Knowledge Engineering for Decision Support in Osteoporosis

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Organization: University of Utah
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Target Population: Osteoporosis, Veterans

Summary: There are many factors that influence how and if chronic diseases such as osteoporosis are identified and treated. They include process barriers, such as workflow and organization, and information and cognitive barriers, such as the saliency of the problem and suboptimal organization of information relevant to the treatment decision. Specific cognitive barriers to identifying and treating osteoporosis include failure to identify that a patient is at high risk for a fragility fracture, not knowing what level of risk justifies treatment, and uncertainty about when to initiate treatment. This is one of the reasons why, despite the high burden of osteoporosis, fewer than 25 percent of veterans who are at risk for fracture are currently treated for osteoporosis.

While computerized clinical decision support has the potential to improve appropriate treatment rates by identifying patients at risk, such systems are often poorly developed and may not reflect physicians' models for conducting clinical tasks or preferences for structuring tasks and navigating systems, thus reducing the system's optimal impact.

The overall goal of this project is to develop robust knowledge for supporting accurate osteoporosis-related treatment decisions that addresses these information barriers. Specifically, the investigators will use electronic and survey data to create a new risk-stratification rule. This rule will adapt a currently accepted risk-stratification rule and the World Health Organization's treatment guidelines to the veteran population, identify information constructs that are important to clinicians for supporting the correct treatment decision, and use the findings to develop and pilot test a new tool.

While this project is focused on a specific clinical topic and setting, its approach to providing decision support at the point of care by integrating treatment guidelines, characteristics of the target population, and information needs of clinicians can serve as template for decision support for other disease conditions.

Specific Aims:

- Create and validate a Veterans' Affairs (VA)-specific risk-stratification rule for fragility fractures. **(Ongoing)**
- Incorporate the risk-stratification rule into a computerized decision support system for osteoporosis treatment. **(Ongoing)**
- Pilot the decision support tool for initiating osteoporosis treatment. **(Upcoming)**

In addition to the research project goals, Dr. LaFleur will further her long-term career goal of identifying

and preventing drug-therapy failures in chronic disease populations. Funding from this Mentored Clinical Scientist Research Career Development Award will allow Dr. LaFleur to advance her skills in health services research through structured coursework, regular seminars, and mentoring in the fields of clinical informatics, decision modeling, epidemiologic methods, and statistical approaches.

2010 Activities: 2010 activities focused on developing the risk stratification rule to be used with VA coded data. Dr. LaFleur and her team identified a cohort of 2.9 million veterans and completed a significant amount of the programming and analysis to develop the risk stratification models. This included developing a dataset that combines variables related to fracture risk from three VA datasets: the Medical SAS Dataset (all inpatient and outpatient services provided to veterans), the Corporate Data Warehouse (clinical patient care information from VistA), and the Pharmacy Benefits Management Dataset (records of prescriptions dispensed to veterans to identify drug exposures related to risk). The model incorporates outcome data from the Medical SAS dataset for fractures that were treated within the VA system and outcome data from the Medicare-VA dataset to capture fractures that were treated outside the VA system. The team developed and submitted their request for the Medicare data and are awaiting approval.

One change from the original grant proposal was the addition into the rule of bone mineral density screening. While bone mineral density screenings are predictive of fracture risk, they are not codified anywhere in the electronic data. However, Dr. LaFleur and her team used natural language processing software to integrate these screenings into the model as a variable.

Work began on incorporating the risk-stratification rule into a computerized decision support system with the development of case vignettes to identify risk factors and fracture risk constructs that are associated with osteoporosis treatment. In addition, and as part of her career goal for the Mentored Clinical Scientist Research Career Development Award, Dr. LaFleur completed the first year of courses towards her 3-year informatics certificate.

Preliminary Impact and Findings: There are no preliminary findings.

Strategic Goal: Develop and disseminate health IT evidence and evidence-based tools to improve health care decisionmaking through the use of integrated data and knowledge management.

Business Goal: Knowledge Creation