

Revalidation of ACUITY 2016

Results indicate the continued accuracy of ACUITY 2016 equations

Introduction

Predictive models decline in accuracy over time, resulting in what appears to be significantly improved ICU performance. A major reason for this decline in accuracy is that event rates are changing over time due to improvements in medical technology and an increased ability to share clinical experiences through the internet and social media. An example of this is mortality before hospital discharge for admissions to ICUs which has showed a steady decrease over the past 10-15 years.

It is imperative therefore to periodically reevaluate predictive models in order to maintain their precision. Predictive models using contemporary ICU admissions are much better suited for retrospective benchmarking and to generate accurate, meaningful predictions for comparing ICU performance. One of the leaders in the field of predictive modeling is Dr. Andrew Kramer, Founder and CEO of Prescient Healthcare Consulting. In 2016 Medical Decision Network (MDN) engaged Dr. Kramer to update models that were existing in the market and also to develop a new equation for predicting the duration a patient remains on mechanical ventilation. The result of that work was ACUITY 2016.

At the end of last year MDN asked Dr. Kramer re-evaluate the validity of ACUITY 2016 for continued use to drive process improvement initiatives. The result of that work is shown in the tables below. The methodology developed to produce the original set of ACUITY 2016 equations was applied to ICU admissions from the MDN Phoenix database for the period 1/1/2016 through 10/31/2017. Results for the hospital mortality equation and the ICU LOS equation are shown in Tables 1 and 2, respectively.

Table 1. Revalidation of ACUITY 2016 Hospital Mortality Equation using admissions from 1/1/2016 – 10/31/2017

	ACUITY 2016
Observed	15.3%
Predicted	14.8%
SMR	1.035 (p>0.05)
AU-ROC	0.861

The hospital mortality equation continues to have excellent calibration and discrimination.

The SMR is not significantly different from 1.00 and the AU-ROC is above 0.85.

Table 2. Revalidation of ACUITY 2016 ICU LOS Equation using admissions from 1/1/2016 – 10/31/2017

	ACUITY 2016
Observed	3.66
Predicted	3.77
OMELOS (Hrs)	-2.8
R ²	0.20

The ICU LOS equation also has good accuracy. The difference between observed ICU LOS and predicted ICU LOS is just 2.8 hours, and the R² = 0.20.

Conclusion

These results indicate the continued accuracy of the ACUITY 2016 equations. The fact that ACUITY 2016 is viable on patients in 2017 makes it the most contemporary set of predictive equations available.

Coming Soon... ACUITY 2018

The next generation of the ACUITY equations will be ACUITY 2018, which is expected to be completed and available in the market by the third quarter of this year. These equations are “hands-free”, in that there is no manual data entry required. These new equations use data currently available in your EMR and will require no additional documentation. These equations will also incorporate Prescient Healthcare’s SIGNIPHY™ algorithms. SIGNIPHY is ground-breaking technology that utilizes physiologic data taken over the first four hours after ICU admission to group patients into mortality risk bands.

SIGNIPHY will set a new standard when it comes to managing ICU performance and will be available exclusively through MDN. To stay up to date on this technology and its’ impending release email MDN at Info@MDNLLC.net.