

# Using Smartphone Application to Guide the Angulation of Head End of Patient Bed

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Traditionally, neurological patients have been nursed in intensive care units (ICUs) and hospital wards with head end elevated at 30 to 45 degrees. Also, in mechanically ventilated patients, elevation of head end of the patient bed at 45 degrees has been proven to significantly reduce the incidence of aspiration and ventilator-associated pneumonia (VAP).<sup>1</sup> Indeed, ensuring head end elevation of at least 30 degrees is a part of almost all proposed VAP bundles that have documented lower VAP rates.<sup>2</sup> However, it has been seen that the application of this simple intervention remains low.<sup>3</sup> Reeve and Cook found that majority of mechanically ventilated patients were kept with angle of the bed elevated less than 30 degrees.<sup>4</sup>

We believe that part of this low implementation is due to lack of knowledge, hospital practices, etc. While some ICU beds have a mechanical indicator (a small bead that moves along a scale on the side rail of the bed), in many ICUs and in hospital wards, the beds may not have any indicator of angle of head end elevation. Also, in the present coronavirus disease 2019 times with many newly established ICUs, ICU beds with angulation indicators may not be available.

In such a scenario, one can use a free mobile application (Angle Meter, Smart Tool Factory, Istanbul, Turkey—available free on Google Play Store). This free app allows measurement of the angle of inclination of mobile phone. By simply tilting the mobile phone parallel to the head end of the ICU bed, the angle of head end elevation of bed can be determined (► Figs. 1 and 2). Using this app, one can ensure head end elevation of more than 30 degrees in ICU patients. This application can be utilized in places where ICU beds do not have head end elevation indicators. Presently, there is paucity of conclusive evidence suggesting the accuracy of these applications when used for this purpose, although mobile applications are



**Fig. 1** Mobile phone aligned parallel to head end of bed to determine the angulation of head end of bed.



**Fig. 2** Angle Meter application demonstrating angulation of head end of intensive care unit bed (33 degrees).

increasingly finding applications inside hospitals and ICUs. We conducted a study to determine this accuracy of the application using an ICU bed with a mechanical angle indicator and found that the application fares very well in determining the angle of angulation. We took a total of readings with the angulation of head end of bed varying from 20 to 70 degrees and found that readings by the two methods varied by less than  $\pm 5$  degrees on all occasions. Further research in this field may provide us with more definitive evidence on the topic.

#### **Conflict of Interest**

None declared.

#### **References**

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