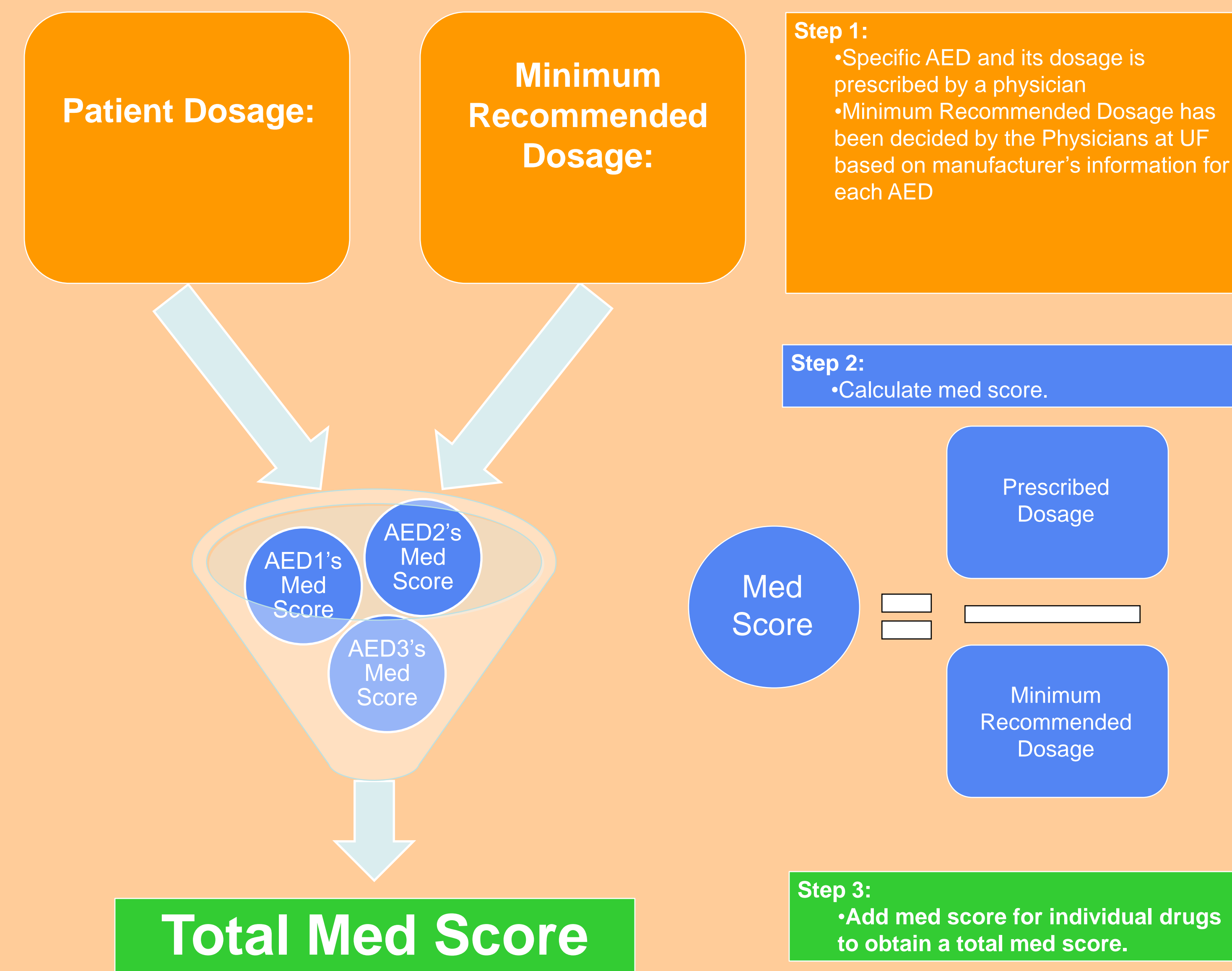


Abstract

Ketogenic Therapy (KT), a diet high in fat, low in carbohydrate, and adequate in protein, is used to treat intractable epilepsy in the pediatric population. The two main goals of the KT are to reduce seizures and the use of anti-epileptic drugs (AEDs). The problem associated with assessing the reduction of AEDs is there has not been an effective way to quantify AEDs. Historically, the number (no.) of AEDs has been used, yet this may not give complete information as it does not take other factors into consideration, such as dosage and patient weight. We have introduced an AED Medication Score (MS), which is the ratio of the prescribed dosage to the patient specific minimum recommended dosage. Each MS is summed to give a total MS for each patient. To test for the applicability of MS, analysis was done on 26 patients using no. of AEDs and MS data from initiation and their last clinic visit. The linear correlation between the change in no. of AEDs and the change in MS is significant but weakly moderate ($p=0.03$, $R=0.42$). The significance is evidence for the reasoning that the change in no. of AEDs and MS measures the same variable but the weak linear correlation illustrates that MS provides different and more information than the change in number of AEDs. For example, after starting KT, 7 patients were on 2 fewer AEDs but their change in MS varied from -12 to 5. The analysis indicates that MS may be a more useful indicator of efficacy of KT.

