

# Chapter 1.17

## Better Knowledge for Better Health Services: Discovering Guideline Compliance

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### ABSTRACT

The expenses in Health Care are an important portion of the overall expenses of every country, so it is very important to determine if the given cares are the right ones. This work is about a methodology, Health Discoverer, and a consequent software, aimed to disease management and to the measure of appropriateness of cares, and in particular is about the data mining techniques used to verify Clinical Practice Guidelines (CPGs) compliance and the discovery of new, better guidelines. The work is based on Quality Records, episode parsing using Ontologies and Hidden Markov Models.

### INTRODUCTION

The importance of health and social services is constantly increasing as global societies grow older

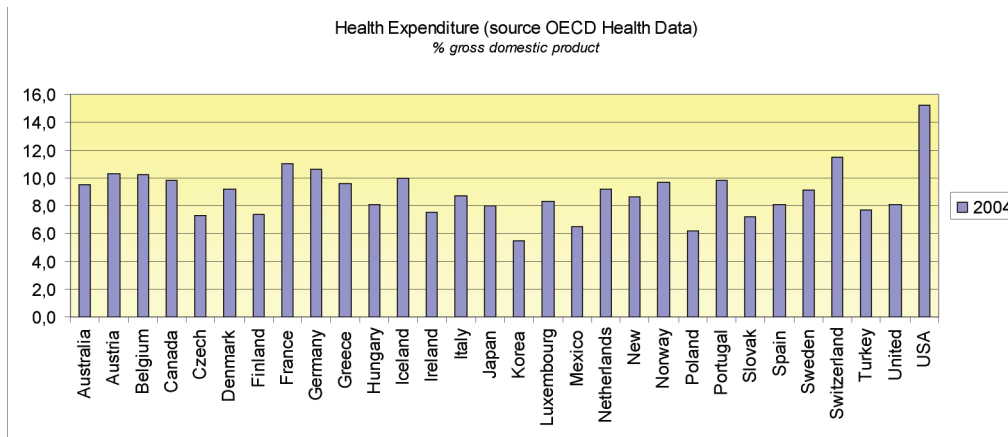
and the awareness of a proper care is spreading between citizens. Central point of this issue is the increasing cost of maintaining such health and social care systems. As reported by OECD (OECD Health Data 2007), the GDP (Gross Domestic Product) used in the health care varies from 5.5% (Korea) up to 15.5% (USA), in Italy we score a 8.7%. This research used the last complete data, on year 2004. In 2005, 2006 and 2007 this research assisted to a substantial growth, in Italy it expect a raise from 8.7% up to 9%.

The research's purpose was to reach the definition of a valid and applicable method for inappropriateness reduction in medical praxis. Being sanitary economy a relatively young science, authors were sure that the quest wouldn't be easy and, being the *inappropriateness* recognized as one of the main resource waste causes within health care services, they were also sure that their search wouldn't be a trivial one.

The measure of appropriateness is strongly related to the use of Health Information Technology

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Figure 1 Health Expenditure %GDP



(HIT); use of HIT is seen as a way to increase the general quality of medical care and a way to reduce its cost (Welch et al. 2007); the clinical decision support systems increase guideline adherence in the clinical practice, thus improving health status and improving the financial elements on the long term.

The EPR (Electronic Patient Records, or Electronic Health Records) are the most discussed form of HIT. USA's Institute of Medicine ([www.iom.edu](http://www.iom.edu)) states eight core functionalities describing EPR:

- health information and data storage,
- management of results from laboratory and imaging tests,
- electronic ordering (e.g., prescription drugs and referrals),
- clinical decision support (e.g., guideline reminders),
- interoperability, and
- administrative processes such as billing.

The research intend to start from existing EPR software systems by improving their ability to manage guidelines and to discover important health properties, hidden in the health data.

This chapter describes the process and technologies authors used to approach the inappro-

priateness, choosing within different instruments the more suitable one, and presents the model developed starting from their consideration.

Because it is very hard to define when a care is appropriate, guidelines usage has been selected as a metric to measure the appropriateness. The way a care is given mainly depends on the processes defined by medical institution as the correct one, and formalized as medical guidelines. So it is very important to know if the medics are following one of the possible guideline, because if it is so there are strong chances that the given care are appropriate, with greater results for the patient and lower expense for the medical institution (and typically for the government).

In section 2 it'll be discussed the process followed to establish an acceptable (by medics, institutions, government) way to measure care rightness and other, yet established metrics; this section is very important because there is a strong resistance by medics and medical institution to measure the quality of given cares. Hence in section 3 it'll be proposed a generalized software architecture able to cope with the problems shown in section 2. Section 4 is focused on the clinical guidelines, entering in the core of this paper, i.e., how to determine if the medics are following them. Section 5 introduces data mining techniques and process (CRISP-DM) when is applied to medical

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