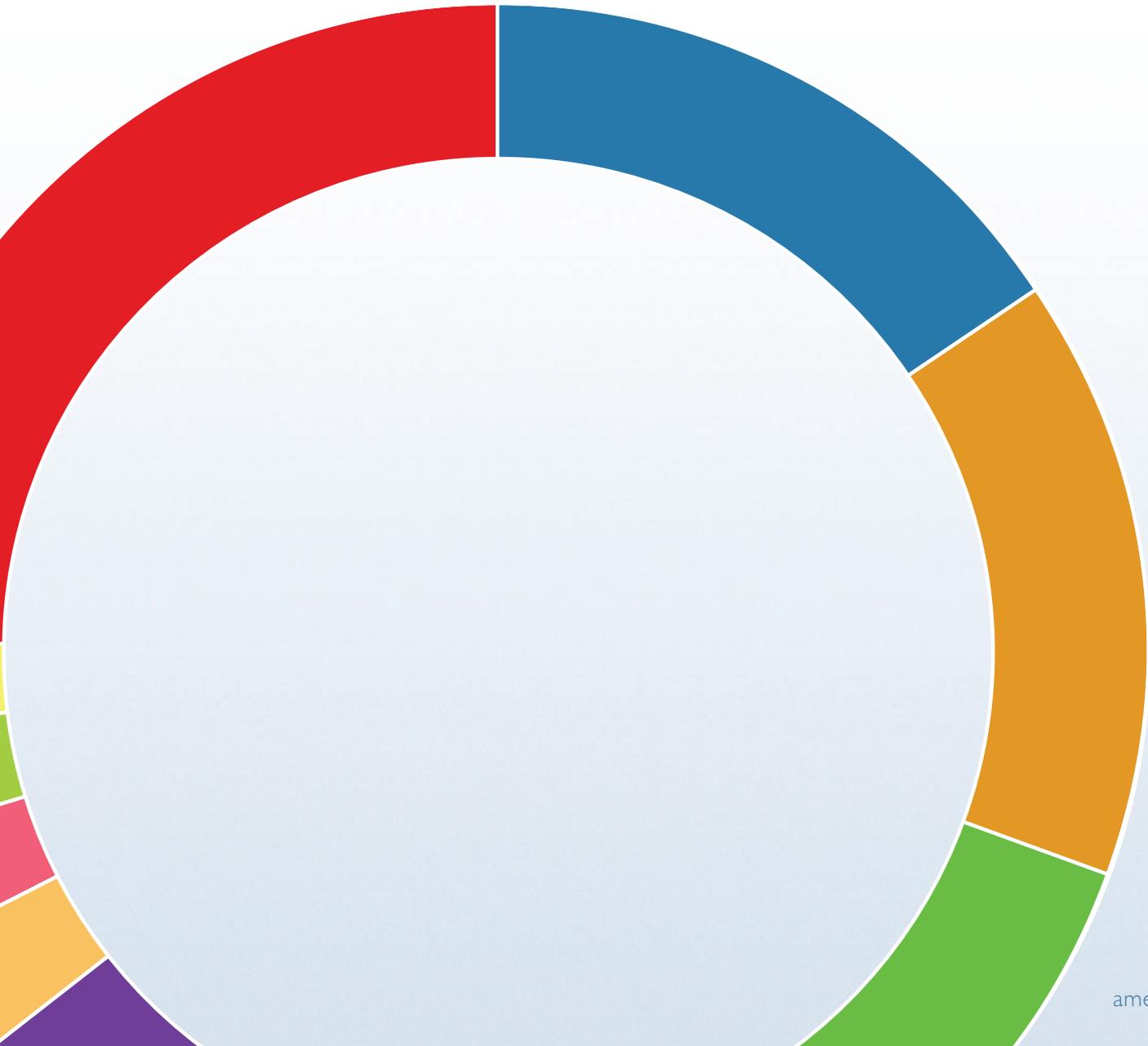


THE CORRELATION OF TRAINING DURATION
WITH EHR USABILITY AND SATISFACTION:
IMPLICATIONS FOR MEANINGFUL USE

A Report From AmericanEHR Partners • October 2011



THE CORRELATION OF TRAINING DURATION WITH EHR USABILITY AND SATISFACTION: IMPLICATIONS FOR MEANINGFUL USE

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BACKGROUND

AmericanEHR Partners is an online community dedicated to supporting adoption, use, and optimization of electronic health records (EHRs). Launched in July 2010, AmericanEHR Partners collects and presents real-time satisfaction rating data from physicians, physician assistants, and nurse practitioners on all nationally certified ambulatory EHR products. Registration for the AmericanEHR Partners is free and access to the satisfaction data is available to all registered users.

Since its inception in July 2010, AmericanEHR Partners has attracted over 10,500 registered users. Based on information collected during the online registration process, these users represent over 208,000 full-time equivalent physicians across the United States. The 13 professional societies now associated with the program collectively represent over 35% of U.S. physicians (see Appendix 1). Professional societies provide education content for the website and enable AmericanEHR Partners to survey their membership about EHR usage and satisfaction. As of this report, over 2,300 clinicians have rated 125 EHR products through these professional society connections.

AmericanEHR Partners plans to release a series of reports over time based on data collected and analyzed through our survey methodology. This report focuses on the following important topics:

- Overall satisfaction with EHRs
- User training as it relates to overall satisfaction and usability of specific EHR functions
- Usability of specific basic and advanced Meaningful Use requirements

A companion report released concomitantly with this one and available through the AmericanEHR Partners site (free registration required) provides additional information about EHR market share and ratings based on practice size. Download the report at www.americanehr.com/reports. Correspondence regarding this report should be directed to info@americanehr.com.

