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Athletic Training Students' Use of Health Information Technology Professional Behaviors During Clinical Experiences: A Report from the AATE Research Network

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Context: As an essential core competency for high-quality healthcare, health information technology (HIT) leverages the use of technology, such as electronic record systems, to collect and use patient care information to make informed clinical decisions. There is a dearth of information regarding professional athletic training students' (ATSs') use of HIT professional behaviors during clinical experiences. **Objective**: To assess HIT professional behaviors ATSs engage with during clinical experience patient encounters (PEs). **Design**: Multisite panel design. **Setting**: 12 professional athletic training programs. **Participants**: 363 ATSs enrolled across the participating professional athletic training programs entered patient encounter information within E*Value during their scheduled clinical experiences. **Data Collection and Analysis**: Characteristics of PEs (length of encounter, student role, clinical site type) were tracked in E*Value by students over three semesters. We used generalized estimating equation models to analyze the likelihood that students included HIT professional behaviors during 30,518 PEs. **Results**: Clinical site type (p=0.04), length of encounter (p<0.001), and student role (p<0.001) had the greatest influence on students' documentation of PEs in electronic records systems; PEs occurring at the college/university setting, longer PEs, and full student autonomy increased the likely of this professional behavior. Length of encounter (p<0.001) and clinical site type (p<0.001) influenced students' use of information documented in electronic records systems to assist with clinical decision-making; PEs longer than 60 minutes and PEs in the clinic setting increased this professional behavior likelihood. **Conclusions**: Since HIT is integral to providing high-quality patient care, and its use is developed and improved upon across the continuum of the professional career, program administrators and preceptors must seek out opportunities for students to engage in HIT behaviors during clinical experiences. Secondary school clinical sites, sites that typically have shorter patient encounters, and preceptors that offer less autonomy are most in need of intentional efforts toward HIT inclusion.

Abstract Word Count: 300/300

Key Words: healthcare informatics, patient care documentation, electronic medical record, patient encounters

Key Points:

- Length of encounter, student role, and clinical site were all associated with whether a student documented information collected during a patient encounter in an electronic records system. Longer encounters, students performing the encounter, and encounters occurring at a college/university setting increased electronic records system documentation practices.

- Students who engaged with patient encounters lasting longer than 60 minutes or encounters in the clinic setting were more likely to use information from an electronic records system to assist with clinical decision-making.

- Patient encounter characteristics linked with the implementation of no HIT professional behaviors included (1) student observation of the patient encounter, (2) patient encounters

occurring in the secondary school setting, and (3) patient encounters that were shorter in duration (i.e., 1-15 minutes).

- Patient care documentation in an electronic records system is a central underpinning of HIT. To ensure HIT professional behaviors are embodied by ATs, it is essential that high quality patient care documentation is being modeled to students during clinical experiences.

More than 20 years ago, the Institute of Medicine disseminated recommendations to address the status of the existing healthcare system in pursuit of improving the efficiency and outcomes associated with patient care.[1,2] These recommendations were derived, in part, from recommendations released ten years prior by the PEW Health Professions Commission for competencies that should be incorporated into the preparation of healthcare providers.[1,3] The core competencies that were ultimately recommended and adopted included providing patient-centered care, employing evidence-based practice, applying quality improvement, working in interdisciplinary teams, and using health information technology (HIT).[1] HIT leverages technology to use data, patient information, and knowledge effectively to improve patient outcomes and healthcare system efficiencies.[1,2,4,5]

The Commission on Accreditation of Athletic Training Education (CAATE) first introduced HIT into athletic training education accreditation standards for post-professional degree and residency programs in 2014.[6,7] It wasn't until 2020 that HIT was explicitly required in the professional preparation of athletic trainers.[8] Today, professional athletic training programs are required to prepare students to use information and data accessed from databases and other sources to drive clinical decision-making.[8] They must understand how to use electronic health records to manage patient data and maintain data privacy. Graduates of professional athletic training programs should be able to use contemporary classification systems and terminology in the delivery and documentation of patient care among other HIT behaviors (Figure 1).[8]

Entry-level athletic training education appears to be situated comparably among our peer professions education programs relative to the preparation of graduates to engage with HIT behaviors in clinical practice. Physical therapist education accreditation standards also require that physical therapy students be taught to use HIT; however, those standards rely on the United