Calculating Med Score

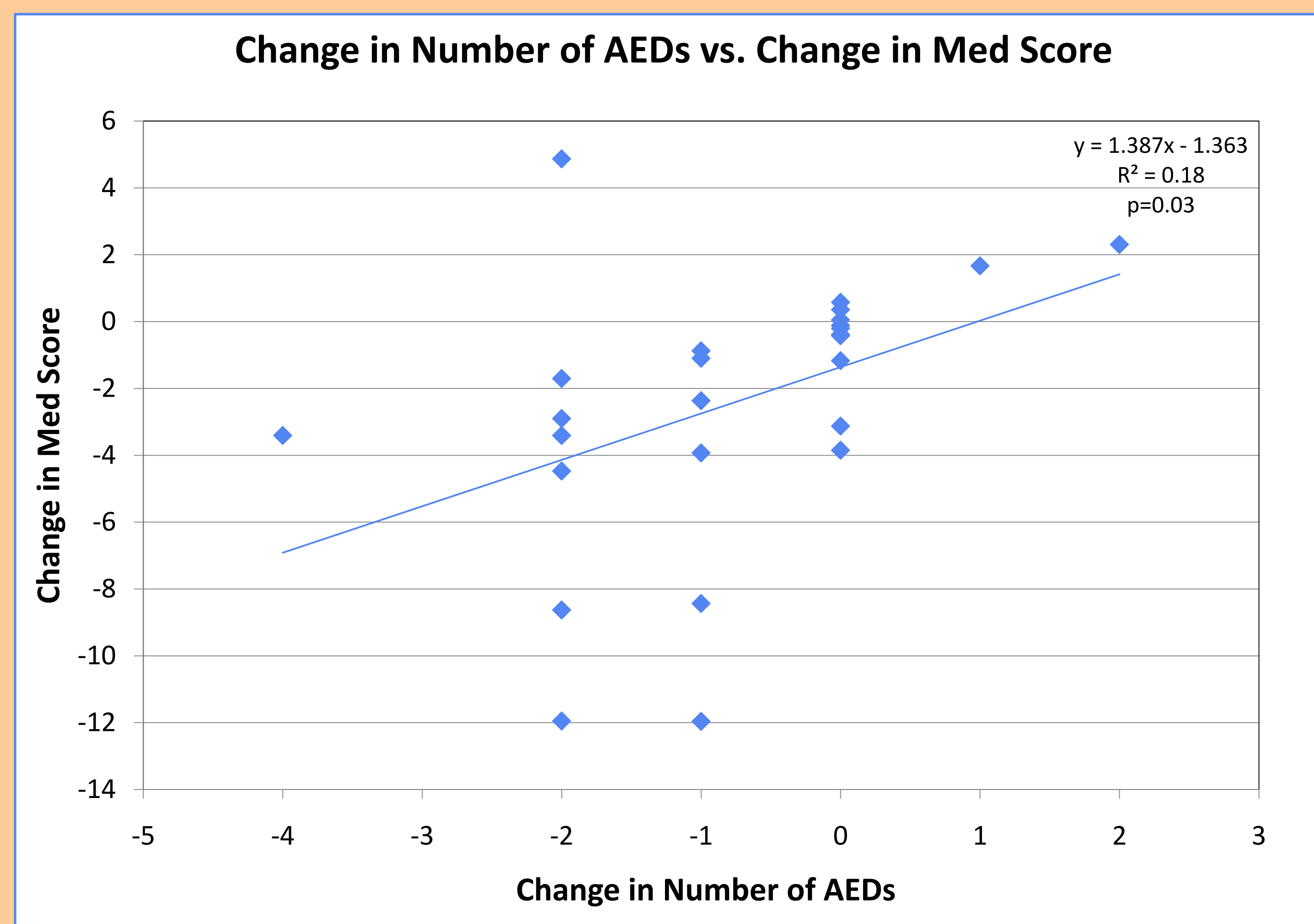


Introduction

In the early 1900s, it was seen that starvation reduced seizures in patients with epilepsy. Ketogenic therapy (KT), a diet high in fat, low in carbohydrate, and adequate in protein, is designed to mimic the effects of starvation to reduce seizures and anti-epileptic drugs (AEDs) in the pediatric epileptic population. AEDs can be used to measure efficacy because one would expect the medications and its dosages to decrease if the KT is effective in controlling seizures. To use reduction in AEDs as a means of efficacy, the AEDs must be quantified. Historically, the number of AEDs has been used to monitor efficacy. Yet, the number of AEDs is not a sensitive tool for measurement. For instance, a decrease in a dosage of a medication would not be reflected if one merely used the number of AEDs as a measure of efficacy. Similarly, dosages cannot be compared throughout time on diet or across patients as most medications are based on patient weight. To resolve the two issues, we have introduced a medication score (Med Score) which is the ratio of the prescribed dosage to the minimum recommended dosage, based on patient weight.