DATA COLLECTION, EVALUATION & REPORTING METHODOLOGY

SURVEY DESIGN

AmericanEHR Partners uses a 139-question online survey to collect data on clinicians' (Physicians, NPs, and PAs) use and satisfaction with EHRs and health information technology. The survey uses skip logic to present individuals with the questions that are most relevant to them, and takes an average of 20 minutes to complete. Respondents are allowed to skip questions or indicate that they do not know the answer to the question. For the purposes of the report we excluded these individuals on a question by question basis. Due to skip logic and these exclusions the number of respondents (*n* value) varies for each question presented in the report. Data is collected on an ongoing basis and the ratings presented on www.AmericanEHR.com are updated on a dynamic basis.

DATA SOURCES

The results presented in this report were collected through surveys conducted in conjunction with five different professional societies between April 2010 and July 2011. Each society was allowed to select the population of their members to receive the survey. Information about EHR use by society members was not available. Therefore, the survey went to both users and non-users of EHRs.

The surveys used as the basis for this report were collected through collaboration with the following five professional societies:

- American Academy of Allergy, Asthma & Immunology (AAAAI)
 - » All members with an email address on file
- American College of Physicians (ACP)
 - » All members in ambulatory practice, who had a valid email address, were not participating in another survey being conducted by ACP, excluding medical students, administrators, and non-U.S. physicians. ACP members were surveyed into separate samples—one with physicians in practices of 20 or less and one with physicians in practices of 20 or greater.
- American Osteopathic Association (AOA)
 - » All members with an email address on file
- Infectious Diseases Society of America (IDSA)
 - » All members in medical practice with an email address on file
- Renal Physicians Association (RPA)
 - » All physician members with an email address on file

Additional data are being collected on a regular basis from these and other societies that have since joined the AmericanEHR Partners program.

DATA COLLECTION, EVALUATION & REPORTING METHODOLOGY

SURVEY DISTRIBUTION, RESPONSE RATE & LIMITATIONS OF THE DATA SET

Invitations were sent via email to the members selected by each professional society. Three reminder emails were sent to each invitee to help improve the response rate. The chance to win an Apple iPad was offered to participants that responded within one month to the initial survey invitation. A total of 4,280 responses were received.

The average response rate was 8.5%, though rates differed across professional societies. This observation may reflect, in part, the variable accuracy of the email addresses collected by the societies and provided for distribution of the survey. The presence of a "gag clause" included by many EHR vendors in their contracts (designed to prohibit purchasers and users of EHRs from sharing information about software problems with anyone outside of their organizations) may have also negatively affected the response rate. The relatively low response rate and these other factors should be taken into account when interpreting the results of this report because of the potential selection bias that may have occurred.

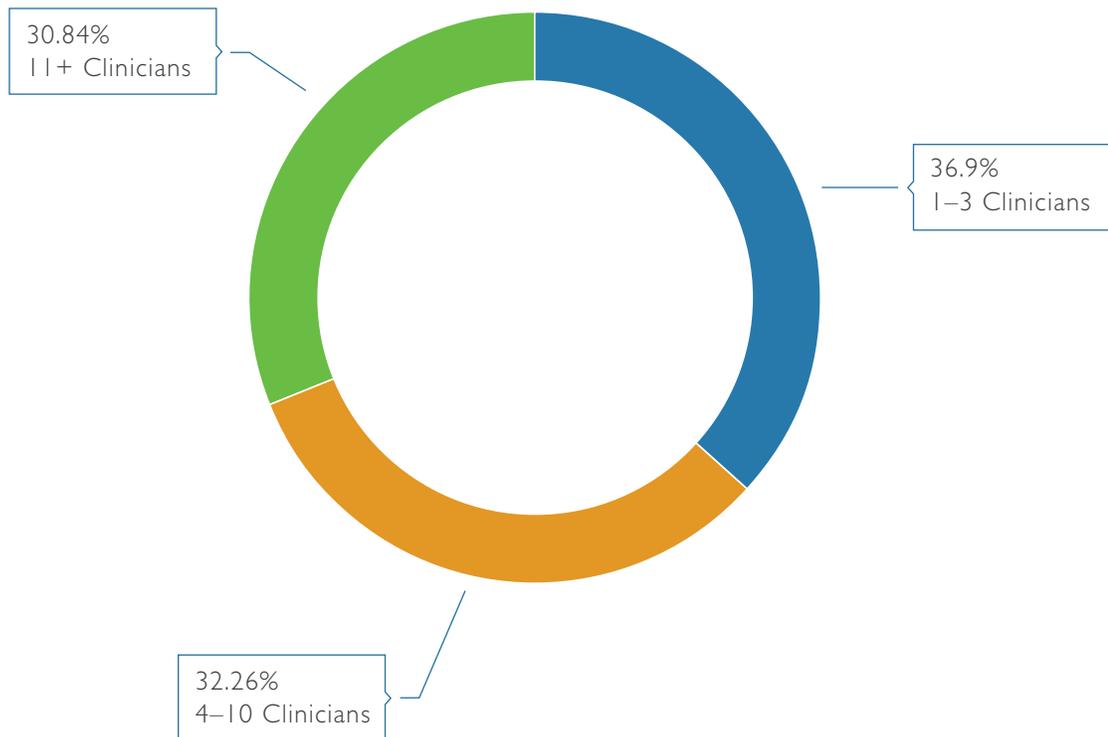
Of those who responded to the survey, 2,384 (54%) had an EHR system and completed the entire survey. Forty-nine different specialties and sub-specialties were represented in this sub-sample of respondents. While AmericanEHR did not independently verify that respondents were physicians, the use of member email lists from professional societies likely limited the potential that non-clinicians completed the survey. None of the responses included in this report were received from surgical specialties. Therefore, the findings presented in this report may not apply to surgical practices. Due to the collection methodology some specialties, such as allergy and immunology, infectious disease and nephrology, are likely over represented in the sample.