States National Library of Medicine's definition, which calls for the "application of IT-based innovations in healthcare services, delivery, management, and planning." [9] Conversely, Physician Assistant education program accreditation standards make no mention of HIT directly but do require instruction on interpreting medical literature and the business aspects of healthcare, including coding and billing practices and patient care documentation.[10]

Researchers have previously measured the inclusion of HIT into patient encounters experienced during clinical practice by credentialed athletic trainers (ATs), and they estimated that ATs used HIT during 70% of patient interactions.[11] In post-professional athletic training degree programs, students perceived HIT as moderately important. Still, they ranked it among the lowest of the core competencies relative to their ability to incorporate it into practice.[12] Before the required inclusion of HIT in athletic training professional education, researchers determined that students perceived that they had implemented the HIT competency in just under half (46%) of the patient encounters during a clinical experience rotation.[13] This number was likely inflated as students were only given binary yes/no response options to the inquiry (i.e., HIT was incorporated, HIT was not incorporated) as to whether they thought they had implemented the competency, but specific behaviors within the construct of HIT were not assessed.[13]

The data suggest that HIT behaviors develop and improve across a clinician's professional experience, beginning with limited implementation in professional education and increasing from there.[11–14] To improve the use of HIT by ATs, ideally, it would first be introduced at the entry-level preparation, increasing its subsequent use throughout a clinician's career. To achieve this, we need to understand what factors influence the use of HIT by athletic training students when engaged in patient care. This study aimed to examine the use of HIT-

related professional behaviors by athletic training students during clinical experiences. Our goal was to identify characteristics of clinical experience rotations that facilitate the most frequent use of HIT behaviors to assist professional program administrators in guiding students to experiences that increase their engagement with HIT.

METHODS

Design

This study was part of a larger investigation to understand the nature and extent of patient care opportunities that exist for professional athletic training students during clinical experiences.[14,15] To collect data for this study, we used a panel design across multiple sites to track various characteristics of the PEs athletic training students engaged in during their scheduled clinical experiences. The data for each unique PE was captured via the Case Logs module feature of the E*Value software (MedHub, Minneapolis, MN) by professional athletic training students across 12 institutions during the span of 1.5 academic years. We received institutional research board approval from the sponsoring institutions prior to data collection. When necessitated, institutional review board approval was also received from the individual participating programs.

Participants

We recruited program administrators of CAATE-accredited professional athletic training programs to participate in this study. To be eligible to participate, programs must (1) have used the E*Value platform for PE tracking programmatically for at least 1 year prior to this study (2) require students to record the PEs they engage in during scheduled clinical experiences in the Case Logs modules of E*Value, and (3) have a 3-year Board of Certification exam aggregate first-time pass rate greater than 85%. During recruitment, 12 of the 15 programs that met all

study criteria agreed to participate for the duration of the study. Since data collection of this study occurred while professional programs were beginning to transition to the graduate level, 5 participating programs were at the undergraduate level while 7 were at the graduate level. A total of 363 professional athletic training students from the 12 participating programs were enrolled in this study. One member of the research team conducted virtual training sessions with the students and program administrators of each participating program prior to data collection. The virtual training sessions focused on a detailed review of the Case Log Module feature in E*Value, operational definitions for all variables, strategies for timely data entry, and an opportunity for administrators and students to ask clarifying questions. Additional details about recruitment, training, and characteristics of the participating programs have been published elsewhere.[14,15]

Instrumentation

Due to the frequency of use by several professional athletic training programs, we selected the Case Logs module within the E*Value platform as the mechanism to collect data for this study. For each PE, students were required to record several characteristics about (1) the PE itself, (2) their role during the PE, and (3) the core-competency related professional behaviors they engaged in during the PE. Specific details about the characteristics recorded for each PE have been published elsewhere.[14,15] For this study, we assessed the HIT-related professional behaviors to determine which PE variables were more likely to contribute to a student's involvement with HIT. The specific professional behaviors associated with HIT that students were asked to record are available in Table 1.

Procedures

To ensure data collection procedures were well established and the data collected were of high quality, only three of the 12 participating programs collected data during the spring 2018 semester. Following a quality control assessment, the remaining nine programs began data collection at the beginning of the fall 2018 semester. All 12 programs required students to track all PEs they engaged with during their scheduled clinical experiences for the full 2018-2019 academic year. During data collection, program administrators downloaded the data entered from E*Value every other week and securely transferred it to the research team. The research team reviewed the data shared by the program administrators bi-weekly to ensure data quality were maintained. Data collection concluded after the spring 2019 semester, and each program received a participation honorarium.

