Information Systems for Administration, Clinical Documentation and Quality Assurance in an Austrian Disease Management Programme

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Abstract. 5.9% of the Austrian population is affected by diabetes mellitus. Disease Management is a structured treatment approach that is suitable for application to the diabetes mellitus area and often is supported by information technology. This article describes the information systems developed and implemented in the Austrian disease management programme for type 2 diabetes. Several workflows for administration as well as for clinical documentation have been implemented utilizing the Austrian e-Health infrastructure. De-identified clinical data is available for creating feedback reports for providers and programme evaluation.

Keywords. disease management, quality assurance, diabetes mellitus, information systems

1. Introduction

The prevalence of diabetes mellitus in Austria is 5.9% [1]. The complications associated with the disease impair patients’ quality of life and burden the health system with considerable costs [2]. The course of the disease can be directly influenced by adequate adjustment of metabolic control. Different therapeutic and diagnostic options are available, that require complex management over a long period of time. Despite the existence of evidence-based guidelines, variability in treatment and care is very high. For these reasons the structured treatment approach offered by a disease management programme (DMP) is considered highly suitable for application to diabetes mellitus.

International experience of the introduction of DMPs and its components shows positive effects, both clinical and financial [3, 4]. The Austrian social insurance’s DMP for type 2 diabetes „Therapie Aktiv – Diabetes im Griff“ (“Active therapy – diabetes under control”) was started in March 2007. Five federal states out of nine already implement the programme. The programme relies upon the commitment to the General
Practitioner as lifelong medical carer and a long-term therapy approach. The components required by the programme and options for IT support (Figure 1) were determined and adapted from the literature [4, 5], strongly influenced by experiences with DMPs in Germany.

![Figure 1. Disease management components. Highlighted components are supported by information systems](image)

2. Information Systems in the Austrian DMP

2.1. Supporting Administrative Processes

The DMP Administration Software (AS) is a multitenant Web application which is accessible for all insurers within the private network of the Austrian social insurance.

**Administration of DMP basis data:** The AS has been designed and developed to enable the administration of multiple DMPs. However, the DMP for diabetes is the sole programme running to date. Furthermore DMPs can be activated for use by particular federal state’s insurance agencies for specific time periods. In practice the main regional insurance agencies take over DMP administration for the smaller insurance agencies. To facilitate this process, a flexible mechanism has been implemented to enable delegation of DMP administration even across federal state boundaries.

**Custody of certificates and authorisations:** To qualify for treating patients in the DMP, physicians are required to have a certificate issued by the medical association that can be linked to the completion of education courses and other criteria. The AS allows for the administration, issuing and withdrawal of certificates. Physicians request enrolment into the DMP on paper. In the DMP administration, the request data is entered and in a subsequent, separate step checked manually by an official before enrolling the physician into the DMP. The different duties have been implemented separately and linked through a set of interrelated workflows.

**Enrolment of patients:** The enrolment of insured persons can occur electronically through the physician’s practice management software (PMS) or via paper forms. The electronic process contains several checks for consistency, e-card validity and entitlement to insurance, so that physician and patient can be immediately informed about validity and success of the transmission. As soon as receipt of the consent form, signed by the patient on paper, is confirmed, a manual processing step is undertaken by the DMP administration to approve patient enrolment.

**Administration of Patient Education Courses:** Patient education programmes have already been implemented in several federal states [6] and have been adopted as modules of the DMP. For this reason, the administration of patient education has been
integrated into the AS. This involves administration relating to doctors who have received training and their corresponding certificates as well as administration of individual courses including course registration, patient inscription and accounting.

Several interfaces to existing software of the Austrian social insurance have been implemented. Document generation can be flexibly integrated into the workflow for notifications arising from the system’s use-cases (using various layouts via templates).

**Figure 2. Data flow for the electronic documentation of the DMP clinical findings sheet**

### 2.2. Electronic Documentation of the DMP Clinical Findings Sheet

Annually, the DMP clinical findings sheet has to be documented for each DMP patient. The corresponding data set consists of diabetes-specific items on health status, treatment, target agreements, quality of life and education. These data are used for quality management with direct feedback to physicians (see 2.3) as well as for controlling and programme evaluation. Due to privacy requirements it has to be avoided that the sensitive, medical data are directly attributable to individual patients within the social insurance. This is achieved by a pseudonymisation step.

Via the e-card infrastructure, the following possibilities for electronic data entry of the DMP clinical findings sheet are offered (Figure 2, top): a) PMS integration: Standardised web-service interfaces (1) are available to the producers of PMS for communication with the health information network adapter (GINA), which is part of the Austrian e-Health infrastructure. b) Entry via web interface generated by the GINA on the physician’s practice PC. c) Entry via a text-based VT100 terminal user interface generated by the GINA for physicians’ practices without computer.