Sixty-nine percent of the surveys were received from physicians in practices of 10 or fewer clinicians. This may represent an oversampling of individuals in small practices (10 or fewer clinicians) as membership statistics from ACP indicate 60% of members are in a practice of 10 or fewer.

DATA COLLECTION, EVALUATION & REPORTING METHODOLOGY

Figure 1

Number of Respondents by Practice Size
(n=2,328)



INCLUSION CRITERIA

Only complete surveys that met the following criteria were included in the analysis for this report:

- Professional designation: physicians
- Location: United States
- No declared conflict of interest (as assessed by a question on the survey)

EXCLUSION CRITERIA

Upon review of the 2,338 survey responses we excluded responses made by 402 individuals for the reasons as noted in Table 1. This report is based on the remaining 1,936 surveys.

DATA COLLECTION, EVALUATION & REPORTING METHODOLOGY

Table 1

Number of Exclusions	Reason For Exclusion
120	Non ONC-ATCB certified products (as of July 2011). This includes 23 “self-built” systems for which ratings were received.
132	Inpatient systems were excluded due to the differing functionality and design requirements of inpatient systems.
93	Government EHR systems (AHLTA, Indian Health Services, VISTA) were excluded due to the differing operational and training experiences; also, they are not commercially available.
33	Unidentifiable EHR system.
10	Discontinued systems.
8	Emergency Department EHR Systems to the differing functionality and design requirements.
6	ONC-ATCB Certified Module Systems were excluded, as we could not determine which functionalities the individuals were actually using.

MEANINGFUL USE AND THE AMERICAN EHR PARTNERS SURVEY

All EHR products included in this report had received ONC-ATCB certification as of July 15, 2011, though we cannot be certain that each survey respondent submitted responses for the ONC-ATCB certified version of a particular EHR.

Since many EHR vendors were in the early stages of implementing Stage 1 Meaningful Use (MU) Certified EHR products when these surveys were completed, this report focuses on a few selected MU requirements related to E-Prescribing and Medication Management. These functions were broadly available in most EHR systems prior to the creation of the ONC-ATCB certification process. In addition, the analysis addresses overall satisfaction with EHR systems as it relates to initial training.

Table 2 lists the four Stage 1 Meaningful Use measures identified for this report and the corresponding questions from the American EHR Partners survey.

DATA COLLECTION, EVALUATION & REPORTING METHODOLOGY

Table 2

CORE MEANINGFUL USE MEASURES	
ONC MU Measures	AmericanEHR Survey Questions
#5. Maintain active medication list	How easy or difficult is it to maintain an active medication list using your EHR? Response options: (Very Difficult, Difficult, Neutral, Easy, Very Easy)
#6. Maintain active medication allergy list	How easy or difficult is it to maintain an active medication allergy list using your EHR? Response options: (Very Difficult, Difficult, Neutral, Easy, Very Easy)
MENU SET MEANINGFUL USE MEASURES	
#1. Implement drug formulary checks	How easy or difficult is it to check patient formulary information using your EHR? Response options: (Very Difficult, Difficult, Neutral, Easy, Very Easy)
#7. The EP* who receives a patient from another setting of care or provider of care or believes an encounter is relevant should perform medication reconciliation. *EP = Eligible Professional	How easy or difficult is it to import a patient's medication list from another source (e.g. Surescripts, hospital, health information exchange) using your EHR? Response options: (Very Difficult, Difficult, Neutral, Easy, Very Easy)
	How easy or difficult is it to reconcile an imported medication list with medications listed in a patient record using your EHR? Response options: (Very Difficult, Difficult, Neutral, Easy, Very Easy)

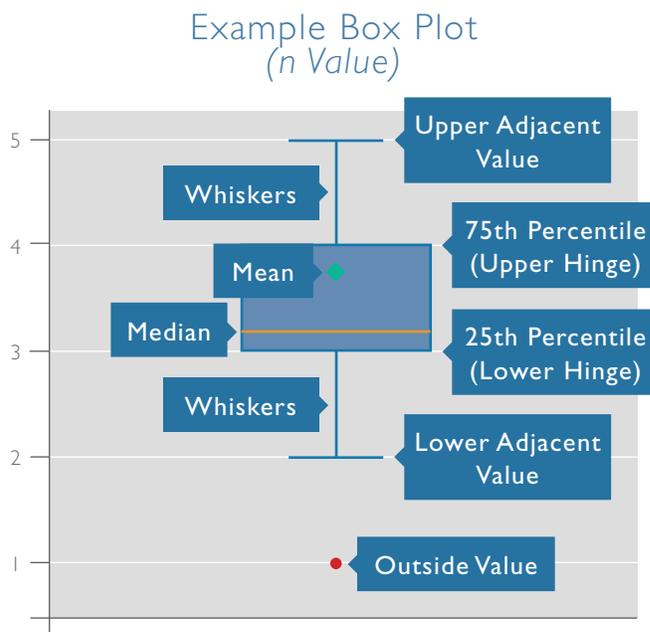
ADDITIONAL CAVEAT

This report provides an in-depth analysis of survey responses to these questions correlating length of training, involvement in EHR selection, and ratings of usability. For questions related to training, the response options were: a) 1–3 days; b) 3–5 days; c) 1 week; d) 2 weeks; e) Over 2 weeks; and f) Did not receive training. During our analysis, we recognized that these options used overlapping time frames. While this survey design error may confound the results to some degree, the actual impact was probably limited since individuals completing these questions had an equal chance of choosing one overlapping choice over the other. Surveys currently being conducted by AmericanEHR Partners have addressed this design flaw.

