

## Chapter 42

# Document Management Mechanism for Holistic Emergency Healthcare

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### ABSTRACT

*A number of recent studies have showed that early and specialized pre-hospital patient management contributes significantly to emergency case survival. Along with the deployment and availability of appropriate emergency care resources, this also requires the availability of timely and relevant patient information to emergency medical service professionals. However, current healthcare information systems are characterized by heterogeneity and fragmentation, hindering emergency care professionals to have access to holistic or integrated patient information from the various organizations that participate in emergency care processes where and when needed. At the same time, many e-health programs have been undertaken worldwide in the area of emergency and unscheduled care with the objective to facilitate sharing of electronic patient information that may be considered important for the delivery of high quality emergency care and, hence, need to be readily available. In this vein, this paper takes a holistic view of the information needed in emergency healthcare and focuses on developing an appropriate tool for providing timely access to holistic care information by authorized users while retaining existing investments. Thus, a special purpose document management mechanism (DMM) is proposed that facilitates creating standardized XML documents from existing healthcare systems and that enables access to such documents at the point of care. For illustrative purposes, the mechanism has been incorporated into a prototype, cloud-based holistic EMS system.*

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## **INTRODUCTION**

The fundamental challenge of a healthcare system is to serve a demand that has unlimited scope for increase with limited resources. Ageing populations, raising expectations and advances in life sciences drive demand for quantity and quality of health services. The difficulties that lie ahead are in reconciling individual needs stemming from those developments with the available financial and non-financial resources (Gooch, Rizk & Vest, 2010). Emergency medical services (EMSs) constitute vital components of healthcare systems as they deal with various kinds of accidents and emergencies, including the most critical acute illness and injury episodes that affect older people, people with chronic diseases and other population groups (Burnside, 2008; Beul & Finell, 2010; Feufell, 2011). Thus, modern health services are expected to provide high quality emergency healthcare in the most cost-effective and appropriate manner.

Conceptually, EMSs are concerned with the provision of both pre-hospital and in-hospital emergency healthcare and their operations typically involve a wide range of interdependent and distributed activities, performed by cooperating individuals (medical, nursing, paramedical and administrative) who differ on levels of background, skill, knowledge and status. As these activities can be interconnected to form emergency healthcare processes within and between the participating organizations (i.e., ambulance services and hospitals), EMSs can be viewed as virtual emergency healthcare enterprises where the cooperative effort of these individuals must be coordinated, aligned, integrated and meshed in order to improve organizational performance (Burnside, 2008; Greenhalgh, 2010). Hence, it is important to define and automate, through suitable information delivery tools, EMS processes, from the time of a call for an ambulance to the time of patient discharge from a hospital, that span organizational boundaries so that to create and empower collaboration and coordination among the participating organizations (Poulymenopoulou, Schooley & Xie, 2011). This paper describes a document management mechanism (DMM) for assembling comprehensive emergency patient information from existing systems and making it readily available to authorized users in the form of standards-based XML documents.

The current state of emergency healthcare delivery is mostly characterized by fragmentation of individual services to patients (e.g. ambulance, health center and hospital services) and by absence of collaboration and coordination among service providers (Poulymenopoulou & Schooley & Remen, 2011). Thus, the various parties involved in emergency healthcare (e.g. ambulance services and hospitals) strive to improve their efficiency, effectiveness and overall performance on their own, based on different perceptions on what the short and long term quality objectives are and on how best to meet them (Xie, 2011). Moreover, while access to integrated medical information is usually supported in all other aspects of healthcare, this is not the case in emergency cases (DePallo, 2011). However, since patients may not be able to recall pertinent medical facts due to new or preexisting conditions, providing emergency professionals with access to important patient medical information is considered important in order to reduce medical errors, such as adverse drug events, as has been demonstrated by several studies (Burnett, Feufell & Remen, 2011; Finnell, 2010). For example, a survey of paramedic self-reported medication errors demonstrated that 9% of respondents admitted to having made errors in the previous 12 months due to a variety of reasons including missing information. As the scope of paramedic practice is continually evolving, and the introduction of new drugs to pre-hospital environment increases, the risk of medication errors may also show a potential to increase (Crossman, 2009). To this end, focusing on the overall EMS performance requires a more holistic view of emergency healthcare delivery by the various parties involved which, in turn, implies that there is a need for integrated patient information in support to EMS processes to reduce errors, limit additional radiation, avoid adverse drug events and

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