Control charts in anticoagulant treatment

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Atrial fibrillation is the common cardiac arrhythmias of these days particularly in elderly adults. Fibrillation is characterized by an abnormal operation in heart, in case the uncoordinated atria contractions result on accumulation of blood on headset and it will form a clot. This clot can move to other organs and limbs and it can trigger other medical problems. Thus, fibrillation affects the patient's life. Currently the anticoagulant treatment using warfarin is the fully validated treatment to prevent the health problems mentioned above. Oral anticoagulant therapy is the most used treatment, because through the ingestion of medication the blood will become more fluid and consequently it reduces the possibility of blood clots. A patient who undertakes this treatment should be periodically monitored to ensure maximum effectiveness of the drug and ensure that it is under control. Sometimes it is not easy to understand that anticoagulant treatment is under control, therefore control charts are an important tool to assess whether or not the coagulation is controlled. The control charts are able to detect possible changes in industrial processes, but they are used in several areas, particularly in the health services. The application of control charts in health has increased substantially and recently there have been several studies using process control techniques, in particular to support the monitoring of patients. There are several types of charts: Shewhart, EWMA and CUSUM. Shewhart charts are traditionally used to control the average of individual observations. Shewhart control charts are simple and very easy to apply and interpret for monitoring the process in real time allowing the rapid detection of changes in the process. However, some authors argue that there are better charts to detect process variations. EWMA and CUSUM charts are an alternative to Shewhart because they are more sensitive to small variations and use the information contained in all sampling, therefore they are more appropriate to study individual observations. The goal of this study is to use control charts to monitor anticoagulant treatment and choose the best chart to help this monitoring. In this work, Shewhart, EWMA, and CUSUM are applied to case studies with data collected from a public hospital. The advantages and drawbacks of each type of control chart are discussed.
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