Strategies for a Systematical Patient Identification

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Abstract: The growing demand for informational self-determination of patients will not only result in a stronger participation in therapeutic decision making hence causing a change in the physician-patient-relationship, but also require more complex information logistics for health care providers. In this context, a core challenge is the patient identification in a heterogeneous system of diverse ICT solutions. This article presents first approaches how to solve problems arising from insufficient patient identification, both from a single actor's perspective as well as the health network perspective. In a first step, organisation internal as well as cross-organizational mechanisms for patient identification are presented. In a second step, systematic and integrated strategies are discussed. This paper concludes with an outlook on future research questions in this field.

Keywords: Patient Identification, Networkability, Identity Management

1 Introduction

The increasing digitalization provides potential for improvements in the health care sector through better accessibility of documentation and distribution of information. At the same time, conflicts can be caused due to unsettled proprietary and disposition rights, when using or accessing information [Ba05].

On patient side, existence of a far-reaching *public* medical information basis leads to a stronger participation in therapeutic decision making, commonly referred to as patient-empowerment [SW03]. Thus today's physician-patient-relationship is undergoing a major change, as patients are no longer just passive consumers of medical services, a knowledge domain of which access was limited to physicians [Br05]. 78 % of patients and 88% of physicians indicated that the physician-patient-relationship considerably improved through an active knowledge acquisition by the patient [He05].

The digitalization of *patient-related* information however gives rather rise to concerns in wide sections of the population. Protection of data confidentiality and privacy are increasingly at the core of the physician-patient-relationship.

On physician-side, the growing digitalization of patient-related information[1] requires an increasing understanding of ICT-solutions and a certain level of networkability, the ability to efficiently and rapidly engage in business relationships with other actors in the health care sector [GRW06]. Due to the rise in the number of differently structured storage media of patient information and resulting fragmentation, costs for allocation and maintenance of interfaces are rising. Non-existence of a nation-wide centrally administered master patient index, which is accessible to all health care actors, complicates the problem of patient identification [Bü02]. The term identifiability refers to the capability of unambiguously relating a given identification data to a communication partner (e.g. a patient) [Fe05]. Closely linked to the process of identification is authentication, which is both related to the verification of a communication partner's identity, as well as proof of one's own identity [Na06].

2 Approaches for Solving the Gordian Knot of Patient Identification

In the United States, approximately 98'000 people die because of medical malpractice during hospitalization. 13% of the overall number of malpractices in surgery and 67% of errors in conjunction with blood transfusions can be traced back to erroneous patient identification [Jc05]. Studies in England and Australia revealed that between 12% and 16% of all inpatients are exposed to an "adverse event" [St05]. Consequences of mistaken patient identity and related mistreatment and faulty medication are serious. The main reasons for these events frequently occur due to insufficient communication, lack of team work, but often also due to inadequate verification of a patient's identity [CB02] and lack of trust in corresponding ICT solutions [Na06].

2.1 Organization Internal Patient Identification

Through the use of radio-frequency identification (RFID), which today is broadly used in industry in various areas [SS02], errors in organisation internal patient identification can be minimized. Thanks to the automatic transmission of captured identification characteristics, the patient trail can be recorded and compared to clinical pathways, which is a major contribution to quality assurance [KC06]. Clinical pathways define a multidisciplinary set of required actions and outcome targets for managing the overall care of a specific type of patient and medical condition and therefore provide means to define the to-be therapy process [Wo04].

[1] For example electronic medical records (EMR) maintained in hospitals or personal health records (PHR) maintained by patients or third parties.

In case a patient is hospitalized again in the same health care facility, a comprehensive history of the patient can speed up the whole therapy process from admission to release and at the same time reduce costs through e.g. avoidance of repeated anamnesis. Therefore, increased importance should be ascribed to a reconciliation of existing patient records within an organization. This can be for example realized through an Enterprise Master Patient Index (EMPI), which centrally holds patient master data. During admission of a patient, the personal characteristics (e.g. name, date of birth) and other information such as insurance number can be matched against the EMPI. This cross-application index is the central point where all application specific-indexes in the individual systems are inter-related and uniquely assigned to a patient. A central interface enables data-exchange with other clinical and administrative information systems of the hospital (cp. Figure 1, left box).

As setting up an EMPI is a complex and costly endeavour, a decentralized matching procedure is preferred in many cases [Le98]. This approach involves local authentication through corresponding extensions of the individual applications (e.g. PACS, laboratory systems, etc.). It enables comparison of historic data with actual data of a patient inside one system or with data of another system. A major downside of this approach is however the lack of a single, combined view on the overall history of a patient, as only data in the corresponding systems can be compared one to another (cp. Figure 1, right box).