DATA COLLECTION, EVALUATION & REPORTING METHODOLOGY

EXPLANATION OF BOX PLOTS AND STATISTICAL ANALYSIS

The use of box plots is used extensively in this report. Box plots depict the distribution of respondents' choices. The box is drawn around the central 50% of responses with 25% falling above the median value and 25% falling below the median value. The vertical lines extending from the box (whiskers) depict the remaining responses that are within 1.5 standard deviations of the median, which equates roughly to 99.35% and 0.35% of the results. Values that fall beyond 1.5 standard deviations of the median are marked as outliers and are indicated as dots either below or above the whisker.



As box plots are based on the distribution around the median value, it is possible for the lines depicting the box to be the same as each other. For instance, the median and the 75th percentile can share the same value. For an additional explanation of box plots, the following resources are recommended (Wikipedia site http://en.wikipedia.org/wiki/Box_plot) or Robert McGill, John W. Tukey, Wayne A. Larsen (February 1978). "Variations of Box Plots". *The American Statistician* 32 (1): 12–16.

The statistical analysis was performed using ordered logistic regression analysis techniques and standard Welch's t-test where applicable. The statistical package used to analyze the results was STATA.

Ordered logistic regressions analysis was used when comparing the different categories of satisfaction or ease of use (e.g. very dissatisfied to very satisfied or very difficult to very easy) with different categories of training. Ordered logistic regressions are an extension of logistic regression analysis but for ordered categories. For those interested in learning more about these models see http://en.wikipedia.org/wiki/Ordered_logistic_regression and http://en.wikipedia.org/wiki/Logistic_regression.

Additional reading: Long, K. Scott. 1997 *Regression Models for Categorical and Limited Dependent Variables*. Thousand Oaks, CA: Sage.

KEY FINDINGS

The analyses performed on this data set resulted in the identification of five Key Findings, each of which is presented in more detail in the following pages:

KEY FINDING #1: *Overall satisfaction with an EHR was highly correlated with whether the respondent was involved in the EHR selection process.*

KEY FINDING #2: *At least 3–5 days of EHR training was necessary to achieve the highest level of overall satisfaction.*

KEY FINDING #3: *Nearly half (49.3%) of respondents indicated that they received 3 or fewer days of training.*

KEY FINDING #4: *Ratings on ease of use for basic EHR functions required for Meaningful Use continued to improve with 2+ weeks of training.*

KEY FINDING #5: *Ratings of ease of use for specific Meaningful Use measures varied significantly. More training—at least one week—was correlated with improvement in the reported usability of advanced EHR features (e.g., importing medication lists, medication reconciliation, checking patient formulary).*