Number of AEDs vs. Med Score

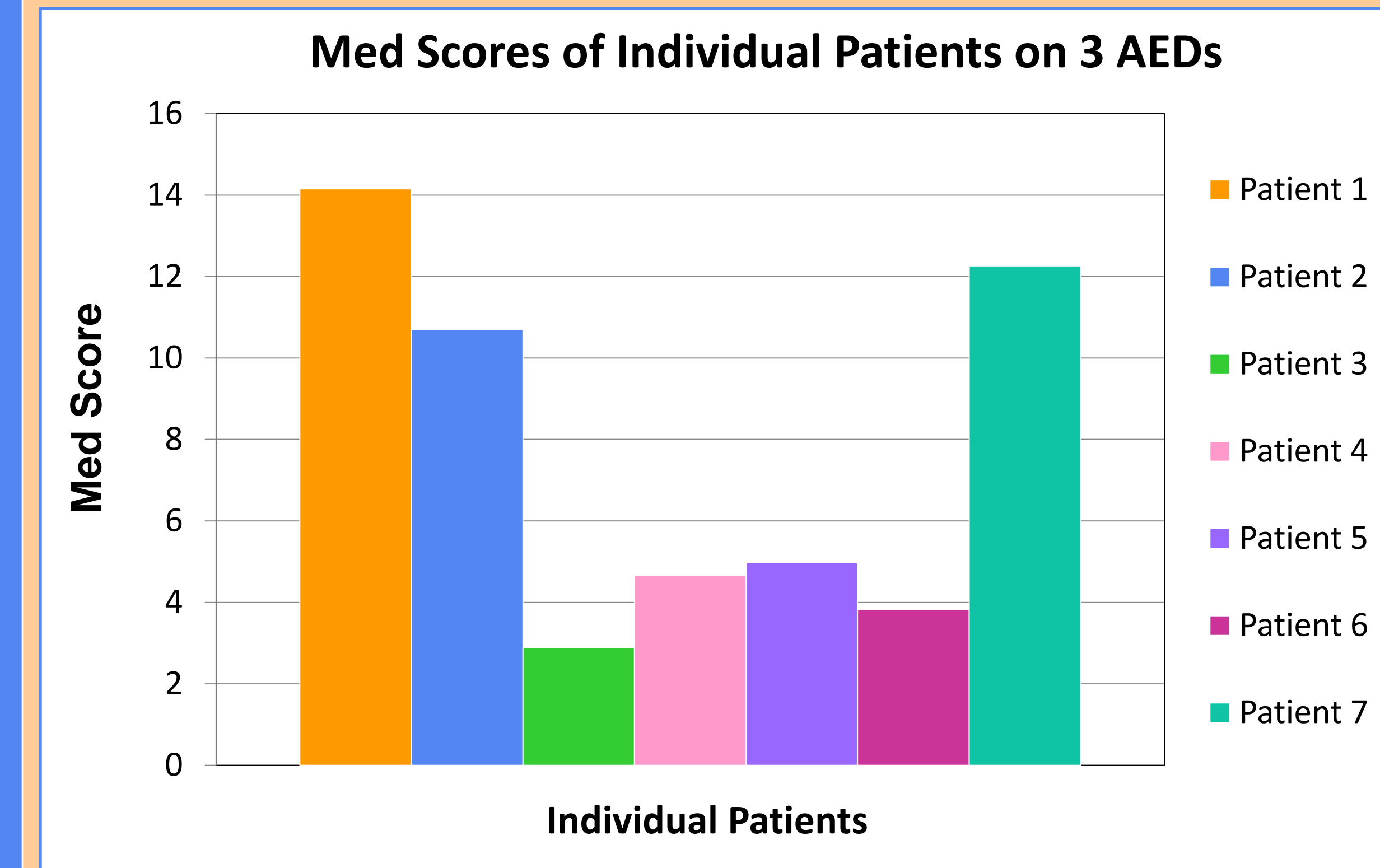
Thus far, the change in the number of AEDs has commonly been used to evaluate the efficacy of the KT. According to our data, the number of AEDs and the Med Score are significantly correlated ($p=0.03$) yet the correlation is weakly moderate ($R=0.42$). One would expect the two to be significantly correlated as the AEDs are part of the Med Score; however, despite the significance, the weakly-moderate correlation illustrates the two variables give different information. The Med Score is more comprehensive and possibly gives more information regarding AEDs.



