Impact of CPOE Order Sets on Lab Orders

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Abstract: *Introduction of the computerized physician order (CPOE) is intended to promote best practices, decrease practice variation among practitioners, and optimize the utilization of resources consistent with evidence based practice guidelines. Implicit in the use of CPOE is the assumption that the use of order sets might decrease utilization of resources such as the ordering of unnecessary laboratory tests. Conversely compliance with practice guidelines may necessitate ordering of certain tests that are deemed to be consistent with the good practice of medicine. In order to develop an understanding of these issues, we compared the utilization of laboratory orders prior to and following implementation of order sets in CPOE. In addition, we analyzed the impact of CPOE on the timely placement of certain orders based on critical levels of some laboratory results, in this instance potassium.*

Methods: The analysis was conducted at the Ohio State University Medical Center's Information Warehouse (IW), which captures all transactions done through CPOE, as well as laboratory results, and allows for the analytical creation of relationships between other clinical information on the patient such as diagnosis relating groups (DRG), ICD9 diagnosis, and diagnostic procedures. For this analysis, we used lab transactions generated by the CPOE system and from manual paper orders prior to CPOE implementation.

Results:
Lab Order Volume: High-level analysis indicates that irrespective of the disease, the average number of laboratory orders per patient increased by approximately 50% over a two-year period. More detailed analysis of the number of laboratory orders per DRG (Figure 1) indicates that in the majority of medical DRGs, the average laboratory orders per patient have increased. This accounts for most of the increase in the lab orders outlined above. By comparison, in the majority of instances the average laboratory orders per patient in surgical DRGs have decreased. The reasons for these differences are not clear. One can only speculate that prior to the implementation of CPOE, many of the ingredients of the laboratory order tests incorporated in CPOE had not been a pattern of practice on medical services. Whereas in surgical services, one might speculate that physicians practice more standardized or "protocol" medicine, thus the implementation of CPOE simply refined these protocols.

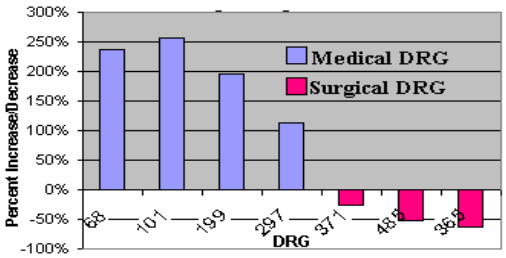

FIGURE 1: Percent change in avg. lab orders per patient

Turnaround Time: An important consideration in any computerized system is to assess the impact on timely delivery of care. In this respect, we measured the interval between the reporting of a critical potassium value and the time taken to correct it.

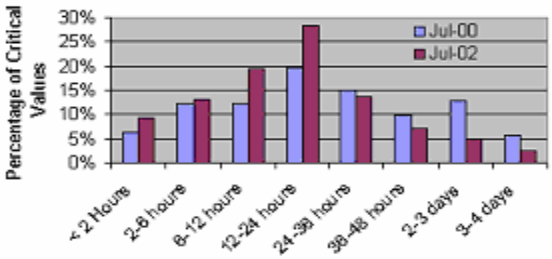

Figure 2: Percentage of critical values of potassium by normalization time

Figure 2 outlines the breakdown of the time intervals it takes to normalize potassium levels. The implementation of CPOE improves the time interval for the correction of potassium values in our patients. More specifically, turnaround time to normalize critical potassium levels within 24 hours increased from 50% in the pre CPOE period in July 2000 to 70% in the post CPOE period in July 2002.

Conclusion: The introduction of order sets derived from best practices in to the computerized order sets produced, in general, an increased utilization of laboratory orders. There were differences however between surgical and medical DRGs. Secondly the introduction of CPOE improved the time interval between reporting of the critical level of potassium and the correction of that value. This suggests that CPOE had a positive impact on timely intervention and thus potentially contributing to favorable outcomes.