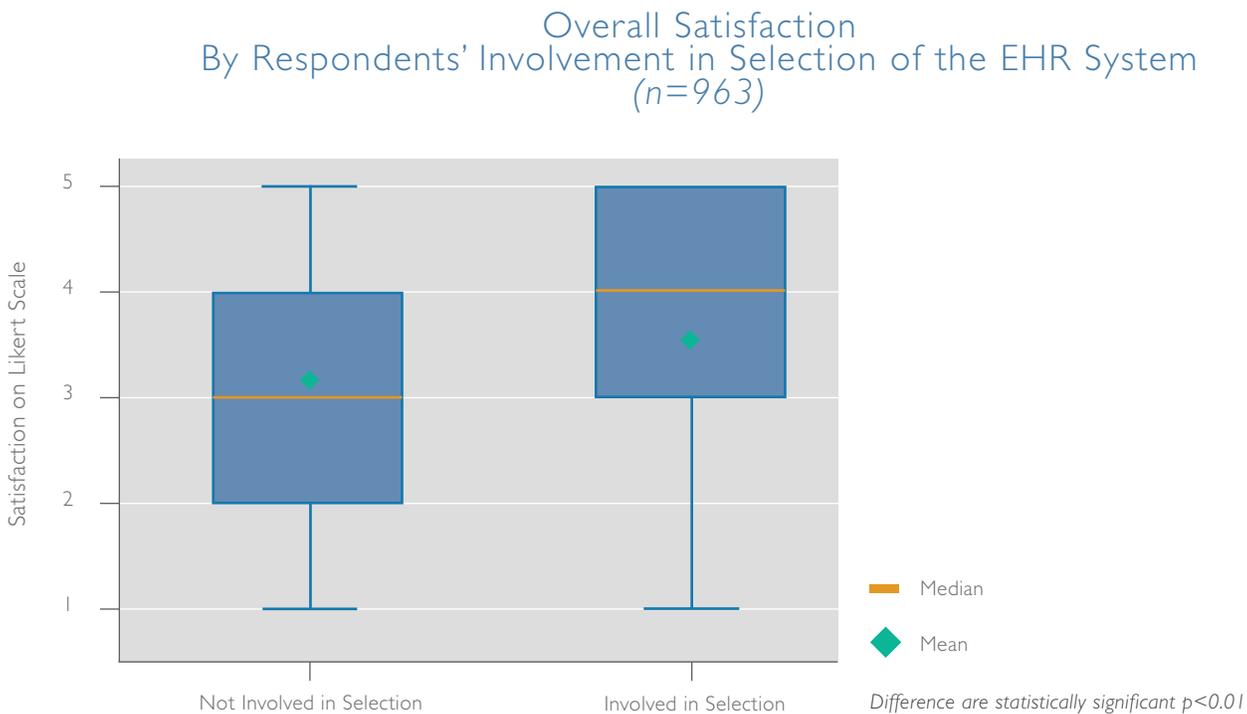
KEY FINDING #1

Overall satisfaction with an EHR was highly correlated with whether the respondent was involved in the EHR selection process.

In 2009, the American Academy of Family Physicians (AAFP) reported statistically important differences in overall satisfaction with EHRs in use among individuals who had participated in the selection of their EHR system versus those who had not been involved in the selection decision.[†] Our data confirm AAFP's survey findings. AmericanEHR Partners user satisfaction was higher for individuals involved in the selection of an EHR when compared to those respondents who were not involved ($p < 0.01$). Figure 2 illustrates this finding.

Survey data consistently demonstrated that individuals who were involved in the selection of their EHR system compared to those who were not involved responded differently. In each question presented in this report, Welch's t-test showed that these differences were statistically significant $p < 0.05$. The reasons for this finding cannot be clearly ascertained from the data available. It is conceivable that "involved" individuals represent more sophisticated users of technology, prior EHR users involved in new decisions, or just a self-selected sample of highly motivated clinicians. However, we cannot exclude the potential that even EHR-naïve individuals benefit from early exposure to EHR options and discussions of features/ functionality that then aid their transition to the EHR eventually selected. This is an area for future research. Despite the uncertainty of its cause, the finding is potentially an important factor to consider and is therefore included in the analyses presented.

Figure 2



[†] Edsall, Robert L., Adler Kenneth G., *The 2009 EHR User Satisfaction Survey: Responses From 2,012 Family Physicians: If you're shopping for an EHR system, you might appreciate this advice from a couple of thousand colleagues.* *Fam Pract Manag.* 2009 Nov–Dec; 16(6):10-16. <http://www.aafp.org/afpm/2009/1100/p10.html>

KEY FINDING #2

At least 3–5 days of EHR training was necessary to achieve the highest level of overall satisfaction.

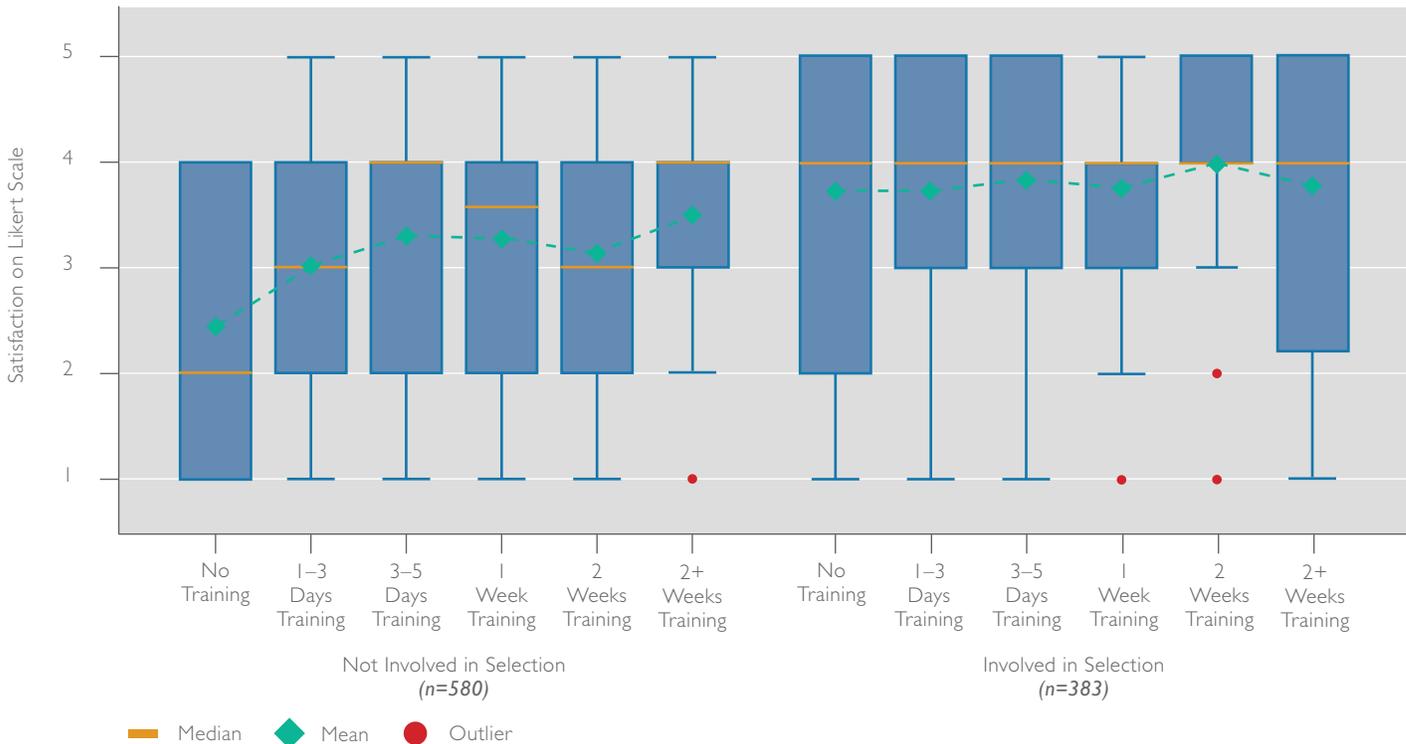
The AmericanEHR Partners survey data indicate a significant correlation between the length of initial training and overall user satisfaction with the EHR product. Physicians who received no training had the lowest satisfaction. The highest overall EHR satisfaction was seen both after 3–5 days of initial training and after 2 weeks of training. The differences seen in training were statistically significant for EHR users not involved in EHR selection ($p < 0.05$ when they were compared to individuals with no training). For respondents involved in the EHR selection, there was no statistically significant change in overall satisfaction across all durations of training assessed. These data are represented in Figure 3.

