# Structuring the content of large-scale Electronic Patient Records

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**Abstract.** Standardizing and structuring the clinical content of Electronic Patient Records (EPR) considers as an important mean to improve good utilization of resources within healthcare service, as well as to increase the quality of treatment and care. Based on an interpretive approach, we report from a large EPR project running from 2012 to 2016 in the northern health region of Norway. This paper focuses on the initial socio-technical challenges in the transition from free text documentation to a structured EPR system Preliminary the transition raise an interesting need of negotiation between the vendor's choice of structure through persistence information and the involved healthcare practitioners demand of structuring clinical information to local needs.

## Introduction

Standardized and structured clinical information within the Electronic Patient Record (EPR) considers as an important mean to improve better utilization of resources within healthcare service, as well as to increase the quality of treatment and care given. The traditional way of documenting is to produce free text documents, where the major part of the physicians are dictating and the secretaries are transcribing the oral clinical information to electronic documents. Implementing structured and standardized clinical information in the EPR system has proven to be difficult in several ways, and addresses challenges for the traditional way of documenting. Accordingly, we ask the following research question: *How do the initial socio-technical challenges play out in the transition from free text documentation to using a structured EPR system?*

Based on an interpretive approach (Walsham, 1995), we report from a large EPR project referred to as BigInvestment running from 2012 to 2016 in the northern health region of Norway. The involved vendor, BigVendor is developing and testing out a new generic EPR infrastructure, which lend heavily on structured and standardized documentation on a scale never seen before in Norwegian hospitals.

The new EPR system is currently in the initial test phase at the Department of Dermatology in the University hospital of Northern Norway. This paper reports on the very first experiences.

As a theoretical basis, we use the concept of information infrastructure due to the large scope of EPRs (Bowker and Star, 1999; Aanestad and Jensen, 2011).

# Changing from free-text to structured information

The BigInvestment project have addressed many goals for the new EPR system. The system is supposed to support real time planning and monitoring of treatment and care through standardized patient pathways and transparency of treatment activities, compilation of patient information in one screen shot, and support administrative tasks related to the medical treatment and care. To accommodate these goals, the vendor develops the new EPR system based on structured clinical information by using an archetype approach from openEHR standard.

Structured information can be comprehended in different ways. First, structure refers to different predefined documents set-up, documents connected to healthcare practitioners' occupation, or documents connected to different clinical contexts. Second and representative for this paper, structured information refers to standardized *clinical* information within the EPR system. The latter stress that standardized and structured clinical information should be the preferred and major input of the clinical information in the EPR system to underpin an explicit and quality assurance documentation of clinical assessments, treatment and care. Furthermore, an EPR system based on structured information make it possible to display the pathway for treatment and care chosen for each patient, and along this line make it easier to ensure that recommended treatment and care is accomplished. As stated by one of the managers from BigVendor: *"If the patient's clinical condition is corresponding with a predefined condition e.g. "diagnose A" - it will trigger "process B" to become operative".*

Turning towards testing the new EPR system, BigVendor had to make choices before initiating the new EPR system into clinical use. So far, there are no national library of archetypes or a national superior authority managing standardized structured clinical information. For the initial test, BigVendor had to point out the scope of where to start structuring clinical information:

> "We have outlined a slow implementation process, starting by structuring persistent information e.g. the patient's personal - and social information, medication and medical diagnosis codes -

because it is easy to agree upon and it is important that this kind of information exist in one version only" (Product owner, BigVendor).

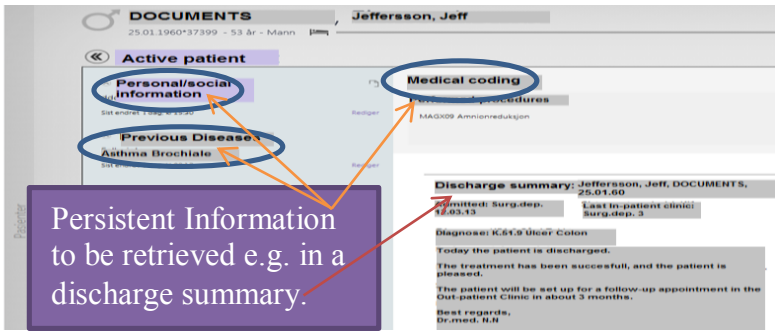


Figure 1. Persistent information.

By structuring persistent information, the system will support the clinicians to ensure that this part of the clinical information is unambiguous and correct, and exist in one version only. In addition, structuring persistent information is meant to simplify the healthcare practitioners documentation process by making it possible to automatically reuse persistent information in different documents, e.g. from the admission note to the discharge summary.

The next evolving step from free-text to structured information is to introduce medical observations e.g. blood pressure, height, weight and other similar measurements as structured information integrated within document templates.


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Figure 2. Observations as structured information.

By introducing observations as structured clinical information, the new EPR system will support real time secondary use clinical information, which is the assumption to display a timeline of a patient's condition, planned and executed activities.

The Department of Dermatology at the University hospital was the first site for testing the new EPR. The department has both an in-patient and an out-patient unit, and the healthcare practitioners work in close collaboration with other sub- medical specialties in the hospital as well as other hospitals and primary care.

The first presentation of the system revealed that the dermatologists could not see major benefits of using structured clinical information as the input of patient information into the record. The dermatologist questioned the advantages because the new system forced them to write more of the clinical documentation by them self, which would give them less time for the patients. The immediate benefit they addressed to the new system was the display of important patient information in one screen shot, contrary to the existing system where information are collected by opening several documents. In addition, the dermatologists were enthusiastic of the automatically reuse of persistent information into new documents, e.g. the discharge summary.

However, before testing the dermatologist strongly recommended to transform existing paper based treatment templates into electronic structured information templates. A paper-based schema includes sections of e.g. recommended dose of light therapy, treatment intervals, and areas of the body to be treated. By making an electronic structured version of this schema, the dermatologist saw it as an improvement of the documentation process, both for clinical as well as for a timesaving purpose. The dermatologists' voices were crucial in decided which schemas to convert into structured information templates.

# Concluding discussion

BigVendor has selected persistent information as a point of departure to initiate the use of structured record. So far, there is no doubt and no controversy among the clinicians that persistent information is a rational and necessary choice to ensure the quality of clinical documentation. However, the physicians' initial feedback pointed to the limited range of using persistent information to increase the documentation process. The physicians required a variety of structured templates tailored to their local needs. This work was a collaboration between clinicians deciding what to structure and the developers doing the technical work. The presented case raise an interesting negotiation between the general and fundamental structuring of persistence information from the vendors' perspective compared to the demand of local tailoring from the users' point of view. The paper is 'a work in progress' and the authors will closely follow the test to enrich the data collection.

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