Data Analysis

Since no major changes were made to the data collection procedures, the data submitted by the three programs that participated during the spring 2018 semester were included in the full data set for analysis. We examined all data using SPSS version 27 (IBM Corp., Armonk, NY). Students' professional behaviors associated with HIT during PEs were compiled using descriptive statistics, including frequencies, means, and standard deviations. We calculated relative risk ratios to determine the likelihood that students included any of the professional behaviors associated with HIT during each PE. Generalized estimating equations models (GEE) with Poisson distributions and robust covariance estimators were used for these analyses. The results are expressed as a proportionate difference relative to the reference category. For example, the finding that students were more likely to use information from an EHR/EMR to assist with clinical decision-making during encounters of 16-30 minutes (RR=1.52) compared to

PEs of 1-15 minutes means that the 16-30 minute encounters were associated with a 52% increased likelihood of using EHR/EMR information relative to those lasting 1-15 minutes.

Potential predictor variables for analysis comprised several PE characteristics, including clinical site type (college/university, high school, clinic, other), length of encounters (1 minute to >60 minutes), and student role (observed the PE, assisted their preceptor with the PE, performed the PE under preceptor supervision).[14,15] For all HIT-related professional behaviors that students included during PEs, we used an analogous GEE approach to examine the association of PE characteristics on the composite opportunities (ranging from none of the behaviors to all of the behaviors, 0-2 behaviors). Only those predictors that significantly contributed to the equation were included in the final model. Pairwise comparisons were also subjected to sequential Bonferroni corrections. We established an a priori significance level of 0.05 for all analyses.

RESULTS

In total, 338 athletic training students from the 12 participating programs included a response for HIT behaviors in 30,518 PEs, which account for 99.6% of the cumulative 30,630 PEs recorded for this study. A detailed description of the participating programs for this study is published elsewhere.[14,15] An analysis of the individual HIT behaviors showed that students documented the information obtained from the PE in an EHR/EMR in 33.7% of PEs and used information from an EHR/EMR to assist with the clinical decision-making process in 4.6% of PEs. The implementation of no HIT behaviors was reported by students in 64.6% of PEs, while the implementation of both HIT behaviors was reported in 3.2% of PEs. The overall clinical correlations of HIT-related professional behaviors and associated characteristics of the documented PEs are presented in Table 2.

Documenting the Patient Encounter in an Electronic Records System

Length of encounter ($\chi^2(4)=38.1$, $p<0.001$), student role ($\chi^2(2)=16.9$, $p<0.001$, and clinical site type ($\chi^2(3)=8.1$, $p=0.04$) were associated with whether the student documented information obtained from the PE in an EHR/EMR. When compared with PEs of 1-15 minutes (n=18017 PEs), students engaging in PEs of 16-30 minutes (n=8819 PEs; RR=1.30; 95% CI, 1.17 to 1.44; $p<0.001$), PEs of 31-45 minutes (n=2327 PEs; RR=1.64; 95% CI, 1.37 to 1.94; $p<0.001$), PEs of 46-60 minutes (n=903 PEs; RR=1.53; 95% CI, 1.29 to 1.80; $p<0.001$), and PEs longer than 60 minutes (n=452 PEs; RR=1.35; 95% CI, 1.02 to 1.79; $p=0.03$) were more likely to document information obtained from the PE in an EHR/EMR. Students who performed the PE (n=21798 PEs) under the supervision of their preceptor (RR=1.46; 95% CI, 1.21 to 1.75; $p<0.001$) or assisted their preceptor during the PE (n=5051 PEs; RR=1.24; 95% CI, 1.05 to 1.46; $p<0.01$) were more likely to document information obtained from the PE in an EHR/EMR than students who observed their preceptor completing the PE (n=3669 PEs). Students participating in clinical experiences in the high school (n=8307 PEs) setting (RR=0.75; 95% CI, 0.60 to 0.92; $p=0.007$) were less likely to document information obtained from the PE in an EHR/EMR than students participating in clinical experiences in the college/university setting (n=20016 PEs).

