

## 04. Diagnostic bacteriology & general microbiology

4b. Lab management, automation and QC

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**Background** A medical knowledge engine is a piece of software that consists of a package of well-designed, interacting rules to clinically interpret frequent as well as rare or inconsistent medical findings.

**Methods** These rules are written by experts of the respective medical domain, usually together with a medical knowledge engineer. The medical expert (pathologist and/or clinician) provides the necessary medical knowledge, if available, or needs to establish the knowledge for rare or previously unknown situations. The knowledge engineer (medical informatician) knows how to put this knowledge into a computerized, structured form, how to process it, and how to integrate it into a given health information technology landscape.

**Results** An example is the Hepaxpert knowledge engine for the automated clinically oriented interpretation of hepatitis A, B, and C serology test results. As input, Hepaxpert accepts test results for hepatitis A serology (anti-HAV, IgM anti-HAV, and HAV-RNA), for hepatitis B serology (HBsAg, anti-HBs, anti-HBc, IgM anti-HBc, HBeAg, anti-HBe, anti-HBs titre), and for hepatitis C serology (anti-HCV, HCV-RNA). For each of these parameters, input possibilities include “tested positive”, “tested negative”, “borderline”, or “not tested”. The anti-HBs titre is entered as titre value. On the basis of the designed rule packages, all possible combinations of hepatitis A, B, and C test results – even extremely rare or complex – will be interpreted. A total of 151 rules is able to interpret a total of 61,520 combinations of test results. The carefully designed, hierarchically structured rules are represented in a Health Level Seven (HL7) International standard medical knowledge representation and processing scheme called Arden Syntax. The Arden Syntax was brought into a clinical decision support technology platform, called ArdenSuite.

**Conclusions** This platform is not only able to edit and process medical rules (of any kind) but also to have the established medical knowledge engines (such as Hepaxpert) integrated in different health IT systems such as laboratory or hospital information systems, software as a service (SaaS) products, or applications in AppStores. It transfers high-quality, clinically oriented knowledge from the pathologist to the clinician.

**Keyword 1**

hepatitis serology

**Keyword 2**

decision support

**Keyword 3** automated

interpretation