Adoption of Mobile Technology in Anesthesia Workflows: A Quantitative and Qualitative Analysis

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Introduction: Healthcare providers have access to new technologies to assist in improving efficiency and effectiveness of care. Electronic medical records (EMRs) as accessed through desktop-based applications are widely available in major academic medical centers, while mobile-based applications are a more recent development. Mobile-based EMRs offer providers convenient access to information regarding patient investigation status and conditions[1]. Within anesthesiology, EMRs can serve as anesthesia information management systems and patient handoff guides. The usage of and barriers for mobile EMRs within the anesthesia workflow have not been well explored previously and is the focus of this present study.

Methods: We performed a qualitative and quantitative analysis of mobile EMR usage by clinical providers within the Department of Anesthesiology at Vanderbilt University Medical Center (VUMC). VUMC utilizes Epic as its EMR, and Haiku is Epic's mobile application for providers. Data collected for this study include user role, National Provider Identifier (NPI), SmartTool usage, and recent Epic Haiku application usage for the department. Provider NPIs were used to query the NPPES NPI Registry for provider gender and NPI enumeration date, which was used to estimate years in practice. Provider usage of personalized SmartTools, including SmartPhrases, SmartTexts, and SmartSets, was extracted from the EMR and used to generate a score from 0 to 4 to serve as a proxy for technology savviness. A multivariate logistic regression was fitted to the data. A 16 item questionnaire was adapted from an existing, validated instrument, using a modified Delphi method[2]. The questionnaire was distributed to Haiku non-adopters, defined as providers who had not logged into Haiku within the past 30 days. The questionnaires were completed between April and May 2021 and the frequency distribution of questionnaire responses were analyzed.

Results: 490 clinical providers were identified in the Department of Anesthesiology. 107 Student Registered Nurse Anesthetists were excluded due to lack of NPIs. Of the remaining 362, there were 88 physicians (24%), 72 residents (20%), and 202 Certified Registered Nurse Anesthetists (CRNA; 56%). 266 providers (73.5%) had recently used Haiku, 55 (15.2%) had not recently used Haiku, and 41 (11.3%) had never used Haiku. Using a multivariate logistic regression, only provider role of resident (odds ratio, 3.55; 95% CI, 1.30-9.71; P < 0.05) and CRNA (odds ratio, 2.06; 95% CI, 1.10-3.85; P < 0.05) increased the likelihood of recent Haiku use. Logistic regression fit parameters are shown in Table 1. 27 questionnaires were completed out of 107 sent with a response rate of 25.2%. Among non-adopters, 16 (59%) disagreed that Haiku would improve job performance, 15 (56%) were worried about draining phone battery and having VUMC applications on their personal phone. 17 providers (63%) would use Haiku if provided a smartphone for that purpose.

Table 1. Logistic Regression Fit Parameters

	Reference Category	Odds Ratio (95% CI)	p-value
Provider Role			
Resident	Attending	3.554 (1.301, 9.709)	0.013
CRNA		2.060 (1.104, 3.845)	0.023
Gender			
Female	Male	1.145 (0.686, 1.909)	0.605
Years in Practice			
5-10 years	0-5 years	0.570 (0.255, 1.276)	0.172
10-15 years		0.496 (0.232, 1.062)	0.071
15+ years		0.730 (0.243, 2.189)	0.574
SmartTool Usage		1.119 (0.812, 1.541)	0.491

Conclusion: Provider characteristics including resident or CRNA role increase the likelihood of mobile EMR use. Non-adopters do not believe that mobile EMR use would increase job performance. Institutionally provisioned devices are likely to increase use of mobile EMR within anesthesia workflow.

References: 1. Kim J, Lee Y, Lim S, Kim JH, Lee B, Lee JH. J Med Internet Res. 2017 Oct 18;19(10):e340. 2. Lin C, Lin IC, Roan J. J Med Syst. 2012 Jun;36(3):1965-77.