Using Information from an Electronic Records System

Students' use of information from an EHR/EMR to assist with the clinical decision-making process during PEs was associated with length of encounter ($\chi^2(4)=19.8$, $p=0.001$) and clinical site type ($\chi^2(3)=30.5$, $p=<0.001$). Students were more likely to use of information from an EHR/EMR to assist with the clinical decision-making process when the length of the encounter was 16-30 minutes (RR=1.52; 95% CI, 1.17 to 1.96; $p=0.002$), PEs of 31-45 minutes (RR=2.54; 95% CI, 1.58 to 4.06; $p<0.001$), PEs of 46-60 minutes (RR=2.05; 95% CI, 1.42 to 2.93; $p<0.001$), or longer than 60 minutes (RR=2.79; 95% CI, 1.53 to 5.08; $p=0.001$) compared

to PEs that were 1-15 minutes. Regarding clinical site type, students were more likely to use information from an EHR/EMR to assist with the clinical decision-making process in the clinic setting (RR=3.20; 95% CI, 2.10 to 4.87; $p<0.001$) compared to the college/university setting.

Implemented No Health Information Technology Behaviors

The likelihood that students implemented no professional behaviors related to HIT was associated with student role ($\chi^2(2)=12.8$, $p=0.002$), clinical site type ($\chi^2(3)=17.4$, $p=0.001$), and length of encounter ($\chi^2(4)=34.2$, $p<0.001$). Students who performed the PE (RR=0.88; 95% CI, 0.81 to 0.94; $p<0.001$) or assisted their preceptor with the PE (RR=0.93; 95% CI, 0.87 to 0.99; $p=0.02$) were less likely to implement no HIT behaviors than those who observed their preceptor performing the PE. Students participating in clinical experiences in the high school setting (RR=1.13; 95% CI, 1.03 to 1.22; $p=0.005$) or 'other' (n=587 PEs) setting (RR=1.69; 95% CI, 1.24 to 2.31; $p=0.001$) were more likely to implement no HIT behaviors than students participating in clinical experiences in the college/university setting. When compared with PEs of 1-15 minutes, students were less likely to implement no HIT-related professional behaviors during PEs of 16-30 minutes (RR=0.88; 95% CI, 0.83 to 0.92; $p<0.001$), PEs of 31-45 minutes (RR=0.73; 95% CI, 0.63 to 0.83; $p<0.001$), PEs of 46-60 minutes (RR=0.77; 95% CI, 0.68 to 0.85; $p=0.001$), or PEs longer than 60 minutes (RR=0.82; 95% CI, 0.69 to 0.96; $p=0.02$).

Composite Health Information Technology Behaviors

The total number of HIT-related professional behaviors included during a PE were affected by the length of the encounter ($\chi^2(4)=38.9$, $p<0.001$). When compared with PEs of 1-15 minutes, students were likely to implement more HIT-related professional behaviors during PEs of 16-30 minutes (RR=1.33; 95% CI, 1.19 to 1.48; $p<0.001$), PEs of 31-45 minutes (RR=1.78;

95% CI, 1.43 to 2.19; $p<0.001$), PEs of 46-60 minutes (RR=1.61; 95% CI, 1.36 to 1.90; $p<0.001$), and PEs longer than 60 minutes (RR=1.53; 95% CI, 1.10 to 2.09; $p<0.001$).

DISCUSSION

The purpose of our study was to identify characteristics of patient encounters experienced by athletic training students during clinical experience rotations that facilitate the most frequent use of HIT behaviors. We found that the implementation of HIT behaviors by athletic training students were primarily influenced by their role during the encounter, length of the encounter, and the type of clinical site the encounter occurred in. Interestingly, there was no consistency across the variables regarding the different HIT behaviors, which suggests there currently is no one ideal clinical structure that would increase the frequency of HIT behavior use.

Documenting in an EMR/EHR

Documenting patient care in an EMR or EHR is not only a component of the CAATE curricular content standards for professional athletic training programs,[8] it is also a recommendation included in the *Best Practice Guidelines for Athletic Training Documentation* disseminated by the National Athletic Trainers' Association.[16] In order for students to become proficient and consistent documenters as they enter clinical practice, it is imperative that they are provided continual opportunity to document actual patient care during clinical experiences. Our findings suggest that nearly two-thirds of all patient encounters experienced by athletic training students during clinical experiences do not allow for any engagement with an electronic patient care documentation system.

