Identifying the Factors Causing Revenue Loss from a Pyxis Medstation

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Abstract

M.D. Anderson Cancer Center uses the Pyxis Medstation 4000 system as the primary source of medications on the nursing unit. However, as usage increases, the human error potential also increases, leading to lost revenue. The effect selection in the framework of general linear models showed that Drug Unit Cost, Dosage Form and Medication Class were the top three factors for inpatient lost revenue; and Drug Unit Cost, Dosage Form and Station Group were the top three factors for Ambulatory Treatment Center (ATC) lost revenue.

Introduction

The Pyxis Medstation was developed by CareFusion (originally Pyxis Corporation), and has been available since 1990. The software uses barcode scanning to ensure that the intended medications are removed from the Pyxis, as well as providing access to the proper storage pocket upon medication refill. The result is a reduction in patient wait time, more efficient use of nursing time, and assurance that the proper therapy will be administered to the patient.

The University of Texas MD Anderson Cancer Center uses Pyxis 4000 for hospital medication dispensing. There are an average of 17,700 Pyxis vend transactions daily in multiple nurse stations and clinics. Human error can occur during the transactions, such as miscounts or incorrectly documented removals, causing the institution to lose over one million dollars in potential revenue annually. Thus, identifying the source of the loss for both inpatient and the ATC areas would be the first step toward mitigating the problem, and reversing revenue shortfall.

Data Source and Analysis Method

There are over 200 Pyxis machines in inpatient nursing stations and outpatient clinics in the hospital. The inpatient and ATC transaction data from 2007 to 2011 were collected through Brio Intelligence 6.6.4 against a DB2 database. The lost revenue was calculated based on the drug cost (average wholesale price) and the discrepancy quantity and the special formula for charges.

The Lost Revenue was selected as the dependent variable. Service Center (IP), Station Group (ATC), Medication Class, Dosage Form, Transaction Type, Drug Unit Price, Subdrawer, Blind Count, Shift Worked, Week Number and Weekday were selected as independent variables for the dataset. The values of potential lost revenue were applied with log transform to make the data in normal distribution. The effect selections in the framework of general linear models were used to assess which independent variables impact most on the lost revenue, and stepwise selection with corrected Akaike Criterion (AICC) method was used in model selection (SAS 9.2).

Results

There were 73,234 transactions (inpatient area) and 14,708 transactions (ATC area) associated with negative discrepancies. Multivariate analysis shows that 9 out of the 10 selected independent variables were significant on the lost revenue for inpatient ($P<.0001$). The exception was Weekday. Seven out of the 10 selected independent variables were significant on the lost revenue for ATC ($P<.0001$). The exceptions here were Weekday, Week Number and Transaction Type. For inpatient, the effects on the lost revenue (AICC) from large to small were Drug Unit Price, Dosage Form, Medication Class, Subdrawer, Blind Count, Transaction Type, Shift Worked and Week Number. For ATC, the effects on the lost revenue (AICC) from large to small were Drug Unit Price, Dosage Form, Station group, Subdrawer, Blind Count, Medication Class and Shift Worked.

In each independent variable, according to Pareto charts for inpatient, drug unit price “< $50” accounted for 47.03% of the lost revenue; Dosage form “IV solution” accounted for 65.24% of the lost revenue; “Critical Care”, “Leukemia” and “Bone and Marrow Transplantation” accounted for 41.05% of the lost revenue. “Subdrawer” accounted for 73.95% of the lost revenue. On the ATC side, drug unit price “< $50” accounted for 50.36% of the lost revenue; Dosage form “IV” accounted for 90.69% of the lost revenue; and station “R2”, “R10”, “ATCRX” and “Emergency Center” accounted for 66.95% of the lost revenue.

References