Acoustic sensor versus electrocardiographically derived respiratory rate in unstable trauma patients.

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Respiratory rate (RR) is important in many patient care settings; however, direct observation of RR is cumbersome and often inaccurate, and electrocardiogram-derived RR (RRECG) is unreliable. We asked how data derived from the first 15 min of RR recording after trauma center admission using a novel acoustic sensor (RRa) would compare to RRECG and to end-tidal carbon dioxide-based RR ([Formula: see text]) from intubated patients, the "gold standard" in predicting life-saving interventions in unstable trauma patients. In a convenience sample subset of trauma patients admitted to our Level 1 trauma center, enrolled in the ONPOINT study, and monitored with RRECG, some of whom also had [Formula: see text] data, we collected RRa using an adhesive sensor with an integrated acoustic transducer (Masimo RRa™). Using Bland-Altman analysis of area under the receiver operating characteristic (AUROC) curves, we compared the first 15 min of continuous RRa and RRECG to [Formula: see text] and assessed the performance of these three parameters compared to the Revised Trauma Score (RTS) in predicting blood transfusion 3, 6, and 12 h after admission. Of the 1200 patients enrolled in ONPOINT from December 2011 to May 2013, 1191 had RRECG data recorded in the first 15 min, 358 had acoustic monitoring, and 14 of the latter also had [Formula: see text]. The three groups did not differ demographically or in mechanism of injury. RRa showed less bias (0.8 vs. 6.9) and better agreement than RRECG when compared to [Formula: see text]. At [Formula: see text] 10-29 breaths per minute, RRa was more likely to be the same as [Formula: see text] and assign the same RTS. In predicting transfusion, features derived from RRa and RRECG gave AUROCs 0.59-0.66 but with true positive rate 0.70-0.89. RRa monitoring

is a non-invasive option to glean valid RR data to assist clinical decision making and could contribute to prediction models in non-intubated unstable trauma patients.