Previously, researchers identified some of the barriers that preceptors face in teaching documentation to students within clinical practice.[17] As is common with most tasks associated with athletic training practice, one common barrier to teaching this content was time.[17] Our

findings indicated that the amount of time spent with the patient was an influencing factor to documenting patient encounters in an EMR or EHR with longer patient encounters resulting in an increased likelihood for this behavior. As most healthcare documentation does not occur during the patient interaction,[18] we interpret this finding to indicate that longer PEs generate more information that likely warrants documentation. Given that time is a barrier for the majority of athletic trainers' documentation practices,[19] preceptors face an added time challenge of having to guide students through the documentation practice which may result in a several iterations of documentation attempts and revisions.[17] When time is limited, this may decrease the likelihood for a preceptor to provide opportunities for students to engage in documentation to facilitate expeditious completion of the requisite task.

Our findings also indicated that students were most likely to document in an EMR or EHR when performing or assisting their preceptors with the PE and were least likely to do so when observing their preceptor perform the PE. The latter finding seems appropriate since the preceptor was performing the encounter; they would be the appropriate person to document it accordingly. However, given that students did not document in an EMR or EHR for 62.8% of their performed patient encounters, it is unclear who, if anyone, electronically documented those patient interactions.

The only other clinical experience characteristic that influenced documentation in an EMR/EHR by students in our study was clinical setting, with students in secondary school clinical experiences being 25% less likely to document in an EMR/EHR. This finding is not surprising as previous researchers have identified that athletic trainers in the secondary school setting faced several barriers to documenting patient care, including time, technology issues, and patient volume.[20,21] Preceptors in secondary schools facing such challenges are less likely to have

adequate patient care documentation and that subsequently will impact the students' opportunities.

Another barrier to student documentation previously noted by preceptors is concerns regarding patient privacy protection, which in some cases might be reflected in employer policies regarding student access to EMRs or EHRs.[17] In 2015, the American Medical Association released an executive summary that indicated that medical students were significantly restricted in using EHRs, citing that only 32% of medical students were allowed to view patient records, 41% were allowed to view and document within an EHR, and only 27% could view, write notes, or enter orders within an EHR.[22,23] This could similarly impact athletic training students, specifically those associated with hospital or physician practice settings, as the Centers for Medicare & Medicaid Services have explicitly denoted that services provided students are not reimbursable and therefore have instituted policies about which billable services are permitted to be documented by students.[22] It is likely that as a result of these policies, preceptors in settings that submit for third-party reimbursement are more likely to have rules regarding all healthcare student documentation within the EMR/EHR, regardless of their role in the patient interaction. Athletic training preceptors have, in some cases, implemented processes by which notes are scribed on paper and then input into the electronic record, however this practice results in duplication of effort and likely compounds the barrier of time.[17,19]

Solutions are needed to support athletic training student documentation practice during clinical experiences, preferably ones that mitigate the aforementioned barriers such as time, concerns over patient privacy, or limited availability of electronic recordkeeping systems in certain practice settings. Athletic training program administrators should address expectations of documentation with preceptors prior to assigning students and ensure that documentation of

patient care is a planned component of the educational experience. To address some of the patient privacy concerns, athletic training program administrators should first aim to guide students towards compliance with the Health Insurance Portability and Accountability Act by applying for a National Provider Identifier (NPI).[24] However, an NPI alone will not address employer concerns over student EMR/EHR use relative to billable services, nor will it overcome the barriers of time or the lack available of EMRs/EHRs in some settings. To improve upon access to electronic records to document patient care regardless of setting policies, athletic training program administrators will likely need to explore the potential for using an academic electronic medical/health record (AEMR/AEHR) for students during clinical rotations. An AEMR/AEHR is an electronic patient record designed solely for academic use to eliminate the barriers of patient care documentation for students.[25] Students can document in an AEMR/AEHR independently, or alongside their preceptor documenting in an EMR, to ensure quality documentation and data entry. Use of such a system would also eliminate some of the barriers unique to the secondary school setting as the student would not be reliant on the preceptors' documentation to complete their own. AEMRs/AEHRS have been shown to progress documentation skill competency, increases the use of informatics, and improves upon perceptions of documentation.[25] The use of an AEMR would also provide the added benefit of tracking patient encounters students experience during clinical experiences for programmatic use.