**Transmission and data preparation via e-card infrastructure:** Already at the GINA, data is prepared and split into a sensitive and an administrative dataset (2). The sensitive data consists of clinical documentation from the DMP clinical findings sheet. It is supplemented by data on patient, physician, insurer and data collection, which thereby are made available for later evaluation. Sensitive data and person reference are encrypted, so that they can only be decrypted and handled by the DMP medical data repository and the pseudonymisation centre, respectively. Aside from meta-data relating to documentation, the administrative dataset also contains single data fields extracted from the clinical documentation (risk-factor data), which serve as the basis...
for patient reminders. After preparation, the data is transmitted to the e-card central system (3). Up to this step, processing takes place synchronously. To ensure performance and independent functioning of the e-card central system, selected contents of the AS data repository are constantly transmitted to the e-card central system and kept up-to-date. The e-card central system transmits the administrative data to the AS (4) via a web-service interface, whereby information about the receipt of clinical documentation serves as the basis for accounting. The sensitive data, bundled and signed, are transmitted via the data platform of the association of insurers to the pseudonymisation centre (5). The pseudonymisation centre uses an irreversible technique to replace the person reference with a pseudonym, which is then encrypted. Further transmission to the DMP Medical Data Repository follows likewise over the data platform (6). Here both, pseudonym and sensitive data are decrypted, stored and made available for reports relating to quality management and evaluation.

Transmission and data preparation via Social Insurance electronic portal:
Regional data centres that process paper documentation submitted by physicians may transmit data via the Social Insurance electronic portal (Figure 2, bottom). A client application for data entry allows offline recording and validation of DMP clinical findings sheets. The collected data is transmitted (7) to the Social Insurance electronic portal via a web application and digitally signed by means of the national Citizen Card framework. Only data packages signed by registered and authorised users are accepted. The data preparation of sensitive and administrative data takes place as above along with transmission to the pseudonymisation centre (8) and AS (9), respectively.

2.3. Quality Reports and Feedback

The existing information system Healthgate BARS [6, 7] is available to support generation of quality reports for benchmarking by importing and analysing the pseudonymised data. Subject to analysis are quality indicators that arise from the guidelines and pathways of care and can be determined from the available DMP clinical findings data. Analyses can be made available online via an interactive Web interface and through the mailing of individually tailored reports with explanatory text.

An invitation system enables the insurance organisations, on the basis of specific risk-factor data, to directly contact patients in order to remind them of outstanding examinations or provide them with targeted information on education, events etc.

2.4. Security and Data Protection

At the time of enrolment onto the programme, all patients give written consent to actively participate in the programme, to arrange treatment targets and to receive diabetes related information from the social insurance. The described data flows were defined and agreed with the national data protection commission and the medical association. According to the principle of data-avoidance, only necessary data fields are saved in as much detail as essential (e.g., risk-factor data for invitation system).

3. Discussion and Conclusion

With the DMP „Therapie Aktiv – Diabetes im Griff“, a structured treatment approach for a chronic illness is available for the first time in this magnitude in Austria,
supported by a standard IT infrastructure which is integrated in the national e-health infrastructure. It is pleasing that after considerable harmonisation efforts it has been implemented regionally with only some minor variations. 452 physicians and 8,044 patients (2.4% of diabetic population from federal states where DMP is available) were enrolled in the programme in April 2009. By centrally collecting clinical data of all enrolled patients, a diabetes disease register is established which can assist in revealing information about the health status of patients with diabetes in Austria and facilitate international comparisons [8]. Quality improvement strategies relevant for diabetes according to [4] are present in the programme. One exception currently are physician reminders, the evidence of effectiveness for which is not particularly strong.

The information system utilizes the Austrian e-Health infrastructure and its smartcard enabled security features. Pseudonymisation and storage of clinical findings data both are carried out within the sphere of the Austrian social insurance, however in separate organisationally unrelated units. Physicians’ acceptance will be mainly dependent on the integration of DMP functions in the PMS, which provides the frontend. There is a multitude of different PMS available, and it remains a future challenge to further promote and improve relevant functions of PMS for Integrated Care. This should contribute to accelerating the paradigm shift, not only regarding the change from paper to electronic documentation but to actually use the collected data in practice [9]. The costs for implementation into practice management software are comparatively higher than they would be with entirely centralised systems [10].

Electronic documentation of the DMP clinical findings sheet and patient enrolment has been launched recently. Therefore data for evaluation and quality assurance reports will be available from May 2009 for the first time. It is expected that this will have a positive influence on the number of enrollees into the programme.

References