Towards the Systematic Maintenance of Different Versions of Rule-Based Immunization Guideline Logic

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A major challenge in building a computer-based clinical guideline arises from the need to update and maintain the logic as the clinical field evolves over time. This problem poses particular difficulties when the guideline logic is complex and when the goal of the computer-based implementation is to react to all combinations of relevant clinical conditions in a patient-specific fashion. The problem is compounded if several versions of the logic need to be maintained in parallel for a period of time, for example, to allow different states and health organizations to switch from one version to another at any time they choose.

This paper describes an approach to the representation of rule-based guideline logic that facilitates the maintenance of several simultaneous versions of the guideline. The approach has been implemented in IMM/Serve, a rule-based guideline for childhood immunization [1]. We have used the approach to accommodate several changes to the logic, including two recent changes made by the CDC's Advisory Committee on Immunization Practices:

1. a change in the DTP vaccine series to recommend DTaP for earlier doses,
2. a change in polio vaccine series to allow IPV to be used for doses 1 and 2.

TOWARDS A SYSTEMATIC APPROACH

The paper discusses versions of the guideline and variations in the rule-based logic. Variations in the immunization logic include, for example, a *new_polio* and an *old_polio* variation, a *new_DTP* and an *old_DTP* variation, etc. Each variation affects a specific subset of the guideline logic. Any given version of the guideline is defined by the set of variations which it requires. For example, the *Oregon_97* version of the logic might be defined by the *new_polio* and *new_DTP* variations.

IMM/Serve's current approach has the following features:

1. Each version is explicitly defined by the set of variations which it contains.
2. The rules are constructed so that the logic of each variation is defined by a set of control variables which are set differently for each variation.
3. The control variables control the execution of a set of generic (variation-independent) "kernel" rules which implement the heart of that variation's part of the guideline logic.

DISCUSSION

The approach allows a small number of variation-specific "control rules" to capture the differences between variations of the logic, while the rest of the logic is shared. The approach thereby provides a natural mechanism to isolate the differences between the variations from the underlying logical structure of the guideline. We anticipate that this general approach will make it easier 1) to implement new variations of the logic, 2) to test the new variations, and 3) to disseminate the variations to immunization registries in a way that will meet their needs.

The question of how best to represent different versions of a computer-based clinical guideline is complex and will involve different issues in different domains. This paper describes an approach which appears well suited for the domain of childhood immunization. This approach, or variants of it, may well apply to guideline logic in other clinical domains as well.

References

1. Miller PL, Frawley SJ, Sayward FG, Yasnoff WA, Duncan L, Fleming D: IMM/Serve: A rule-based program for childhood immunization. Proceedings of the Annual Fall Symposium of the American Medical Informatics Association (Formerly SCAMC), Washington DC, October 1996, pp. 184-188.

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