A multidisciplinary effort in reducing antibiotics usage by Use of Antibiotic Prophylaxis Guideline and Sepsis Marker (Procalcitonin)

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Introduction
In late 2011, neurosurgery wards were troubled by the rising trend of Vancomycin resistant Enterococci (VRE) identified in their patients. Broad spectrum antibiotic usage, including Vancomycin and third generation cephalosporin, like ceftriaxone, was thought to be one of the culprits. An antibiotic stewardship workgroup was hence formed to tackle the problem. A two-prone approach was adopted, including the implementation of antibiotic prophylaxis guidelines for neurosurgical operation, and use of Procalcitonin. Procalcitonin is one of the new generation sepsis markers. It is a precursor hormone of calcitonin and is produced ubiquitously in respond to bacterial infections, and its dynamic closely correlate with the extent and severity of bacterial infections. It is regarded as a more specific and has a higher positive predictive value than CRP as a sepsis marker. It has better predictor than CRP especially for patient with sepsis and pneumonia and has been used as guide for antimicrobial treatment.

Objectives
The objective is to study if the antibiotic workgroup can effectively reduce broad-spectrum antibiotic usage

Methodology
The antibiotic workgroup consisted of Neurosurgeon, Infectious Disease physician, Clinical Microbiologist, and Infectious disease pharmacist. The “Antibiotic Prophylaxis Guidelines for Neurosurgical Operation” was drafted and implemented to the Department of Neurosurgery, stipulating the appropriate prescription and correct duration of broad-spectrum antibiotics including vancomycin and ceftriaxone.
Procalcitonin was used as a guide to assist decision of antibiotic prescription. Its performance characteristics were made known to neurosurgeons: When the reading is less than 0.5µg/L, sepsis is unlikely and antibiotics withdrawal is encouraged. When the reading is ≥0.5µg/L and <2µg/L possible sepsis and close monitoring is encouraged. When the reading is ≥ 2µg/L, clinical sepsis is likely. Difficult or doubtful cases will be reviewed by clinical microbiologists or infectious disease team for decision. Vancomycin and ceftriaxone usage was monitored by Infectious Disease pharmacist.

**Result**

The consumption of vancomycin (IV) and ceftriaxone (IV) in QEH NS specialty before and after ASP meeting (in 2011-4Q) were compared. Consumption of vancomycin (IV) decreased by 37.1%, from 49.87 DDD/1,000 patient days (2010-2011) to 31.37 DDD/1,000 patient days (2012-2013), (p<0.05, two-sided, by Z-test for two poisson means). Significant linear decreasing trend is also observed in the quarterly vancomycin consumption data (negative value in the estimated coefficient of “time” in linear regression model is significantly different from zero (p <0.05) with moderate level of r-square (0.561), which indicates the model is moderately fitted). Although the consumption of ceftriaxone (IV) also decreased by 9.8%, from 144.19 DDD/1,000 patient days (2010-2011) to 130.04 DDD/1,000 patient days (2012-2013), (p<0.05, two-sided, by Z-test for two poisson means), no significant linear trend are observed in the quarterly ceftriaxone consumption data before and after the ASP meeting. Estimated coefficients of “time” in linear regression model are not significantly different from zero in both periods (p>0.05) and weak level of r-square (0.011 before meeting and 0.057 after meeting) indicate there is no significant relationship between the change of ceftriaxone consumption and time. In conclusion, Our antibiotic stewardship workgroup have successfully brought down the usage of vancomycin. It must be emphasized that our work cannot be realized without the support from all the staff in the department of neurosurgery. We belief our work might have been the first step towards the ultimate control of VRE.