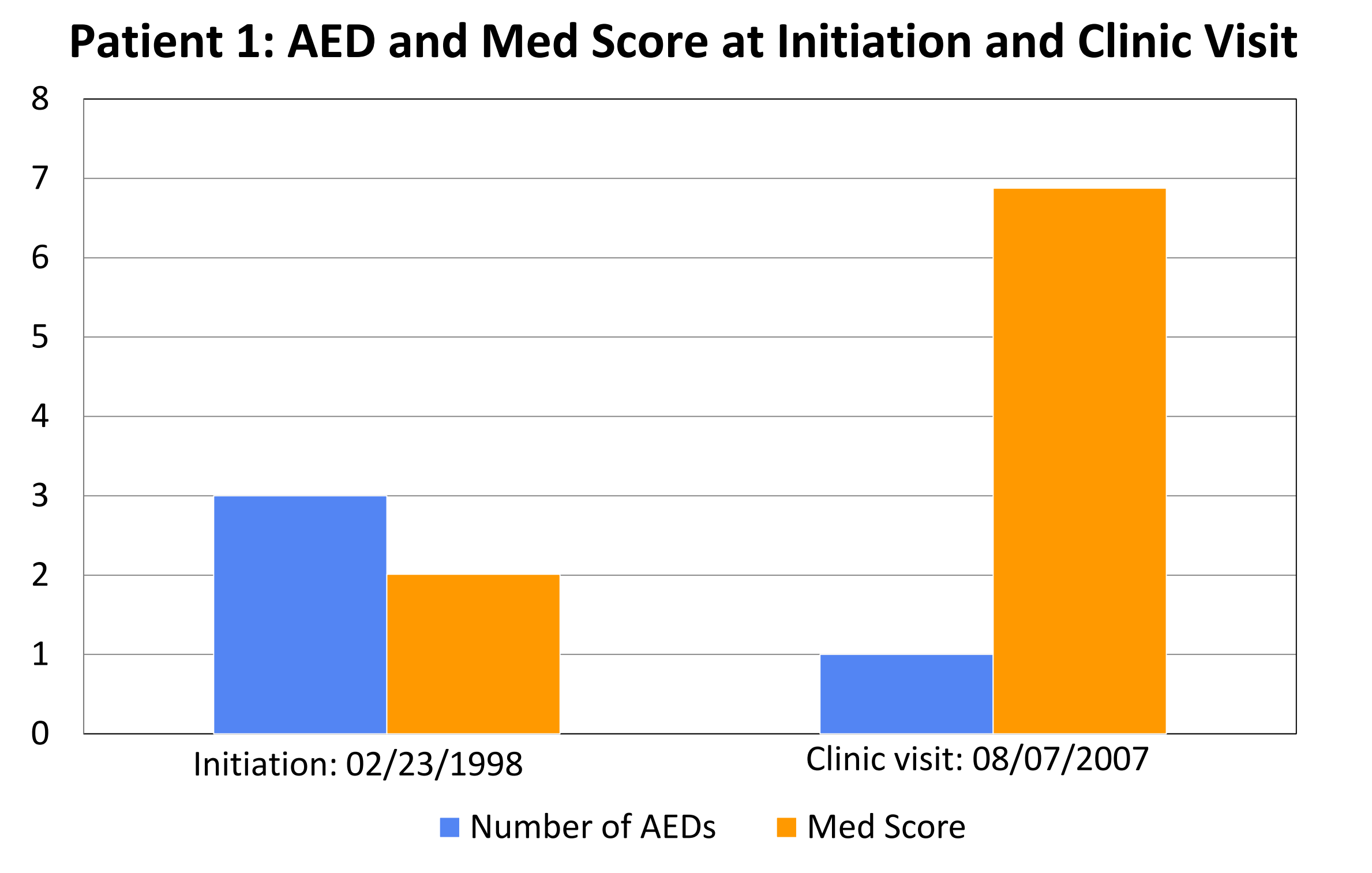
Materials and Methods

Anti-epileptic medication dosage information and weight were obtained for 31 prospective patients at their last clinic visits. Of the 31 patients, 26 had AED dosage and weight data available at initiation. From this information, Med Scores were calculated for each AED at initiation and at the patient's last clinic visit. A total Med Score was calculated by adding the individual Med Scores.

