Microbiological and Virological Knowledge-Based Alert Service

Jakob KAINZ[a,b], Jakub GAWRYLKOWICZ[b], Robert STRASSL[c],
Birgit WILLINGER[c], Florian THALHAMMER[c], Andrea RAPPELSBERGER[c] and
Klaus-Peter ADLASSNIG[b,c,1]

[a]*University of Applied Sciences Vienna, Höchstädtplatz 6, 1200 Vienna, Austria*
[b]*Medexter Healthcare, Borschkegasse 7/5, 1090 Vienna, Austria*
[c]*Medical University of Vienna, Spitalgasse 23, 1090 Vienna, Austria*

Abstract. Hospital wards need immediate information about multi-resistant pathogens and contagious viruses in their hospitalized patients. An alert service configurable with Arden-Syntax-based alert definitions passing through an ontology service to complement results from microbiology and virology with high-level terms was implemented as proof of concept. Integration into the University Hospital Vienna's IT landscape is ongoing.

Keywords. Alert and ontology service, microbiology, virology, clinical decision support, Arden Syntax

1. Introduction

The need for automated alerting in case of multi-resistant pathogens or contagious viruses in hospitalized patients is rising [1],[2]. As an extension of Momo [3], an analysis and reporting system for microorganisms in operation at the University Hospital Vienna, Austria, a configurable alert service is being established.

2. Methods

Examination results from the hospital's microbiology and virology laboratories are sent to Momo via an XML-based structured data interface. They are incorporated into Momo's databases and ready for display and analysis. Part of Momo is an ontology for heterarchically ordered microbiological and virological concepts. A copy of selected data is further provided to the alert service, whose core consists of an ArdenSuite server [4] with Arden-Syntax-based medical logic modules (MLMs) [5]. The MLMs check for alert situations such as the presence of 3 or 4MRGN bacteria or positive PCR test results for SARS-CoV-2 and other viruses. An upstream ontology service fills in parent concepts of the received basic results to allow higher-level alert definitions in the established MLMs. Thus, the logical if-then part in the MLMs can then act on parent concepts, such as 4MRGN or VIRUS ALERT. Technically, the system is based on multiple microservices, interacting via REST calls.

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[1] Corresponding Author: Klaus-Peter Adlassnig; E-mail: klaus-peter.adlassnig@meduniwien.ac.at.

3. Results

The system's components are being developed and interconnected. Alert results are generated and pushed towards the receiving electronic health record (EHR) system of the hospital. Presently, a demo version as shown in Figure 1 is available.

Figure 1. Results of the present proof-of-concept ontology and alert service.

4. Discussion and Conclusion

The Arden-Syntax-based MLMs allow to update and extend the alert criteria, the ontology service to change and add new alert terms as well as to extend the parent concepts. Alerts will be displayed after passing a filter to avoid overalerting. The alert results will be included into the EHR's continuously running view of active patients on the ward. The final design is ongoing. After integration, a usability and performance evaluation will be carried out.

Acknowledgement

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