These findings may have implications for both the EHR selection process as well as the models of EHR training used to help clinicians prepare for EHR implementation. Those respondents not involved in EHR decision-making required approximately two weeks of training to attain the same levels of overall satisfaction achieved with little training among those respondents who were involved in the EHR selection process.

While we were unable to determine whether overall satisfaction translates into use of EHR functions to support better care, one potential conclusion is that involving as many physicians in the EHR selection process as is conceivably possible could help practices achieve earlier adoption and acceptance of the technology. Whether this leads to improved use and earlier positive effects on clinical care is a question for additional research. As noted in the methodology section, the survey sample is prone to selection bias and highly motivated clinicians may be over-represented.

Figure 3

Overall Satisfaction By Respondents' Involvement in Selection of the EHR System (n=963)



Overall Satisfaction scores for each category of training are statistically different from each other $p < 0.05$ for those not involved in the selection but not for those who were involved in selecting when no training is used as the base outcome. Detailed analysis available in Appendix 2.

KEY FINDING #3

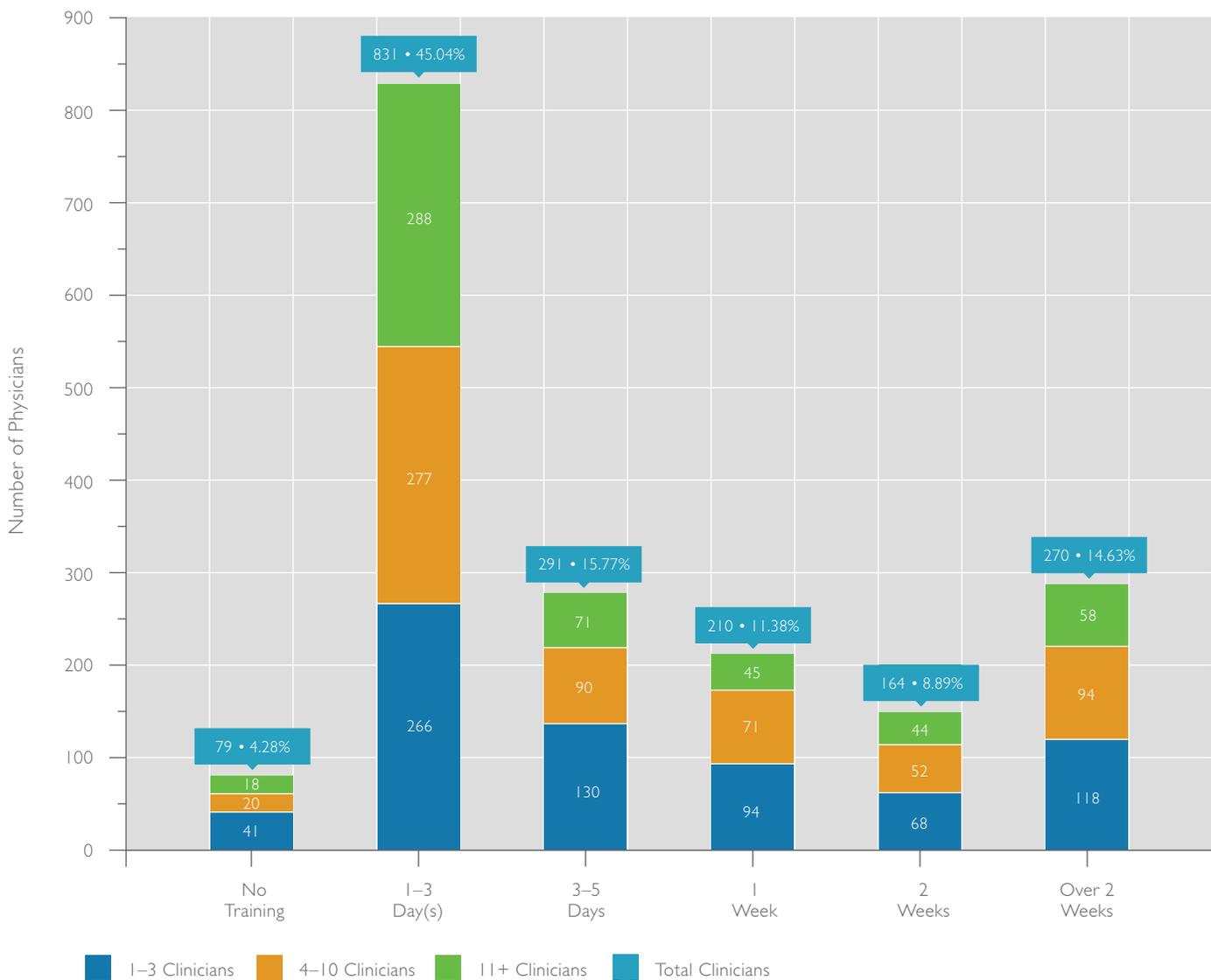
Nearly half (49.3%) of respondents indicated that they received 3 or fewer days of training.

