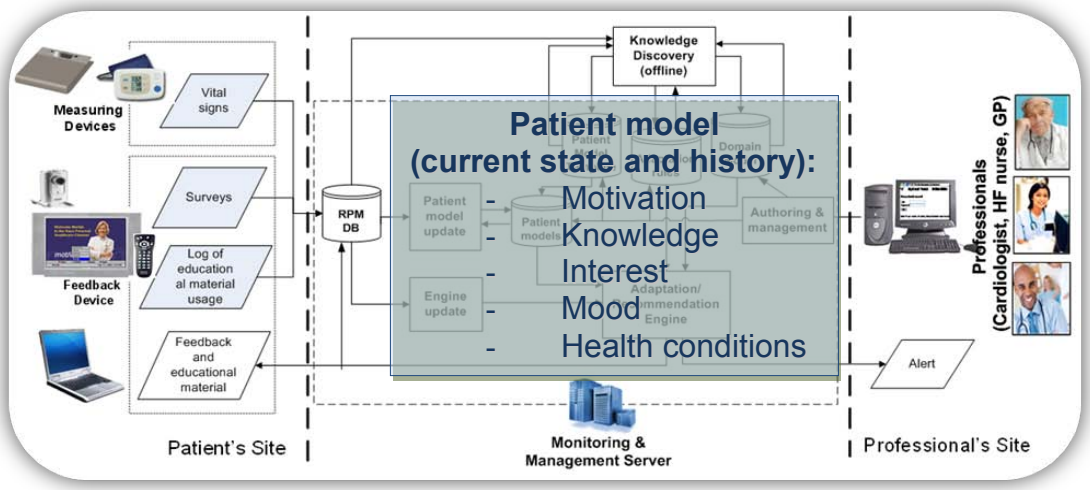
1 Introduction

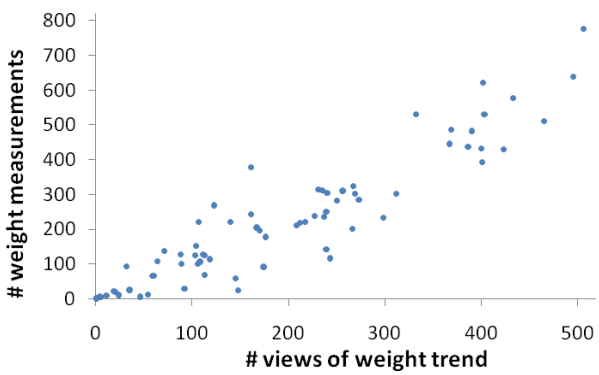
Chronic diseases are the leading cause of death and healthcare costs in the developed countries. Healthcare systems are undergoing a paradigm shift from patient care in the hospital to the patient care at home [2]. It is believed that RPM systems, by providing adequate patient monitoring, instruction, education and motivation can facilitate normalization of the patients' conditions and prevent re-hospitalization. Recently, a possible architecture of the next generation personalized RPM systems was introduced, and a general process of knowledge discovery from RPM data, leading to identification of potentially useful features and patterns for patient modeling and construction of adaptation rules, was considered [1].

In this work we focus on the design of an EDM framework aimed at facilitating the adaptation and personalization of information services by discovering actionable patterns from educational material usage data as well as motivational and instructional feedback, and linking those with the conditions and quality of life of the home-monitored patients. We sketch a conceptual framework how EDM in RPM can be implemented and provide motivating examples based on our preliminary study of one real RPM dataset.

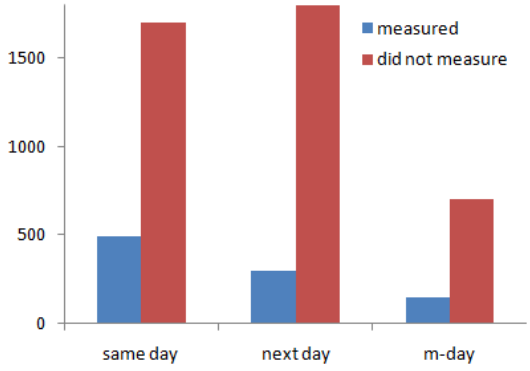
2 EDM for Personalization in RPM: First Steps and Further Work

Figure 1 (top) gives an insight how EDM technology can become an integral part of RPM systems. The output of knowledge discovery process will be utilized for patient modeling and providing input for the adaptation engine. One type of practically relevant questions related to patient modeling and adaptation includes e.g. "*what kinds of patients are likely to weigh themselves regularly if they review their weight charts*"; "*what is the relationship between the patients reviewing the charts and watching educational videos or reading motivational messages*", "*do the patients (or what kind) restart weighting after receiving a message that they forgot to do so*". Two examples drawn from the real RPM dataset, collected during a clinical trial, are shown at the bottom of Figure 1.





"Is the patient who reviews his weight charts also more likely to weight himself regularly?"



"Do the patients restart weighting after receiving a message that they forgot to weight?"

Figure 1. The role of EDM in RPM (top) and motivating examples (bottom)

The preliminary results of our exploration study suggest that there is potential for EDM to facilitate data-driven patient modeling and motivate the shift from the one-size-fits-all approach currently employed in the development of RPM systems to personalization in providing educational materials, motivational support and informational content to their users. Our further work includes the many-sided analysis of the RPM usage database with the focus on the educational content and usage data. The particular focuses include subgroup discovery and identification of signatures describing well-doing home-monitored patients and those who require more assistance of the medical staff.

Acknowledgments. This research is partly supported by KWR MIP, FP7 EU HeartCycle and NWO GAF projects.

References

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