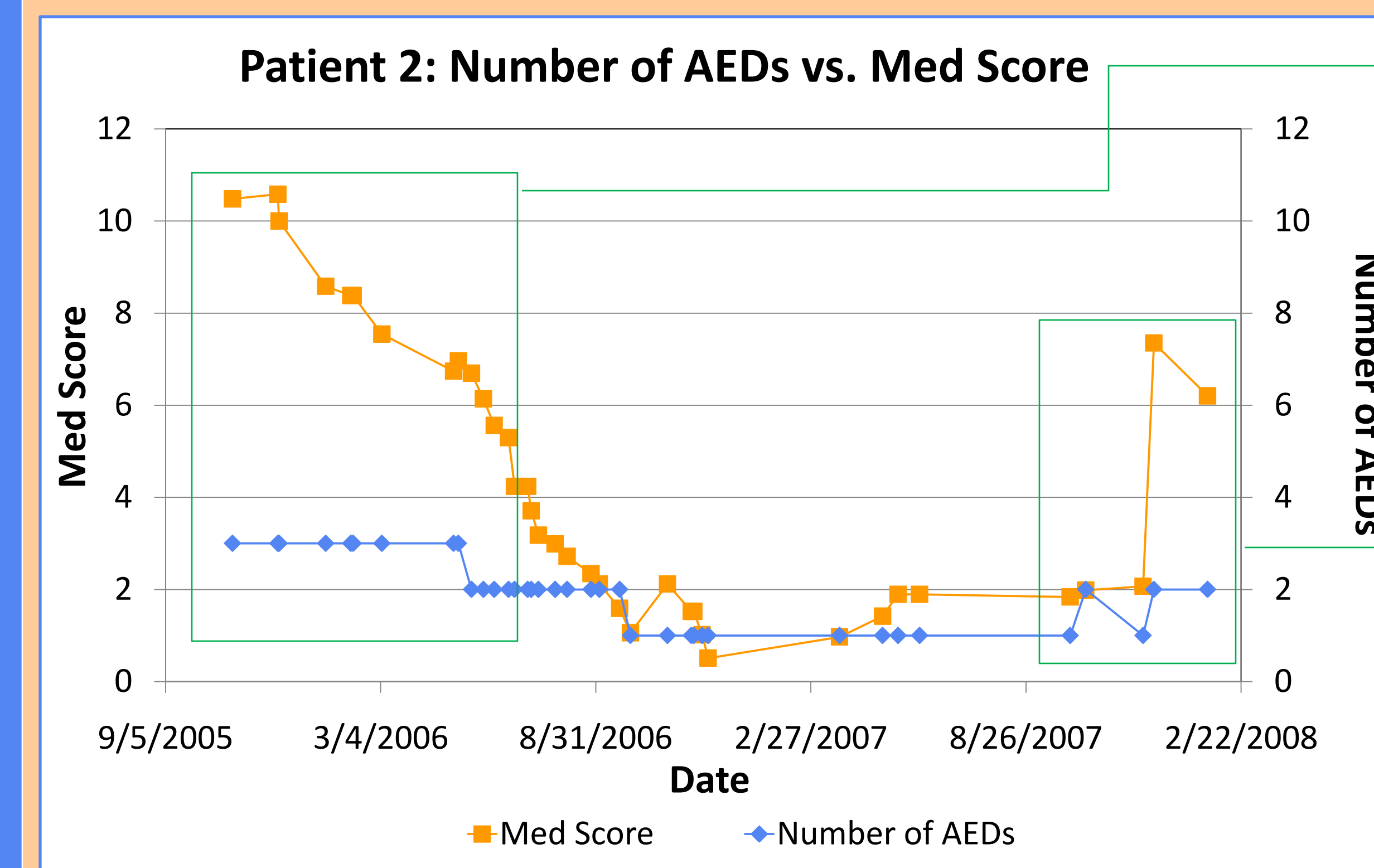
Results



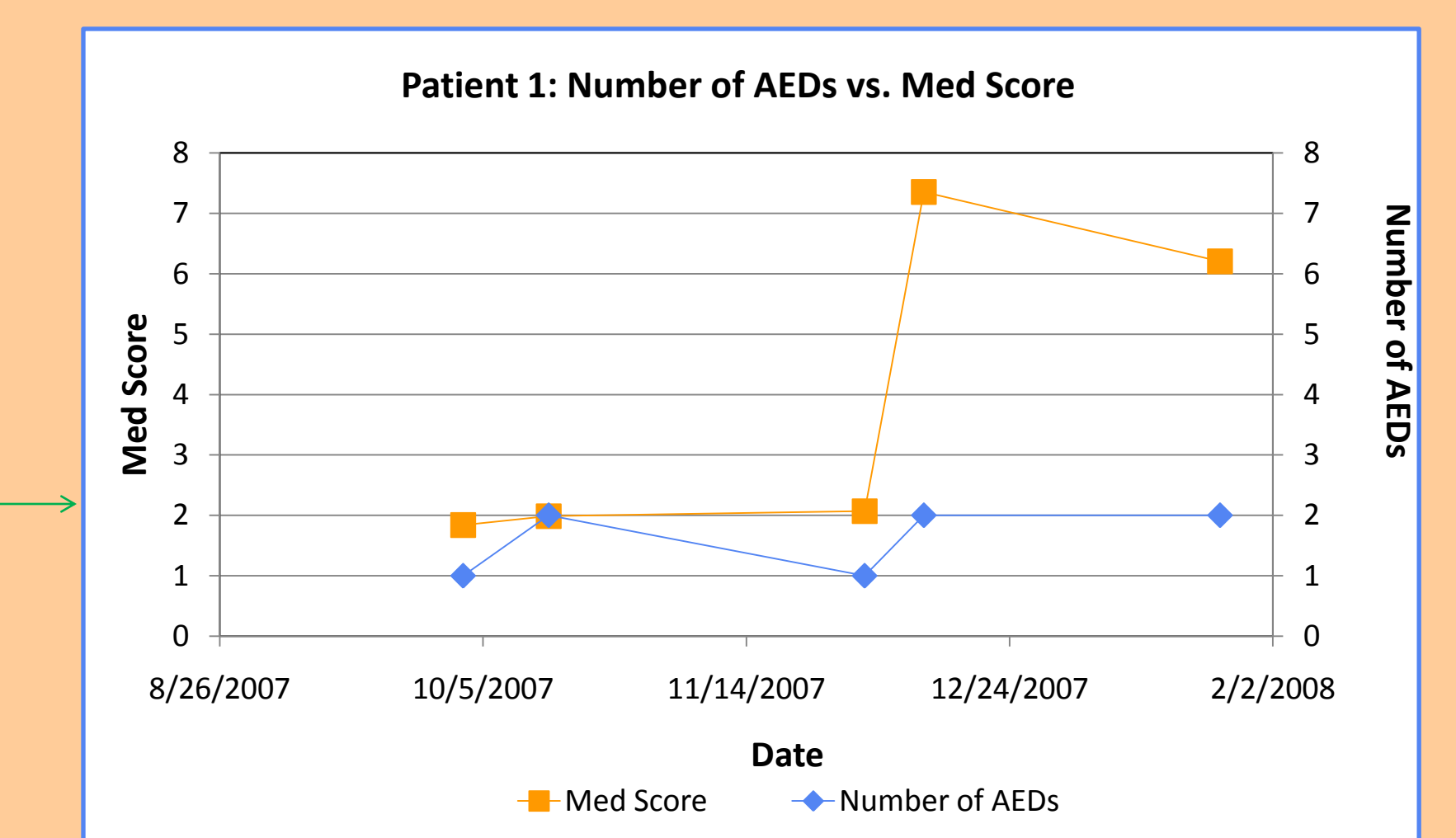
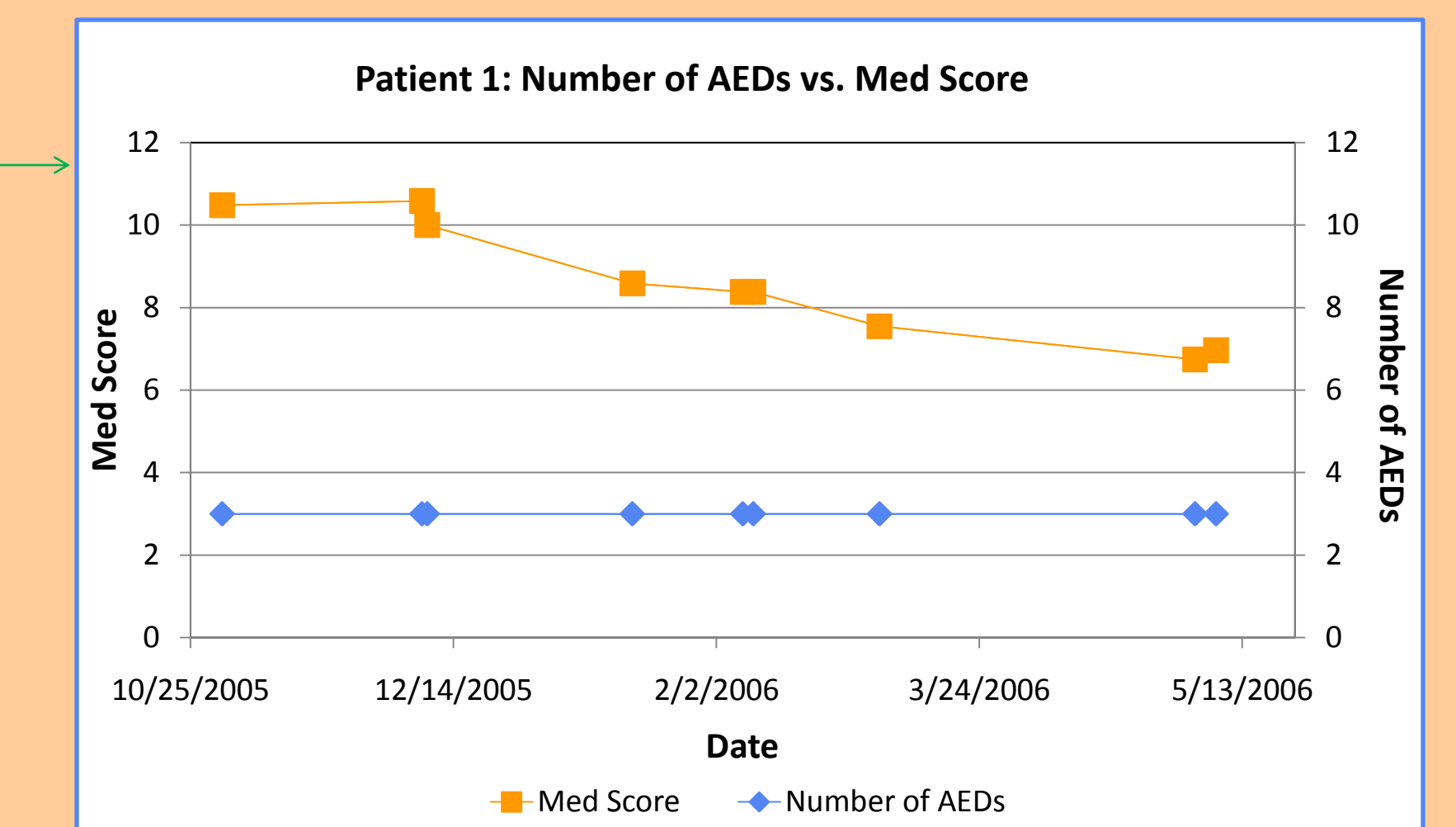
The figure contains Med Score data from 7 patients who are on 3 AEDs. Although the number of AEDs are the same, the Med Score ranges from 2.89 to 14.15. The data validate the sensitivity of the Med Score to changes in dosage of AEDs. Further, it illustrates the comprehensive nature of the Med Score.



The figure contains AEDs and Med Scores from a patient at Initiation and at a clinic visit. Although the AEDs decreased, suggesting the patient's health is relatively better, the Med Score has increased. The figure exemplifies the importance of dosage in addition to the number of AEDs.



The figure contains the AED and Med Score data for a patient throughout his time on diet. During the year 2006, the patient's Med Score decreased but the number of AEDs remained the same. During the end of 2007, the number of AEDs and Med Score differ in the interpretation of the patient's AEDs.



Conclusions

- Med Score takes into account the weight of the patient. As a patient gains or loses weight, the amount of medication per kg of weight is decreased or increased, respectively.
- Med Score is sensitive to situations where one AED may be decreased but the dosage of another is increased. Merely using the number of AEDs may give a false indication of a patient's progress.
- Different AEDs have different dosages, rendering cross-comparisons of number of AEDs impractical. Employing the Med Score, a patient's current medications can be compared to those in the patient's past as well as to those of other patients.
- Med Score conveys different information about the amount of medication than does the number of AEDs.