Abstract—The authors developed a support system for finding hypotheses about clinical knowledge from medical records. The support system has a retrieval function using medical records and uses coverage-oriented views displaying search results. The coverage-oriented views are snippets, graphs, and tag clouds. In addition, users can narrow the search results utilizing keywords, ranges of values, and labels of codes, corresponding to snippets, graphs, and tag clouds, respectively. The coverage-oriented views and the narrowing methods utilizing the views make the retrieval system interactive. We predicted that users could find hypotheses by grasping features of search results using coverage-oriented views based on interactive retrieval. We evaluated the developed system and received positive responses from medical staff.

I. INTRODUCTION

Clinical knowledge is expected to be extracted from accumulated medical records in order that higher quality medical care can be provided based on the clinical knowledge. In this study, clinical knowledge is defined as the universal relationship between subjective data and objective data of patients, diagnoses and medical practices for patients. Namely, we treat universal relationships in medical records as clinical knowledge.

Generally, in order to obtain knowledge from large and variant information, we limit the amount of data to information having specific characters and conditions. When the information is narrowed, we can easily find trends of narrowed information so that we would generate hypotheses based on the trends. Narrowing information is realized by using a retrieval system. Moreover, we can easily grasp the trends by using coverage-oriented views.

II. OBJECTIVES

In this study, the authors develop and evaluate a hypotheses-generating support system using medical records for clinical knowledge acquisition. The system displays targeted medical records in whole or in part using coverage-oriented views. These coverage-oriented views include queries that users can use to narrow the selection of medical records. Namely, the coverage-oriented views including queries realize interactive retrieval between the system and users. The interactive retrieval helps users to choose query and to generate hypotheses that may lead to clinical knowledge.

III. MATERIALS AND METHODS

Kinds of medical information we treated were discharge summaries, information of blood tests, disease names, and medical practice information, which includes information of operations and prescription. We selected the information because almost all cases of hospitalization were related to the information.

The system used coverage-oriented views showing targeted medical records, in whole or in part. We selected appropriate methods to provide coverage-oriented views of natural language data, numerical data, and coded data, making use of snippets, graphs, and tag clouds, respectively. Yamamoto et al. used tag clouds to support users’ decision of choosing keywords which are utilized to rerank search results [1]. In addition, users could narrow the search results utilizing keywords, ranges of values, and labels of codes, respectively.

The coverage-oriented views and the narrowing methods utilizing the views made the retrieval system interactive. We predicted that users could find hypotheses by grasping features of targeted cases using coverage-oriented views based on interactive retrieval. We evaluated the developed system in terms of its potential for helping users find hypotheses about clinical knowledge.

IV. RESULTS

The results of the evaluation of displaying information holistically suggested that the coverage-oriented views promote intuitive understanding, were inherently interesting, and made the viewer want to look at the medical records. Regarding interactive searching, the evaluation suggested that the comprehensive display of medical records helped in the selection of new queries and supports searching. Therefore it was presumed that repeated interactive searching was effective for discovering hypotheses that led to clinical knowledge. In addition, the system appeared suitable for simply viewing medical records without a particular purpose.

REFERENCES