Automated Dose Checking and Intervention for Bariatric Patients

Yan Huang\(^a\), MA, Richard M. Reichley\(^a\), RPh, Laura A. Noirot\(^a\), BS, Wm Claiborne Dunagan\(^{a,b}\), MD, and Thomas C. Bailey\(^{a,b}\), MD

*From*\(^a\)BJC HealthCare and \(^b\)Washington University School of Medicine, St. Louis, Missouri

**Abstract**

According to a recent Center for Disease Control survey, 33% of the US population is obese. Because labeled dosing guidelines are based upon non-obese individuals, under dosing of antibiotics may be problematic in this population. We developed an automated dose checking tool to efficiently detect potentially inappropriate dosing of antibiotics in bariatric (morbidly obese patients).

**Introduction**

Previous studies recognized the challenges in caring for morbidly obese patients.\(^1\) The complexity of drug pharmacokinetics is one of the impediments to achieve optimal care in this population. In 2006, Barnes Jewish Hospital (BJH) was recognized as a Bariatric Surgery Center of Excellence by the American Society for Bariatric Surgery. As part of the continuous effort to improve the quality of care for its bariatric patient population, an internal group of physicians and pharmacists developed dosage guidelines for selected antibiotics based upon renal function and body mass index.

**Methods**

For dosage guidelines, we defined bariatric patients as having weight greater than 100kg and body mass index greater than 40kg/m\(^2\). Our existing automated dose checking tool uses a commercial rule base (Cerner Multum, Kansas City, MO) but dosing rules for bariatric patients are not included. Therefore, new bariatric dosage rules for ciprofloxacin, cefepime, piperacillin/tazobactam, cefazolin, and ceftoxitin were added to our executable clinical decision support (CDS) rule base. For every order for the selected antibiotics, the dose would be checked in real-time against the bariatric rules if the patient was identified as bariatric; otherwise, it was checked against the commercial rule base. Alerts were reviewed by pharmacists and their responses to the dosing recommendation were recorded.

**Results**

From October 2006 through January 2007, 3329 bariatric patients (7.3% of admissions) were admitted to BJH. There were 1589 drug orders for the selected antibiotics in 609 bariatric patients. Table 1 shows a summary of alerts for potentially inappropriate dosing. Approximately 50% of bariatric patients had at least one alerting order during his/her hospital stay.

97% of the alerts for bariatric patients were underdose alerts and 3% were overdose. For non-bariatric patients, 17% of the alerts were underdose and 83% were overdose.

**Discussion / Conclusion**

Underdosing of antibiotics in bariatric patients was a common problem at our institution. We are working to improve the effectiveness of the bariatric dosage rules and several issues have been identified. The bariatric rules have data dependencies on weight and height measurements which were not available electronically for 8% of the drug orders at the time of screening. Approximately 1% of the alerts were false positives due to erroneous weight or height entries. Furthermore the rules are very sensitive to weight change so that a slight weight gain or loss may cause contradictory dosing recommendations for ongoing therapy.

Given the prevalence of obesity in the US, bariatric dosage rules for more drugs are needed but the authoring and validating process is challenging. It is our hope that commercial knowledge vendors will be encouraged to develop bariatric rules to facilitate rapid and wide-scale deployment.

**Reference**