ABSTRACT

Medical error is an adverse event of a failure in healthcare management, causing unintended injuries. Proper clinical care can be provided by employing a suitable clinical decision support system (CDSS) for healthcare management. CDSS assists the clinicians in identifying the severity of disease at the time of admission and predicting its progression. In this chapter, CDSS was developed with the help of statistical techniques. Modified cascade neural network (ModCNN) was built upon the architecture of cascade-correlation neural network (CCNN). ModCNN first identifies the independent factors associated with disease and using that factor; it predicts its progression. A case progressing towards severity can be given better care, avoiding later stage complications. Performance of ModCNN was evaluated and compared with artificial neural network (ANN) and CCNN. ModCNN showed better accuracy than other statistical techniques. Thus, CDSS developed in this chapter is aimed at providing better treatment planning by reducing medical error.

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INTRODUCTION

Nearly every patient hospitalized have a life threat at some point in time during their stay. (Pronovost & Vohr, 2010)

Medical error is a serious threat to the patient’s safety. It is being studied that the one of the common causes of a medical error is a faulty health care system. This could be overcome or prevented by providing proper attention towards improving the health care system (Donaldson et al., 2000).

In this section, the authors will introduce a health care system, types, and causes of medical error, along with their statistics. The authors will also introduce an approach to reduce this medical error by using statistical techniques.

Medical Error: Its Cause and Its Types

In the studies conducted during the 1950s regarding patient safety, a medical error was defined as disease of medical progress (Moser, 1956). Later in the 1990s, three most important studies on medical error: the “Harvard Medical Practice Study” (Leape et al., 1991), the “Quality in Australian Health Study” (Wilson et al., 1999) and the “Utah and Colorado Medical Practice Study” (Thomas et al., 2000), defined it as an adverse event. An adverse event is a failure in medical management, causing unintended injury. As a result of this, the patients may suffer from a disability or longer hospital stay, sometimes even both. But later studies showed that the outcome of an adverse event was a subset of medical error. It is understood that, a safer health care system could be built only by proper design of the processes involved in it. Hence, according to Donaldson et al. (2000) medical error is a failure in completing the planned action in a pre-defined way or application of an alternative plan (can also be called as the wrong plan). The focus of hospitals in a comprehensive health care system is to reduce medical error.

Health care process is compiled by series of clinical and non-clinical activities. Proper treatment management would align these activities and reduce the medical error. For this, it is vital to provide appropriate treatment management from the time of admission. Any failure in this management would lead to an adverse event which is known as medical error.

Statistical Approach for Reducing Medical Errors

Recently, medical error and its consequences were recorded for statistical analysis, and the result has astonished both, the doctors as-well-as a common man (Quaglini, 2009). As a solution for this, an approach was needed that could identify the possible
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