Use of information from an EMR/EHR

The use of EMR/EHRs should provide increased accessibility to patient data that can then improve clinical decision-making.[25] Our findings indicate that student use of information

contained in an EMR/EHR by students was only influenced by two variables; the site at which the encounter occurred and the length of the encounter.

Students involved with patient encounters at a clinic-type of site were 220% more likely than those at a college/university site to indicate having used information from the EMR/EHR to assist with clinical decision-making. Clinic-based sites are more likely to have clear guidelines or policies and employer expectations relative to required documentation practices.[26] Previously, researchers have determined that employment culture and expectations highly impact documentation practices, with college/universities and secondary schools typically lacking in this structure.[19,21,26]

The length of time spent with the patient also influenced the use of information obtained from an EMR/HER to assist with clinical decision-making with the shortest encounter lengths being the least likely to include this behavior. Encounter lengths longer than 30 minutes were all more than 100% more likely to include this behavior. Most researchers examining documentation practices indicate that time is a barrier to good documentation practices,[17,19,21,26,27] so it logically follows that the ability to review documented patient data within that documentation would also require additional time. It is also important to note that specifically for students within a clinical experience, documentation practices of the preceptor prior to the student's arrival will influence the availability of patient data in a patient's file that is available for review and use in clinical decision-making. As researchers have shown that technology, time, and organizational culture are a barrier to patient care documentation in the secondary school and college/university settings,[21,26,27] our findings that students are most likely to have the opportunity to review patient data during clinical decision making during longer encounters and during rotations at clinic-type sites are somewhat unsurprising.

Program administrators should seek opportunities to incorporate patient data into assignments and simulations if such opportunities are not as readily available during clinical experience rotations. Researchers have previously identified that preceptors would benefit from additional development in the process of mentoring and modeling documentation practices and patient-data use prior to supervising students during clinical experiences.[17]

Limitations and Future Research

As with all studies, our is not without limitations. One limitation of the data was that the numbers of responses were not equally distributed across respondent schools, averaging 2543 records per school, and ranging from 48 to 7142. So, while a generalized estimating equations approach was used to address correlated error within student respondent, the 12 schools who participated were not equally represented. It is not clear how this affected our estimates of population-average effects. Due to the nature of data collection, we could only collect information of HIT-related professional behaviors that could occur within a patient encounter. It is possible that other HIT-related professional behaviors were performed by our participants during clinical experiences but were not captured in the patient-case logging structure of our data collection. Additionally, we did not triangulate our findings with preceptor behaviors regarding HIT at each clinical site.

Our findings had inverse results relative to use of an EMR and documentation in an EMR within the same site types. Future researchers should aim to better understand the influence of clinical site type on students' EMR/EHR interactions and use. Future researchers should examine HIT behaviors students may engage in that can be included in clinical practice outside of individual PEs, such as examining injury trends across a patient population. Our data collection also relied on honest and accurate reporting of patient encounters by students. Future

studies should aim to triangulate responses with supervising preceptors to ascertain accuracy in reporting. Future researchers should consider examining the feasibility of an academic EMR to facilitate HIT behaviors among athletic training students.

CONCLUSIONS

Athletic training students' use of the HIT-behaviors is influenced by specific characteristics of the patient encounters experienced during clinical experiences. Students were more likely to document in an EMR/EHR when they perform the encounter, when they encounter last 31-45 minutes long, and when the encounter occurred at a college/university, clinic, or other site. Students were most apt to use data from the EMR/EHR in clinical decision-making when encounters occurred at clinic sites and during longer patient encounters. Shorter encounters, observation roles, and encounters at other types of sites were associated with no use of HIT behaviors. Program administrators should incorporate documentation strategies and supervision within the preceptor development for their program to increase the likelihood that students will have HIT opportunities during patient encounters. A lack of preceptor documentation will result in decreased opportunities for students to use data from an EMR/EHR to guide clinical decision-making. For programs that rely on clinical sites that do not have an EMR/EHR available for student use, an academic EMR is a viable option to increase HIT behaviors amongst students regardless of the documentation method available at the clinical site.