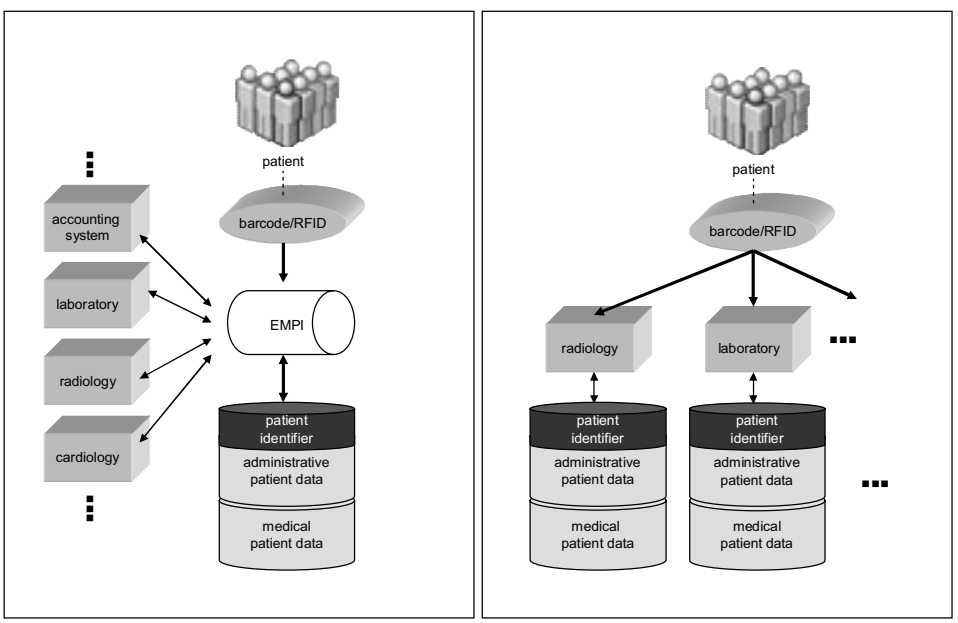

Figure 1: Left box: Central matching using EMPI; Right box: Decentral matching

2.2 Cross-Organization Patient Identification

A considerably more difficult endeavor is cross-organizational patient identification, e.g. in a public health network. The following levels were identified:

- international level (e.g. the European health insurance card as a first example for a cross-national initiative [Eu07])
- national level (e.g. the National Health Index in New Zealand as an example for a national initiative[Te07])
- regional level (e.g. Healthnet British Columbia as an example for a regional initiative [He03])
- local level (e.g. the Modellprojekt5 as an example for a local initiative [Kr07])

Due to distinctive characteristics of different health care systems, a centralized approach, as realized e.g. in the United Kingdom, is not feasible in every case.[2] Therefore approaches need to be developed which enable unique patient identification on different (competency) levels. As an example for a multi-level level identification approach, the patient identification of the State of British Columbia, Canada is depicted in Figure 2.

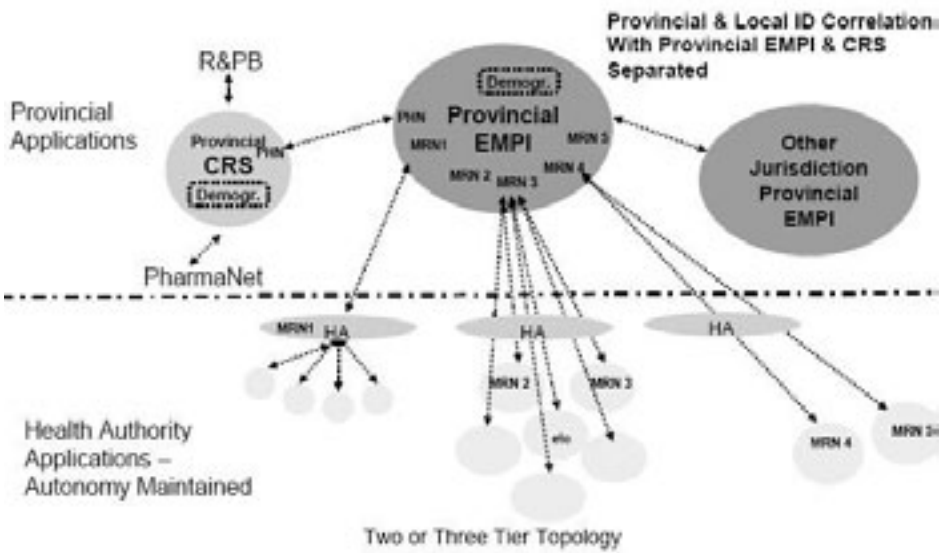

Figure 2: Multi-level patient identification strategy of British Columbia, Canada [He03]

[2] An example of a decentralized health care system is existent in Switzerland. For a total of 7.4 mill. inhabitants, 26 different health care regulations exist. Question of authority between national and federal bodies as well as monolithic structures additionally complicate the introduction of a centralized approach to patient identification.

