A CPG-Based Ontology Driven Clinical Decision Support System for Breast Cancer Follow-up

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Abstract:

Breast cancer is the most common cancer among women in Canada. Due to recent advancements in treatment and diagnosis, more women are surviving breast cancer then ever before and breast cancer survivors are the most prevalent female cancer survivor group in Nova Scotia. As a consequence, the delivery of long-term follow-up care, which has traditionally been provided at the specialized cancer clinics, places a strain on specialist resources. However, there is evidence that family physician follow-up of women with breast cancer who are in remission is a safe and viable alternative to follow-up in the cancer centers. Therefore, there is an incentive to the transfer of breast cancer follow-up care to family physicians after primary treatment is completed by specialists. Notwithstanding, the benefits of such a transfer of services from the tertiary to the primary care centers the main issue is the transfer of specialized breast cancer follow-up care knowledge to family physicians expertise. In this regard, as a first step, Cancer Care Nova Scotia has developed a Breast cancer follow-up clinical practice guideline for use by the family physicians. Yet, the adoption of the said CPG is a challenge in the clinical setting.

We have developed a Clinical Practice Guideline (CPG) based interactive decision support system for the family practice setting to guide family physicians conducting breast cancer follow-ups. The idea is to computerize the breast cancer CPG and then operationalize it using patient data to assist the practitioner to make CPG mediated decisions, recommendations and referrals. In order to achieve the above functionality we have seamlessly integrated the CPG with patient data through electronic interface for collecting patient information. The implementation of the system is achieved in three main steps. In the first step we have converted the breast cancer follow-up CPC in electronic format using the Guideline Element Model (GEM). In the second step we use the logic in the conditional statements of the CPG, to develop a domain ontology using Protégé. Finally in the third step the guideline is executed using the execution engine developed in Health Informatics Laboratory at Dalhousie University. The rule authoring and execution modules of the execution engine is used to develop IF and THEN forward rules with a list of decision variables followed by IF part and list of action variables followed by THEN part of the rule and executing them using the patient specific data.

The next steps are the deployment of the clinical decision support system within two clinics in Nova Scotia, followed by an evaluation study to measure the efficacy of the CDSS in terms of providing point-of-care support to family physicians conducting breast cancer follow-up.

Keywords: Breast cancer follow-up, clinical practice guideline, domain ontology, Guideline Element Model, clinical decision support system.