Our analysis of the time spent on initial training by practice size revealed that 49.3% of physicians received either no training or only 1–3 days of training. Figure 4 illustrates these findings. This short duration of training was most notable among practices of 11 or more clinicians where 58% received less than 3 days of training. Note that 4.28% of respondents indicated that they received no initial EHR training.

Given our data that suggest even a relatively modest duration of training (3–5 days) is associated with higher levels of overall EHR satisfaction among respondents not involved in EHR selection (Key Finding #2), the finding that almost 50% of clinicians who adopt an EHR receive no training or very limited training represents a significant opportunity for improvement with a limited amount of additional investment of time, effort, and expense.

Figure 4

Training Received by Size of Practice (n=1,845)



KEY FINDING #4

Ratings on ease of use for basic EHR functions required for Meaningful Use continued to improve with 2+ weeks of training.

Given the tremendous effort being undertaken by practices across the United States to achieve Meaningful Use, we did an analysis to determine ratings of ease of use (usability) with “basic” EHR functions and length of initial EHR training. For the purpose of this analysis, the following activities were identified as “basic” functions for EHR users:

- Ease of Use: Maintain an Active Medication Allergy List (Core MU Measure #6)
- Ease of Use: Maintain an Active Medication List (Core MU Measure #5)
- Ease of Use: Check For Drug Interactions When Prescribing a New Medication (Menu Set MU Measure #1)

Maintain Active Medication Allergy List

For individuals *not* involved in EHR selection, the overall rating of ease of use for maintaining an active medication allergy list increased with additional training—and every level of training attained statistical significance versus no training ($p < 0.01$). Further, the odds ratio of physicians rating this function as more usable increased relatively steadily over each increment of training assessed, and peaked at 7.08 with 2+ weeks of training when no training was used as the reference category. In other words, the odds of a physician rating a system more usable were 7.08 times higher for those who received 2+ weeks of training compared to physicians who received no training, holding all other variables constant. The odds ratio for physicians involved in EHR selection did increase slightly with additional training but these findings did not achieve statistical significance.

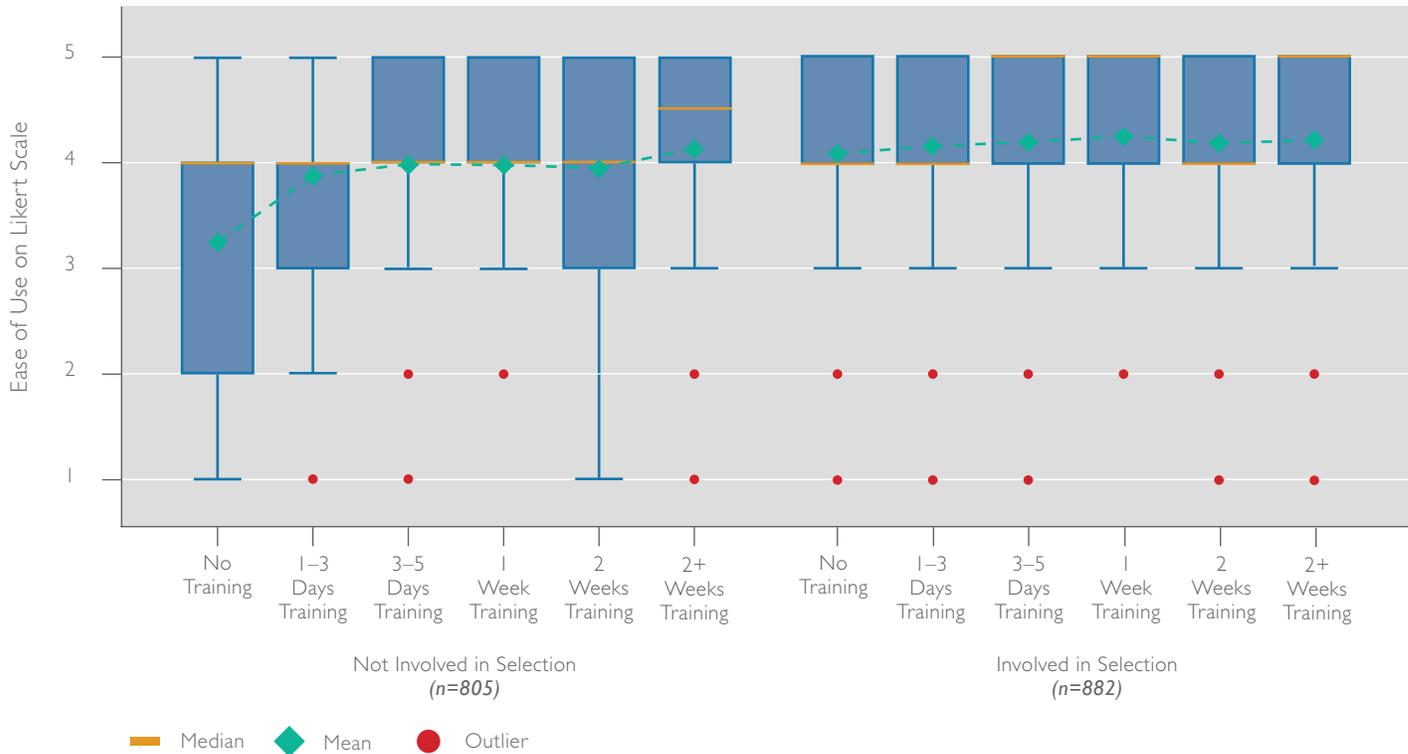
Explanation of odds ratios: The odds ratio is the ratio of the odds of an event of interest occurring in one group compared to the same event of interest occurring in another group. The larger the odds ratio for a given outcome the higher the likelihood of an event occurring when the same set of expectations are met.[†] These odds ratios were calculated using an ordered logistic regression analysis as described in the methodology section. A detailed analysis of the ordered logistic regression analysis used in these findings and the corresponding odds ratios can be found in Appendix 3.