On a local level, health care providers individually and autonomously manage patient master data. The patient identification information is then consolidated on a regional level using an EMPI. This approach is beneficial as it allows maintaining information locally hence ensuring compliance with data privacy regulations of the respective provinces. For patient identification across provinces (e.g. in case of a health incident during a holiday trip) or communication between governmental agencies, corresponding interfaces are designed.

2.3 Patient Identification Strategies

The previously described approaches clearly show that there are different aspects that need to be considered when addressing the challenge *patient identification.* A holistic assessment of the topic can be broken down into four fields of action (cp. Figure 3):

a) Organization internal (initial) patient identification

b) Re-identification of an existing patient and reconciliation with existing patient records within an organization

c) Cross-organizational (initial) patient identification (e.g. in a public health network)

d) Re-identification of an existing patient and reconciliation with existing patient records across organizations

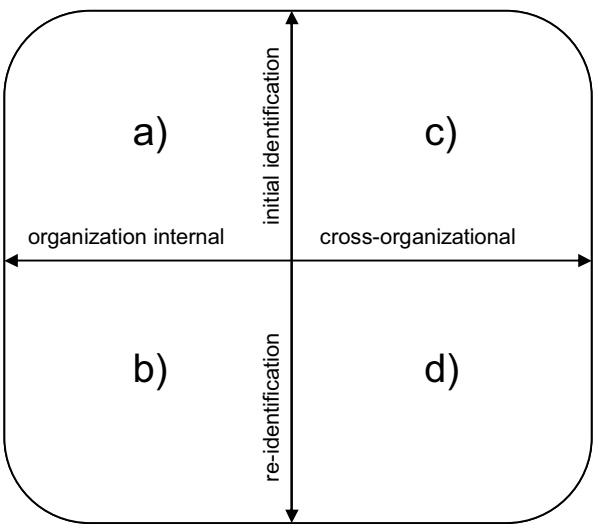

Figure 3: Fields of action for a holistic patient identification

As depicted in Figure 4, different problem solving procedures are applicable depending on the structure and complexity of the respective health care system. Each path however starts with the issue of initial identification. In case of initial development of a hospital-wide EMPI (bottom-up strategy), organization internal patient identification mechanism are introduced in a first step (e.g. social security number or demographic characteristics), which in a second step are used for internal reconciliation of existing patient records. Subsequently the EMPI is then interconnected and consolidated with regional and national public health networks (cp. Figure 4, left box). When introducing a health card which is typically an example for a nationwide identification mechanism (top-down strategy), this includes definition of a unique patient identifier (Personal Health Number).Other personal identity numbers can exist independently from a health card such as the Swedish "personnummer" or the U.S. social security number. This identifier can then also be used for organization internal patient identification, which in turn facilitates and enables reconciliation with existing patient records (cp. Figure 4, right box).

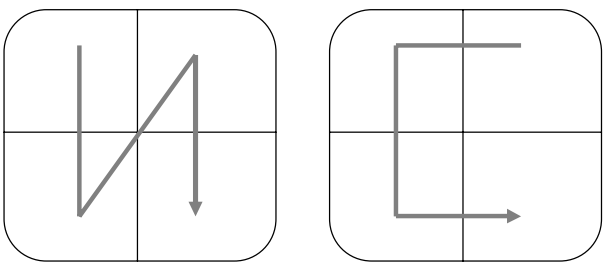

Figure 4: Procedure of potential strategies

The described sequential procedure of patient identification strategies can in reality not strictly be followed. Often, already conducted fields of action are reworked and iteratively optimized. As all fields of action are interdependent, a concurrent progress in the different activities can also lead to an integrated solution for the challenge patient identification but requires profound coordination.

3 Conclusion and Outlook

This article presented that increasing digitalization provides potential for improvements in the health care service. Networkability of health care providers is an essential factor to cope with the growing complexity which is immanent to upcoming changes. As a result of increased diversity of technical instruments (e.g. health card, electronic medical records, etc.), continuous patient identification along the whole therapy process is also becoming an increasingly challenging task. It is shown that through the use of new technologies and appropriate matching procedures, both the organization internal as well as the cross-organizational patient identification can be handled. Additionally, the challenge patient identification is broken down into four fields of action in order to derive systematic and integrated strategies.

Future research needs to be dedicated to further refinement of the systematic of the four fields of action. For this reason different scenarios have to be defined (e.g. what happens with partial information, inexact matches, encrypted/de-identified data etc.) and evaluated by means of prototypical implementations of suggested strategies.

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