

# Computerized Provider Order Entry in the Emergency Department: Pilot Evaluation of a Return on Investment Analysis Instrument

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*The Vanderbilt Center for Better Health conducted a workflow analysis study to determine the benefits of implementing a computerized provider order entry system in the adult Emergency Department. Time savings by role was 1619 hours/year for nurses, 815 for medical receptionist, -95 for attendings, and -100 for residents. Translating time savings into bottom line savings (FTE/overtime reduction, additional charges) resulted in \$31,424 in time savings and \$40,000 cost savings (paper forms).*

**Background:** The implementation of information technology in healthcare faces continued resistance. One reason for this resistance is the difficulty of predicting and calculating the actual post-implementation savings, particularly savings related to improved workflow processes and other intangible benefits. The Vanderbilt Center for Better Health worked with the Owen Graduate School of Management to create a return-on-investment tool, called O<sup>2</sup>I (Outcome on Investment). O<sup>2</sup>I is a database-driven tool and methodology that measures the outcomes of technology implementations. The O<sup>2</sup>I workflow analysis components were piloted as part of the computerized provider order entry (CPOE) implementation in our Emergency Department (ED).

**Methods:** Prior to CPOE implementation we interviewed ED project team members, physicians, staff and administrators to determine and analyze workflow differences before and after implementation. A time study was completed for each impacted workflow step and entered into the O<sup>2</sup>I tool. The workflow analyses, interviews and time studies were repeated one month after CPOE implementation. O<sup>2</sup>I calculated the time savings associated with the change in workflow by multiplying the time savings on workflow steps by the number of times per year each task was completed. Time savings were

discussed with ED staff members to determine how the time savings would actually be realized – if the saved hours would be turned into additional charges, FTE reduction, reduced overtime or absorbed with employees performing non-revenue generating activities with the additional time. True implementation savings were calculated by multiplying the overtime hours by 1.5 times the hourly rate, the reduced FTE by the loaded FTE cost and the additional charges by charges per hour.

**Results:** Total savings was estimated at \$71,424 (time savings: \$31,424; cost savings: \$40,000). 1) *Time Savings:* Most savings was realized for the medical receptionist (815 hrs/yr) and the nurse (1,619 hrs/yr) due to reduced handling of paper-based orders. The CPOE system required more time from attendings (95 hrs/yr) and residents (100 hrs/yr). The realized time savings are shown in Table 1. Attending and resident time savings were absorbed. The saved nursing hours (25%) were attributed to reduced overtime pay and the rest absorbed. Efficiencies in the medical receptionist role translated into not hiring another FTE when the department expanded. The medical receptionists also assumed new responsibilities from the nurses, who spent more time with patients. The net was increased staff satisfaction. 2) *Cost Savings:* The CPOE implementation decreased the amount of required paper forms in the ED, which resulted in \$40,000 annual savings.

**Discussion:** This study improves on earlier benefits realization studies by looking at time saved, then determining how the time saved will be reflected on the bottom line. We looked at how hours saved would result in reduced FTEs, overtime or additional charges. From this we learned that much of the time savings was absorbed in the system rather than impacting the bottom line.

Table 1: Hours Saved Translated into Savings

Role	Hours	FTE Reduction			Overtime Reduction			Additional Charges		Absorbed	Total Savings
		%	FTE	\$	%	Hours	\$	%	\$		
Physician	-95	0%	0	\$ 0	0%	0	\$ 0	0%	\$ 0	100%	\$ 0
Resident	-100	0%	0	\$ 0	0%	0	\$ 0	0%	\$ 0	100%	\$ 0
ED Nurse	1619	0%	0	\$ 0	25%	405	\$20,878	0%	\$ 0	75%	\$ 20,878
ED MR	815	80%	.38	\$10,546	0%	0	\$ 0	0%	\$ 0	20%	\$10,546
<b>Total Savings</b>											<b>\$ 31,424</b>