

Clinical Decision Rules – Evidence or Sense Based?

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Abstract A workshop will provide framework for judgment/data analysis in assessing sensibility of the decision rules. Two different methodological approaches: multi criteria decision analysis and profiles discovery in ill-structured domains, will be presented, as well as three different applied researches in developing specific clinical decision rules. Presentations will be used to facilitate discussion on several opened questions like: Is it possible to use decision rules to deliver patient-centered care? How could we measure the usefulness of medical information? How could we measure clinical sensibility of decision rule? Among other, these questions and assessment of sensibility of the decision rule depends on judgment rather than data analysis, and should be addressed in some way.

Keywords. Decision making, Decision analysis, Decision support model

Introduction of the topic

Complexity of decision making procedures in biomedicine and health care are supported by various kinds of decision support systems. Some of them are developed specifically for that goal, while some other health care procedures could indirectly influence a lot to the decision processes. Decision support systems like guidelines are based on the experts' consensus, and mainly it is evidence based and/or based on experts' knowledge and experience. On the other hand clinical decision rules are prospectively developed and validated in a way that specific topic or problem is researched. Original research results are supposed to derive decision rules for the specific clinical, epidemiological, or other health care problem. After validation with sufficient evidence, decision rules could be applied into the routine. Methodological standards for the development of clinical decision rules are highly influencing quality of the decision rule. Questions or check-list on problem question, population and

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setting, study size, pretest probability, and type of validation could provide appropriate insight to the evidence characteristics used to derive specific decision rule. Many decision rules require complex calculations, and are difficult to memorize, so they need to be used in the form of software. Question is: do we have appropriate evidence for the task of developing decision rules, and what about the sense? Is it possible to use decision rules to deliver patient-centered care, and individualize to the needs of each patient? How could we measure the usefulness of medical information? How could we measure sensibility of decision rule to describe whether the decision rule is clinically reasonable? Moreover, is it easy to use? Does it provide a course of action? It is not likely that physicians are going to accept rule that requires intensive calculations, or rule depending on laboratory results that are not available at the moment of decision making. What kind of decision rules are going to be more likely used, rules providing some course of action or rules providing probability of outcome? These questions and assessment of sensibility of the decision rule depends on judgment rather than data analysis, and need to be addressed in some way.

Intended audience for this workshop are all interested in developing, validating, and using clinical decision rules, and especially interested in assessing the sensibility of the decision rules. Workshop is going to be organized in a way that each speaker makes specific contribution from his or hers expertise, whether from own experience in developing clinical decision rules or experience in developing methodological tools for decision rule development. Discussion will follow presentations, and the aim of the discussion is searching for an answer how to assess sensibility of the decision rules. It is expected to define framework for judgments or appropriate analyses.

1. Aim of the discussion

We are going to discuss methodological aspects of deriving clinical decision rules with the stress on the sensibility of the results.

Evidence or sense is bringing focus on data analysis or judgment.

Is it possible to use clinical decision rules to deliver patient-centered care is going to be discussed, as well as preference of course of action vs. probability of outcome as possible decision support format.

Finally, assessing usefulness of medical information and sensibility of decision rules is going to be discussed.

2. Contribution from each speaker

Zdenko Sonicki is going to make an introduction to the topic of the workshop, and present two different situations from two WHO research projects with the aim of developing clinical decision rules for predicting Streptococcal pharyngitis, and clinical decision rule for triage of children under 5 years of age with hydrocarbon (kerosene) aspiration in developing countries, where he took a part as a researcher.

From the Streptococcal pharyngitis project, reporting sore throat pain in different cultural settings as a symptom is going to be presented in the evidence/sense context. In developing clinical decision rule for triage of children under 5 years of age with hydrocarbon (kerosene) aspiration in developing countries, possible false positive and false negative results are going to be presented also in the evidence/sense context.

Tatjana Šimurina is going to present her research on developing clinical decision rules for predicting postoperative vomiting in patients undergoing general anesthesia for laparoscopic gynecological surgery, by means of multivariate data visualization based on multidimensional scaling. Problem of predictor selection based on evidence/sense is going to be presented.

Tomislav Meštrović will present his research on operative mortality prediction models in ruptured abdominal aortic aneurysms. Data mining techniques in «ensembles» for predictor identification from small samples as evidence/sense based method will be presented.

Lavoslav Čaklović is going to present his new methodological tool Potential Method. It is Multi Criteria Decision Analysis method based on graph theory. It is more flexible than other (more sophisticated) methods, and it can be applied in missing data situations and in networks with feedback as well. Goal is to develop an intelligent agent which is capable to learn in interaction with a human in the framework of medical diagnosis providing evidence/sense based approach.

Karina Gibert with her colleague Aida Valls from Itaka research group, Dep. Computer Science and Mathematics, Universitat Rovira i Virgili will present work on developing and using KLASS. KLASS is software which was originally conceived for profiles discovery in ill-structured domains (a special kind of real domains with complex structure including heterogeneous data matrices with numerical and qualitative variables). It handles knowledge management for classical or probabilized rules, hierarchical clustering and some mixtures of statistical and artificial intelligence tools to support knowledge discovery. Specific tools are oriented to support the interpretation of classes, like the visualization of the dendrogram, the Class Panel Graphs or the CCCS methodology, which finds concepts associated to final classes by taking into account the hierarchical structure of the clustering. Prediction of the risk of retinopathy in diabetic patients and cognitive rehabilitation programs design after traumatic brain injury will be used as examples.

3. Expected results

Out of 5 speakers 2 contributors are from the data science field, and are involved in developing tools for deriving decision rules. They are addressing multi criteria decision analysis and profiles discovery in ill-structured domains, what can be considered as different approaches to the same goal, searching for evidence/sense based results. Other contributors are presenting their applied researches, also challenged with evidence/sense based search for useful decision rules.

It is expected that this workshop will provide framework for judgment/data analysis in assessing sensibility of the decision rules.