

Clinical Documentation in Emergency Departments:

Integrating paper-based documentation into the electronic medical record

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1 Introduction

1.1 Problem

Clinical documentation is an important foundation to ensure quality of care as well as effective billing. It is often used to review the quality of operations and occasionally serves as evidence in malpractice lawsuits.¹ Therefore, clinical documentation contains notes of all events, actions, and artifacts accumulated during the course of a patient visit. From a business perspective, it is important to facilitate access to revenue-relevant parts of the clinical documentation such as billable procedures, exams, and performed diagnostic tests in a well-structured manner.² Clinical documentation is preferably medically pre-coded so processing with little human intervention is feasible.³ From a clinical perspective, timely access to prior patient data, medical-decision support, and low distraction during the care process are considered essential features.⁴ Since it often serves as means of communication among clinicians, accuracy and compliance with professional standards are crucial. Although high quality documentation is desired, time-consuming record keeping tasks are not well accepted.⁵

Even though electronic data management could bring tremendous benefits, in many institutions data management still mostly consists of a plethora of separate paper documents.⁶ Especially in emergency medicine, which features a distinctive environment, electronic physician and nursing documentation systems are sparse. Many implementations have failed or did not achieve the promised objectives. Often cited reasons for such failures include the hostile work environment as well as strong user

¹ Furthermore, it can be used for symptom and disease surveillance, public health, and clinical research. For further discussion see e.g. Connell/Diehr/Hart (1987); Davidson, et al. (2004); Iezzoni/Greenberg (2003).

² E.g. Espinosa/Case/Kosnik (2004); Edelberg (2004); Proctor/Hall/Carr (2004).

³ Coding schemes used depend on the health system and their accepted codifications. In the U.S. CPT-4 and ICD-9-CM are predominantly used for emergency services billing. In Switzerland ICD-10 has been introduced and ambulatory services are billed using TARMED.

⁴ E.g. Ammenwerth, et al. (2002); Krall, et al. (1997); Moorman, et al. (1994).

⁵ E.g. Sittig/Stead (1994); Young (1984).

⁶ In the U.S. it is estimated that only 5-6% of all ambulatory settings use full EMRs: Chin (2004).

resistance.⁷ Specifically, bed-side access often inherently conflicts with the requirement for uninterrupted clinician-patient communication. Although unintuitive and over-structured applications are widespread, usability problems associated with bed-side data collection appear to be an important factor for many failures.⁸ However, without direct electronic data entry the benefits of information systems can only partially be realized and may result in low data quality, long cycle and turn-around times.

1.2 Objective

This paper lays out a strategy to improve electronic data collection during patient care using digital pen technology. A specific focus rests on a seamless implementation without disrupting workflow and established processes. In order to evaluate this approach, this paper discusses common administrative and clinical processes in emergency departments and it points out how they relate to the documentation task. Moreover, current documentation approaches are reviewed, and a summarized assessment of their advantages and disadvantages is presented. The goal of this paper is to provide a specific analytical view of the data collection, analysis, and retrieval process for clinical documents. It will specifically address the data acquisition problem, which is the basis for further processing activities such as medical coding, billing, and clinical research.

The approach taken here has several limitations: foremost, it is a conceptual analysis and has not been proven during empirical experiments. Only limited information is available regarding the data quality produced by such devices; in particular using complex forms featuring many data elements. Also, the robustness of the process may be questioned as well as the level of organizational acceptance. Processes in emergency medicine are distinct, therefore the benefits may not transpose well to other specialties or even other health care systems.⁹ To fully realize the advantage of this method, data integration is a

⁷ E.g. Taylor (2004); Travers/Downs (2000); Sicotte/Denis/Lehoux (1998); Lorenzi/Riley (1995); Schoenbaum/Barnett (1992).

⁸ van der Meijden, et al. (2003).

⁹ Information management requirements for each specialty are different. Therefore, enterprise-wide systems often only cover basic functionalities and leave specific functions to department-level

necessity. However, integration methods and protocols are outside the scope of this paper.¹⁰ The presented approach merely provides a bridging strategy between paper-based and fully electronic information systems and is exemplified by a conceptual prototype.

1.3 Structure

Chapter two introduces the course of action commonly found in emergency departments. The setting and personnel hierarchies in which such services are rendered are briefly explained. This chapter distinguishes between administrative and patient care processes. Chapter three describes in more detail the requirements for clinical documentation and provides a domain model, which illustrates processes, entities, and data flows. It discusses structural, semantic, and temporal aspects of the patient record. Thereafter, the data collection, analysis, and retrieval processes are examined, which also enable communication among professionals. A review of contemporary methods found in U.S. emergency departments is presented in chapter four. These methods are then compared against a list of criteria discussed in the previous chapter. Chapter five introduces a conceptual prototype application, which is needed to facilitate the proposed documentation approach. The technical architecture is presented as well as several use cases in form of unified modeling language (UML) activity and sequence diagrams.¹¹ Finally, future research needs and a summary are presented in the last two chapters.

applications. The health system ultimately determines the incentive for an organization to implement and consistently use electronic systems.

¹⁰ Established data integration standards include HL7 for textual data and DICOM for graphical information.

¹¹ Fowler/Kendall (2000).