

Impact of Barcode Medication Administration Technology on How Nurses Spend Their Time On Clinical Care

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ABSTRACT: In a time-motion study conducted in a hospital that recently implemented barcode medication administration (BCMA) technology, we found that the BCMA system did not increase the amount of time nurses spend on medication administration activities, and did not compromise the amount of time nurses spent on direct care of patients. Our results should allay concerns regarding the impact of BCMA on nursing workflow.

BACKGROUND: A significant number of hospitals are deploying barcode medication administration (BCMA) technology to improve inpatient medication safety. However, implementation of this technology requires significant changes in workflow for nurses, potentially causing them to spend more of their professional time on administering medications rather delivering other forms of direct patient care. We therefore conducted a time-motion study of BCMA technology to address this concern.

METHODS: We conducted our study in a 735-bed tertiary care hospital that was methodically rolling out, with extensive training and support, a locally-developed version of BCMA technology in its medical, surgical and intensive care units. Trained observers conducted 2-hour observation sessions in which the observer recorded the activities of a single nurse using a validated nursing activity task list. Observers conducted these sessions before the deployment of BCMA technology and resumed them within 9 weeks of BCMA deployment. Nursing activities were divided into 3 major groups: i) medication administration related activities, ii) direct care of patients unrelated to medication administration, and iii) other non-medication administration, non-direct physical care activities. We compared the proportion of time spent on each major activity group between the pre and post observations. As a secondary analysis, we classified all activities into those that were either sensitive to BCMA deployment (e.g. documentation of medication administration) or insensitive to BCMA (e.g. looking

for patient equipment). To account for possible confounding, we measured the type of patient care unit, time-of-day, and the number of patients the nurse was caring for during each observation. We built multi-variable repeated-measures linear regression models to adjust for potential confounders and repeated observations on the same nurses during the study.

RESULTS: We conducted a total of 232 2-hour observations sessions between 2/2005 and 10/2005, evenly split between pre-BCMA and post-BCMA units, giving us 85% power to detect an absolute difference of 4% in the proportion of time spent, or 5 minutes per 2-hour observation. Overall, the proportion of time nurses spent on the major activity groups remained stable. Before BCMA implementation, nurses spent 26.5% of their time on medication administration. After BCMA implementation, this proportion remained statistically unchanged at 24.5% (Wilcoxon Ranked-sum test, $p=0.22$). The proportion of time nurses spent on direct care activities unrelated to medication administration remained statistically unchanged (pre-BCMA 20.1%, post-BCMA 23.7%; Wilcoxon, $p=0.15$). The secondary analysis showed that the proportion of time spent on all BCMA-sensitive activities decreased significantly from 38.3% to 33.4% (Wilcoxon, $p<0.001$). After adjusting for confounders and repeated observations on the same nurses, the conclusions of the bivariate analyses remained unchanged.

CONCLUSIONS: A well thoughtfully-designed, methodically-implemented and fully-supported BCMA system did not increase the amount of time nurses spend on medication administration activities, and did not compromise the amount of time nurses spent on direct care of patients. Activities related to the use of BCMA may also have become more efficient, allowing nurses to spend more time on other professional activities. Our results should help to allay concerns regarding the impact of BCMA on nursing workflow and quantity of direct nurse-patient interaction.