Development of a Dynamic Model Structure for Comparing Ambulatory Reimbursement Systems

dwh simulation services

F. Breitenecker[3], P. Einzinger[1], G. Endel[2], M. Gyimesi[3], Ludwig Meier[3], Nina Pfeffer[2], Niki Popper[1], Andrea Weisser[2]
[1] dwh Simulation Services, Vienna, Austria
[2] Main Association of Austrian Social Security Institutions, Vienna, Austria
[3] Vienna University of Technology, Vienna, Austria

TECHNISCHE UNIVERSITÄT WIEN Vienna University of Technology

Motivation

One central question in health services research is: How can effects of different reimbursement systems be compared accurately with each other? One objective of the ”GAP-DRG” (**G**eneral **A**pproach for **P**atient-oriented Ambulant **DRG**s) project of the Main Association of Austrian Social Security Institutions is to answer this question.

The process that has to be modelled reaches from the occurrence of medical problems to reimbursement of provided services (described in **figure 1**). Dynamic computer models can take account of this complexity and it is possible to simulate the system with different reimbursement schemes.

We concentrate on extramural health care and possible reimbursement systems for this sector and build a model that maps the process of demand for health care and the provision of services as well as the resulting reimbursement.

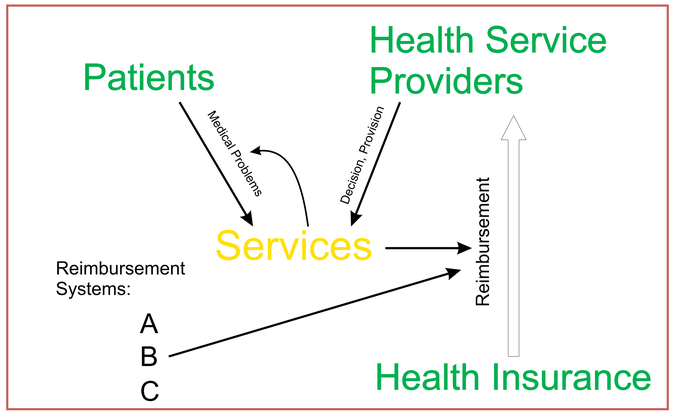

Figure 1. The interaction of patients having medical problems and service providers who make medical decisions leads to the provision of health services. Different reimbursement systems determine the reimbursement of providers. Health services have an influence on the health status of patients.

Model Structure

The model is agent-based and object-oriented, with both service providers (e.g. physicians) and patients modelled as agents.

Different „medical problems” (e.g. diseases and medical conditions) have corresponding object types, which contain for example incidences, disease progression and possible

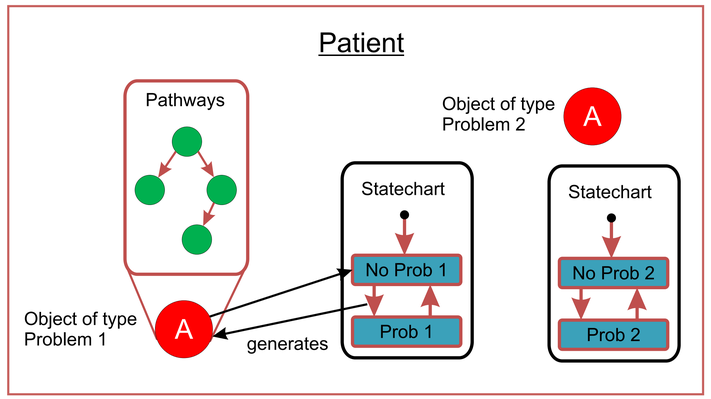

Figure 2. Schematic structure of the patient objects. Patients have simple statecharts that show whether a patient has the corresponding medical problem or not. They contain one problem object, which control disease progression and the patient's need for medical services, for every disease or condition they have.

treatment pathways that are specific for the problem.

Patients develop new medical problems stochastically, based on incidences derived from data. Technically this happens as a patient agent‘s state transition (each patient has a simple statechart for every medical problem type) and the generation of one medical problem object that controls the specific disease and the patient‘s need for health services (**figure 2**).

The model incorporates all services of the Austrian Meta Fee Structure, which contains records matching the various services that public health insurances have in their own fee structures, and their prizes.

Treatment pathways - like the one shown in **figure 3** - control the patient‘s need for providers and health services. Most states urge the patient that he/she should consult a provider from a certain provider category (e.g. an internist). Additionally these states have a list of possible ”service packages”. Depending on the provider who treats the patient the simulation chooses one of the service packages.

A global ”Health Market”, where all providers are registered, refers patients with need for a provider type to an appropriate provider (e.g. one that is in the near surroundings).

A database stores accrued services together with involved patients and providers during model runtime. An object of type „ReimbursementSystem” calculates reimbursement.

Parameterisation and Data

Parameterisation will use billing data of all public health insurances in Austria for the years 2006/2007. Expert panels will help with additional information on structure of the health system and treatment pathways. Demography of the patients will follow official statistics. It will be necessary to model economically and medically important diseases in detail and to aggregate less important medical problem types.

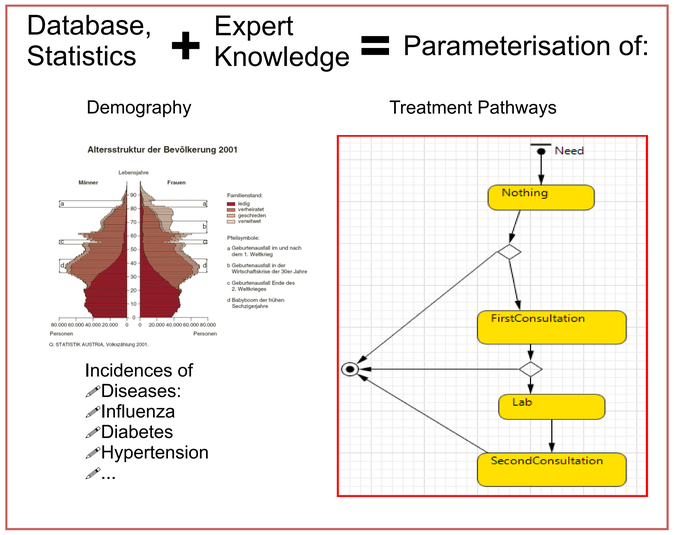

Figure 3. The model places special demands on structural information and parameterisation. Examples are information on demography and spatial distribution of patients, incidences of medical problems and possible treatment pathways. Sources for parameterisation will include official statistics, expert knowledge and existing billing data.

Conclusion

We have proposed a model framework that is capable of mapping the entire process in extramural health care - from the occurrence of medical problems to the reimbursement of health care providers. This is important as it is necessary to take care of dynamic feedback initiated by a change of the reimbursement system.

The next step of the project will be the parametrisation of treatment pathways and other information on the medical problems. This is an ambitious task and has to use both expert knowledge and existing (billing) data.