Abstract

A key objective of Health Services Research is to evaluate the effectiveness of care processes in conditions of daily practice. In this context, drugs as one of the major instruments within the care process present a huge challenge: each drug can cause side effects that can often be identified only after being launched on the market and after broad, long-term intake by, for example, multimorbid patients. Apart from the patients' additional health burden, this results in tremendous costs for the healthcare system. Furthermore, a causal connection between drugs and side effects is frequently overlooked and thus actual costs due to wrong diagnoses and follow-up treatments may be even higher.

In parallel, from the IT point of view, the amount of data digitally recorded during clinical treatment is increasing rapidly. Medications, diagnoses, and other medical data are documented in a structured, machine-processable manner within the so-called Electronic Health Record (EHR). The quality of data contained in an EHR depends on the intended purpose, ranging from administrative to comprehensive, lifelong medical data, but the latter is still discussed as a vision in most of the countries. However, the utilization of EHRs has not yet reached its full potential. Through active monitoring and analysing, medical specialists could be proactively supported in detecting side effects. This leads to the research question of this dissertation: to what extent can these EHRs be re-used for an automatic detection of potential side effects and how can suspected cases be presented to medical specialists in an appropriate way?

In this work, a flexible approach for the detection of side effects called „FlexDAWN" is created, implemented and evaluated as a prototypical decision support system. The evaluation was carried out in inpatient and outpatient settings in the context of the European project SALUS. In contrast to previous work, FlexDAWN distinguishes between known and unknown side effects. All detection methods of FlexDAWN can be configured by parameters enabling and supporting side effect detection in different clinical settings. The presentation of suspected cases is achieved by a web application that can be used on a mobile device, for example directly at the patient's bedside during a ward round.

To conclude, one significant limitation of the FlexDAWN approach is that data analysis is still limited to the data of individual clinical information systems and thus individual health providers. Furthermore, it is well known that „over the counter" (OTC) medication may also play an important role in causing side effects. Such information can only be tracked if a complete medication record of the patient including OTC medication sold in pharmacies and drug stores could be taken into account. However, even though the potential provided by today's fragmented EHR landscape for improving our knowledge about health and care is far from being fully utilized, FlexDAWN is certainly one step in the right direction.