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Figure 1. Wheel of Health Information Technology

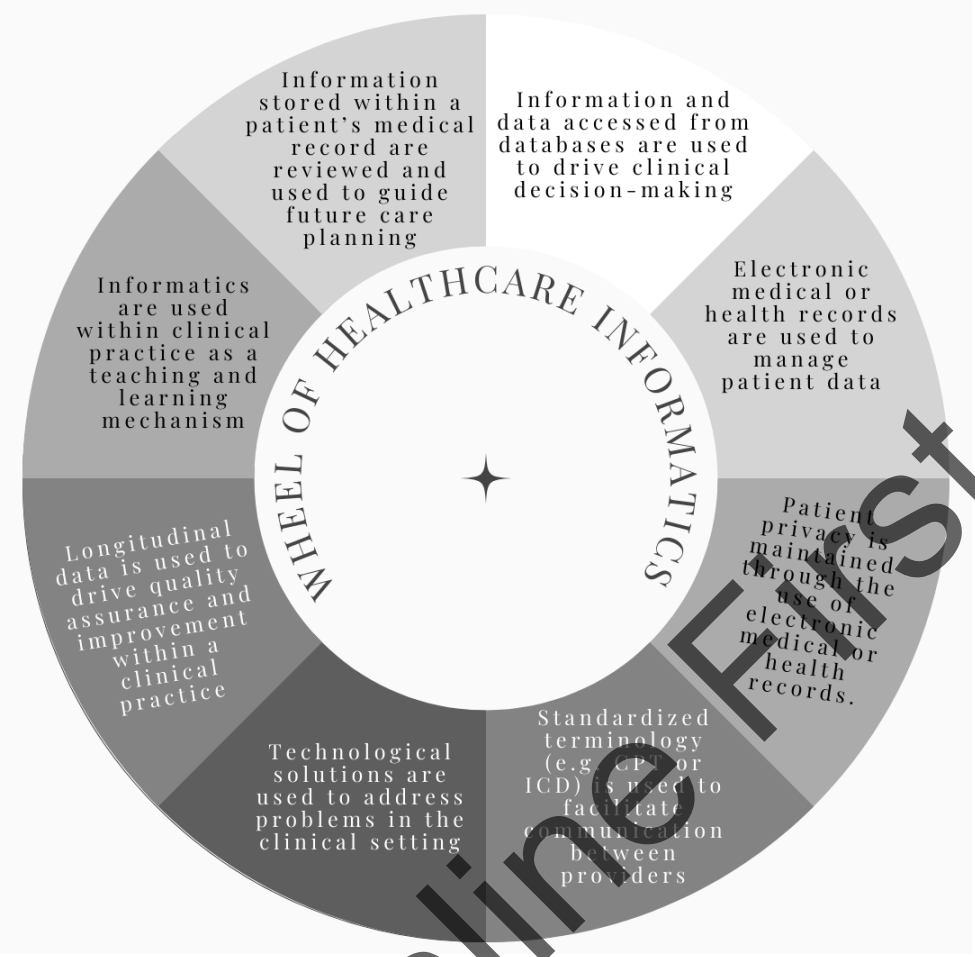

Table 1. Professional Behaviors of Health Information Technology

Core Competency	Professional Behavior	Response
Health Information Technology (HIT)	Regarding this patient encounter, did you: 1. Document the information obtained from this encounter in an electronic health/medical record (EHR/EMR)? 2. Use information from an electronic health/medical record (EHR/EMR) to assist with the clinical decision-making process? 3. None of the above	Yes No

Table 2: Clinical Correlations of Health Information Technology Behavior Implementation During Patient Encounters

PE Characteristic	HIT Behavior			
	Document Information Obtained from PE in an Electronic Health/Medical Record (EHR/EMR)	**Use Information Obtained from an Electronic Health/Medical Record (EHR/EMR) to Assist with Clinical Decision-Making**	**Implemented No HIT Behaviors**	**Composite HIT Behaviors**
Student role				
Performed	**46% more likely**	not significant	12% less likely	not significant
Assisted	24% more likely	not significant	7% less likely	not significant
Observed	comparison variable	comparison variable	**comparison variable**	comparison variable
Length of encounter				
1-15 minutes	comparison variable	comparison variable	**comparison variable**	comparison variable
16-30 minutes	30% more likely	52% more likely	12% less likely	33% more likely to have more behaviors
31-45 minutes	**64% more likely**	154% more likely	27% less likely	**78% more likely to have more behaviors**
46-60 minutes	53% more likely	105% more likely	23% less likely	61% more likely to have more behaviors
>60 minutes	35% more likely	**179% more likely**	18% less likely	53% more likely to have more behaviors
Type of clinical site				
College/university	**comparison variable**	comparison variable	comparison variable	comparison variable
High school	25% less likely	not significant	13% more likely	not significant
Clinic	not significant	**220% more likely**	not significant	not significant
Other	not significant	not significant	**69% more likely**	not significant

