A new algorithm optimized for initial dose settings of vancomycin using machine learning

Shungo Imai, Yoh Takekuma, Hitoshi Kashiwagi, Takayuki Miyai, and Mitsuru Sugawara

1. Faculty of Pharmaceutical Sciences, Hokkaido University, 2. Department of Pharmacy, Hokkaido University Hospital, 3. Graduate School of Life Science, Hokkaido University

Background

In the DT algorithm, the eGFR, age, and BMI were extracted as predictive variables.

Materials and Methods

Study subjects

Excluded:
- Patients who received VCM intravenously November 2011–March 2013 (n = 1534)

DT model

The independent variables were age, sex, estimated glomerular filtration rate (eGFR), body mass index (BMI), concomitant medications, and combination medications (nonsteroidal anti-inflammatory drugs, amoxicillin, sulbactam, ampicillin/sulbactam, piperacillin/tazobactam, and vancomycin drug).

Model evaluation

The DT model

Aim: To construct an optimal algorithm for initial dose settings of VCM using ML with DT analysis

Results

Discussion

1. In the DT algorithm, the eGFR, age, and BMI were extracted as predictive variables.

2. Our DT algorithm obtained the highest rate of attaining the therapeutic range compared to conventional dose-setting methods.

3. The predicted trough value was calculated proportionally to actual and recommended daily doses of VCM. Therefore, these usages could not be considered.

4. Our DT algorithm does not comply with the new TDM guidelines regarding VCM.

5. The predicted trough value was calculated using the following formula:

6. The corrected daily dose was defined as the daily dose per body weight (BW) predicted to reach a trough value of 12.5 mg/L, calculated individually.

7. The independent variables were age, sex, estimated glomerular filtration rate (eGFR), body mass index (BMI), concomitant medications, and combination medications (nonsteroidal anti-inflammatory drugs, amoxicillin, sulbactam, ampicillin/sulbactam, piperacillin/tazobactam, and vancomycin drug).

8. The independent variables were age, sex, estimated glomerular filtration rate (eGFR), body mass index (BMI), concomitant medications, and combination medications (nonsteroidal anti-inflammatory drugs, amoxicillin, sulbactam, ampicillin/sulbactam, piperacillin/tazobactam, and vancomycin drug).

9. Concomitant medications, n (%)

10. Limitations

11. Clinical and regression tree algorithm was performed.

12. The corrected daily dose was defined as the daily dose per body weight (BW) predicted to reach a trough value of 12.5 mg/L, calculated individually.

13. The corrected daily dose was defined as the daily dose per body weight (BW) predicted to reach a trough value of 12.5 mg/L, calculated individually.

14. The corrected daily dose was defined as the daily dose per body weight (BW) predicted to reach a trough value of 12.5 mg/L, calculated individually.

15. The corrected daily dose was defined as the daily dose per body weight (BW) predicted to reach a trough value of 12.5 mg/L, calculated individually.

16. The corrected daily dose was defined as the daily dose per body weight (BW) predicted to reach a trough value of 12.5 mg/L, calculated individually.

17. The corrected daily dose was defined as the daily dose per body weight (BW) predicted to reach a trough value of 12.5 mg/L, calculated individually.

18. The corrected daily dose was defined as the daily dose per body weight (BW) predicted to reach a trough value of 12.5 mg/L, calculated individually.

19. The corrected daily dose was defined as the daily dose per body weight (BW) predicted to reach a trough value of 12.5 mg/L, calculated individually.