Author's response to reviews

Title: Development of a Real-Time Clinical Decision Support System upon the Web MVC-based Architecture for Prostate Cancer Treatment

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Title
Development of a Real-Time Clinical Decision Support System upon the Web MVC-based Architecture for Prostate Cancer Treatment

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Contributions
Hsueh-Chun Lin is the corresponding author who conceived of the study, and contributed in its design, development and coordination and drafted the manuscript.
Hsi-Chin Wu participated in the clinical practice and consulted the knowledge of prostate cancer.
Tsai-Chung Li, Wen-Miin Liang and Jong-Yi Wang collaborated to collect the clinical data and perform the statistical analysis.
Chih-Hung Chang interpreted the concept of the system prototype and helped revising the manuscript. All authors read and approved the final manuscript.
Biography

Hsueh-Chun Lin is an assistant professor at the Department of Health Risk Management, School of Public Health, China Medical University. His research interest includes information system design and development, database and data mining, distributed computation and system integration.

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Tsai-Chung Li is a professor at the Institute of Biostatistics and Biostatistics Center, China Medical University. Her interest is quality of life assessment, statistics, epidemiology investigation.

Wen-Miin Liang is a professor at the Institute of Biostatistics and Institute of Environmental Health, China Medical University. Her research includes psychology assessment, public health informatics and GIS application.

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Conflict of interest statement
The authors confirm here that we do not have any conflict of interest with any of the authors’ response to the manuscript. There are no financial and personal relationships with other people or organizations that could inappropriately influence (bias) the work.

Summary Points
What were the problems to be solved in this topic?
1. Clinicians used to taking several hours, even many days, to study patients’ clinical records (PCRs) but having only a few minutes to explain disease conditions.
2. Patients had difficulties to understand their health conditions since clinicians could only explain the disease by text descriptions.
3. Clinical decision support systems with electronic progress usually work during the cure cycle but lack of online computation functionality in clinics.
4. Many commercial utilities provide computation tools but are not available to join
with real-time analysis for the existing hospital information system (HIS) unless the required modules are reusable or extractable.

What were the methods to be applied for the scopes?

We propose a real-time clinical decision support system (RTCDSS) with Web services interface upon the model-view-controller (MVC) design to reach the scopes.

- **Methods**
  1. Online analytical process (OLAP) upon MVC-based Architecture
  2. Management of distributed database
- **Scopes**
  1. Instantaneous disease evaluation
  2. Risk analysis
  3. Treatment guidance

What were the factors to be considered for the system development?

We considered following clinical data and pretreatment parameters for the system development.

- **System Requirements for Decision Support**
  1. PSA level
  2. TNM stage
- **Evaluation Criteria of Expert Opinions**
  1. Gleason grade and Partin table
  2. Risk evaluation criteria
- **Framework Integration with Clinical Data**
  1. Open Source Framework
  2. Heterogeneous Data Integration

What were the functions developed to solve the problems?

- Development results: solve problem (4)
  A. Disease evaluation of the PSA level
  B. Risk analysis with Partin tables
  C. Interactive treatment guidance
- Practice discussions: solve problem (1), (2), (3)
  A. Online informatics for clinicians
  B. Quality of treatment by system execution
  C. Improvement on clinician-patients relationships
What was this study concluded to our knowledge?

1. Clinicians can clearly explain health conditions to patients by visualized clinical markers and pretreatment parameters.

2. Patients were more easily convinced by evidence-based diagrams with risk evaluation before accepting the treatments and the treatment quality was approved.

3. The design presents the clinician-oriented interface with evidence-based diagrams for online disease evaluation and risk analysis while the interactive guidelines with treatment suggestions offering the efficient online tools for real-time decision making.

4. The proposed framework was applied for prostate cancer clinics and was constructed upon the MVC-based architecture that consists of expandable models for flexibly adaptive with the existing HIS.