



Computerized Presentation of Medical Guidelines

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Abstract

Text free forms of medical guidelines are very often cumbersome and difficult to memorize. Browser that is able to display any GLIF3 model of guidelines in easy to survey manner was developed and its functionality was verified on models of hypertension and unstable angina pectoris guidelines. Browser and Electronic Health Record (EHR) can be integrated into a system that can during examination of a patient suggest next medical actions according to medical guidelines. Such system was designed and now is under development.

Keywords: GLIF, hypertension guidelines, medical guidelines

Introduction

Many clinical guidelines were elaborated to improve quality of medical care and to achieve standardization of treatment. Usually, the first version of medical guidelines is worked out by a group of medical experts in a free text. For computer implementation and processing it is necessary to have guidelines explicitly structured. A lot of modeling means were suggested for this purpose. The most important and nowadays mostly used is the GLIF (Guideline Interchange Format) model [1, 2]. It could be represented in a form of orientated graph. The nodes of the graph are guideline steps and edges represent continuation from one step to the other one. Guideline steps are an *action step*, *decision step*, *branch* and *synchronization steps* and a *patient state step*.

Methods and results

Computerized GLIF models of guidelines give possibility to present them to a user in easy to survey manner. GLIF3 format was extended to contain graphical information and then it was coded in XML language. In a language form encoded guidelines consist of a sequence of guideline steps.

In the meantime a viewer program (browser) was developed in order that any extended GLIF3 model could be visualized. The browser was a Java applet suitable for WEB presentation as well as for download and off-line use [3]. User can follow the guidelines model on the browser screen (Figure 1).

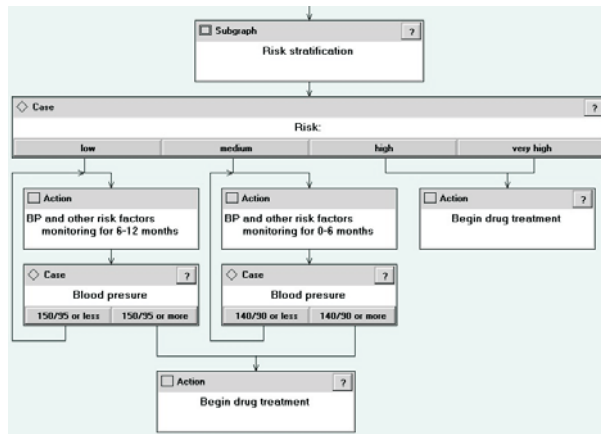


Figure 1: Screen of the guidelines model browser.

The graphical sign in the left upper corner of a step determines its kind (for example a state step etc.). By clicking on a step image one can gain detailed description of the step or one can skip to the guidelines full free text. Functionality of the browser was successfully verified on models of hypertension and unstable angina pectoris guidelines.

More sophisticated version of a browser that uses patient's data for controlled pass through the GLIF model was also developed. The browser asks user for values of GLIF3 model parameters, necessary for evaluation of conditions that determine the pass through the model. If some condition could not be evaluated, the browser stops and highlights the path from the start to the current step. Then the user can input missing data for the browser to be able to continue in visualization. First version of this GLIF browser was developed and tested on GLIF model of 2003 European Guidelines for Hypertension (Figure 3).

The developed browser can be integrated with Electronic Health Record (EHR) software to provide decision support for a physician using EHR (Figure 2).

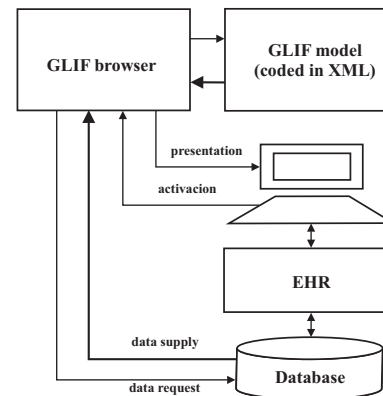


Figure 2: GLIF model integration with EHR.

Architecture of the integrated system was designed and the system is now under development. The system has a client-server architecture. On the GLIF server are stored GLIF models of different medical guidelines. Suppose that during examination of a patient the physician is working with EHR. If he needs decision support, he may choose one of the guidelines provided by the GLIF server and he can start the GLIF client. The main part of the GLIF client is the browser that goes through GLIF model graph evaluating conditions of decision steps. Values of GLIF model parameters, necessary for their evaluation, the client gains from EHR. If some condition could not be evaluated as the needed data items are not in EHR, the client stops and highlights the branch from the root to the current step.

Conclusion

The GLIF browser was designed as a general tool that could present any formalized medical guidelines in a user-friendly manner. It could be used for education of students and as a decision support system in medical practice.

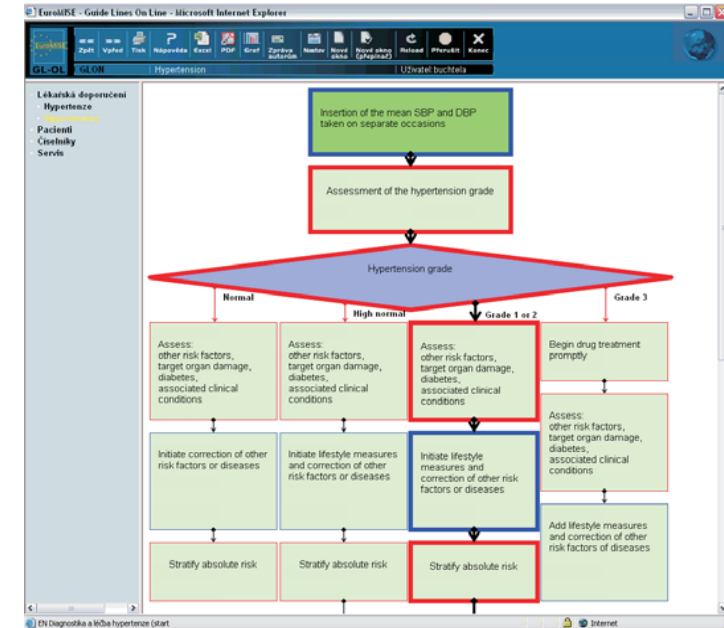


Figure 3: The new GLIF browser.

References

- [1] Ohno-Machado L., Gennari, J. H., Murphy S.,N., Jain N.,L., Tu S., W., Oliver D., et al.: The Guideline Interchange Format: A model for representing guidelines, Journal of the American Medical Informatics Association 1998, 5(4), pp. 357-372.
- [2] Peleg M., Boxwala A., A., et al.: GLIF3: The Evolution of Guideline Representation Format, In: <http://smi-web.stanford.edu/projects/intermed-web/guidelines>, 2000.
- [3] Peleška J., Anger Z., Tomecková M., Veselý A., Zvárová J.: Electronic form of the 1999 WHO/ISH Hypertension Guidelines, Thirteenth European Meeting on Hypertension, Milan, 2003.

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