*Bolding represents the characteristics of the patient encounter that students were most likely to include

Appendix 1. Estimated Marginal Means with 95% Confidence Interval Per Dependent Variable

Variable A. Document the information obtained from this encounter in an electronic health/medical record (EHR/EMR)

	Percentage	Std. Error	95% Wald Confidence Interval		P-Value
Clinical Site Type			Lower	Upper	
Other	0.06	0.117	0	2.29	0.045
Clinic	0.31	0.075	0.19	0.5	
High School	0.26	0.028	0.21	0.32	
*College/University	0.35	0.028	0.3	0.41	
Length of Encounter					<.001
>60 minutes	0.21	0.097	0.08	0.52	
46-60 minutes	0.24	0.108	0.1	0.58	
31-45 minutes	0.25	0.117	0.1	0.62	
16-30 minutes	0.2	0.091	0.08	0.49	
*1-15 minutes	0.15	0.072	0.06	0.38	
Student Role					<.001
Perform	0.25	0.113	0.1	0.61	
Assist	0.21	0.096	0.09	0.52	
*Observe	0.17	0.079	0.07	0.42	

*Reference category.

Variable B. Use information from an electronic health/medical record (EHR/EMR) to assist with the clinical decision-making process

	Percentage	Std. Error	95% Wald Confidence Interval		P-Value
Clinical Site Type			Lower	Upper	
Other	0.09	0.017	0.06	0.13	<.001
Clinic	0.22	0.041	0.15	0.32	
High School	0.07	0.02	0.04	0.13	
*College/University	0.07	0.012	0.05	0.1	
Length of Encounter					<.001
>60 minutes	0.15	0.041	0.09	0.26	
46-60 minutes	0.11	0.02	0.08	0.16	
31-45 minutes	0.14	0.032	0.09	0.22	
16-30 minutes	0.08	0.014	0.06	0.11	
*1-15 minutes	0.05	0.01	0.04	0.08	

*Reference category.

Variable C. None of the above

	Percentage	Std. Error	95% Wald Confidence Interval		P-Value
Clinical Site Type			Lower	Upper	
Other	1.00	0.158	0.75	1.00	<.001
Clinic	0.62	0.067	0.5	0.76	
High School	0.68	0.03	0.62	0.74	
*College/University	0.6	0.026	0.55	0.65	
Length of Encounter					<.001
>60 minutes	0.7	0.06	0.59	0.83	
46-60 minutes	0.65	0.045	0.57	0.75	
31-45 minutes	0.62	0.049	0.53	0.73	
16-30 minutes	0.75	0.038	0.68	0.83	
*1-15 minutes	0.85	0.045	0.77	0.94	
Student Role					0.002
Perform	0.67	0.038	0.6	0.75	
Assist	0.71	0.04	0.63	0.79	
*Observe	0.76	0.041	0.68	0.84	

*Reference category.

Variable D. Composite HIT Behaviors

	Mean Count	Std. Error	95% Wald Confidence Interval		P-Value
Site Code			Lower	Upper	
Other	0.10	0.14	0.01	1.46	0.045
Clinic	0.51	0.10	0.34	0.76	
High School	0.33	0.04	0.27	0.41	
*College/University	0.43	0.03	0.37	0.50	
Length of Encounter					<.001
>60 minutes	0.32	0.11	0.15	0.64	
46-60 minutes	0.33	0.11	0.17	0.64	
31-45 minutes	0.36	0.13	0.18	0.72	
16-30 minutes	0.27	0.09	0.14	0.54	
*1-15 minutes	0.21	0.07	0.10	0.41	
Student Role					0.010
Perform	0.33	0.11	0.17	0.65	
Assist	0.29	0.10	0.15	0.58	
*Observe	0.25	0.09	0.13	0.50	

*Reference category.