† For more information on understanding odds ratios we suggest <http://intmedweb.wfubmc.edu/ebmreviews/odds.html> from Wake Forest Medical School or http://stats.org/stories/2008/odds_ratios_april4_2008.html

KEY FINDING #4

Figure 5

Ease of Use: Maintain an Active Medication Allergy List
By Length of Initial Training and Involvement in Selection
(n=1,687)



Ease of Use scores for each category of training are statistically different from each other $p < 0.01$ when no training is used as the base category for individuals who were not involved in the selection of their EHR. There were not statistically significant differences $p < 0.05$ for individuals who were involved in the selection of their EHR.

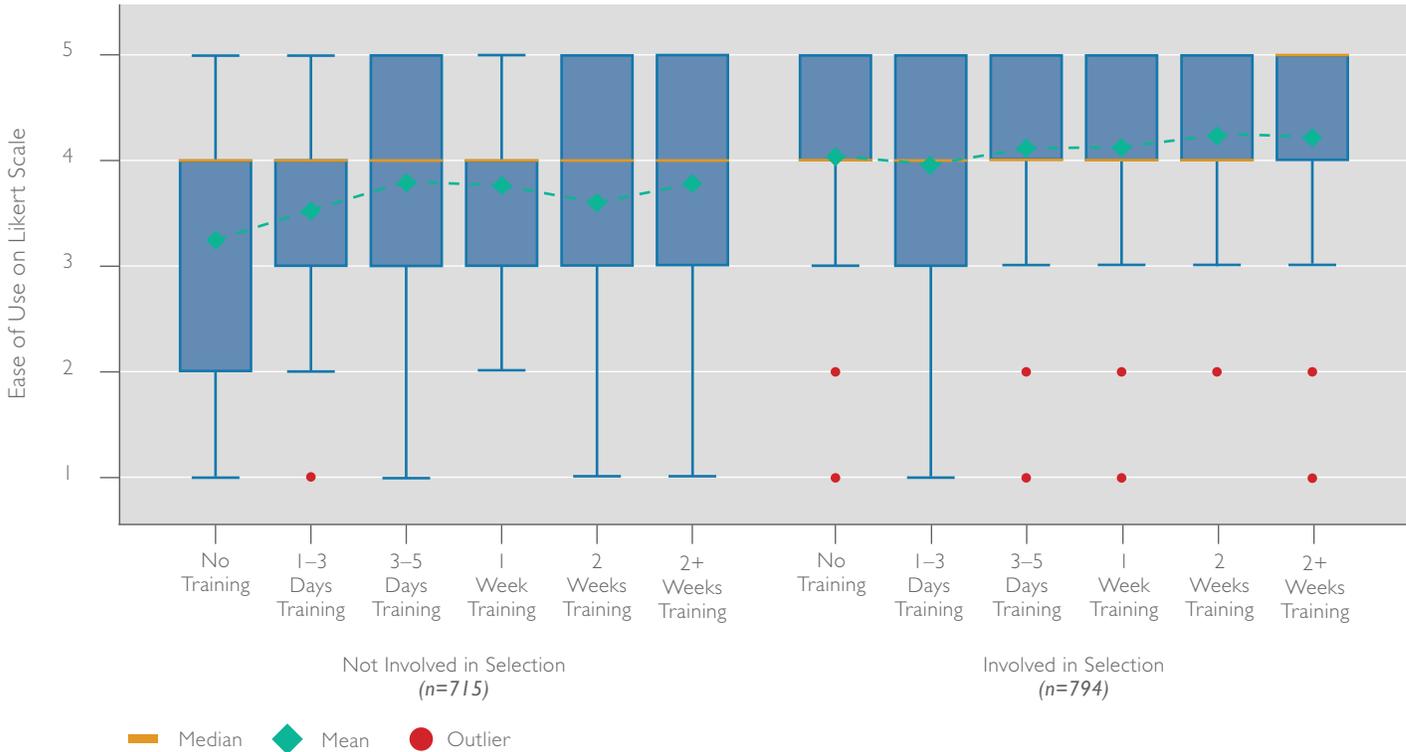
KEY FINDING #4

Maintain an Active Medication List

Similar findings were noted for maintaining an active medication list. Figure 6 illustrates these data.

Figure 6

Ease of Use: Maintain an Active Medication List
By Length of Initial Training and Involvement in Selection
(n=1,509)



Ease of Use scores for each category of training are statistically different from each other $p < 0.01$ when no training is used as the base category for individuals who were not involved in the selection of their EHR. There were not statistically significant differences $p < 0.05$ for individuals who were involved in the selection of their EHR.

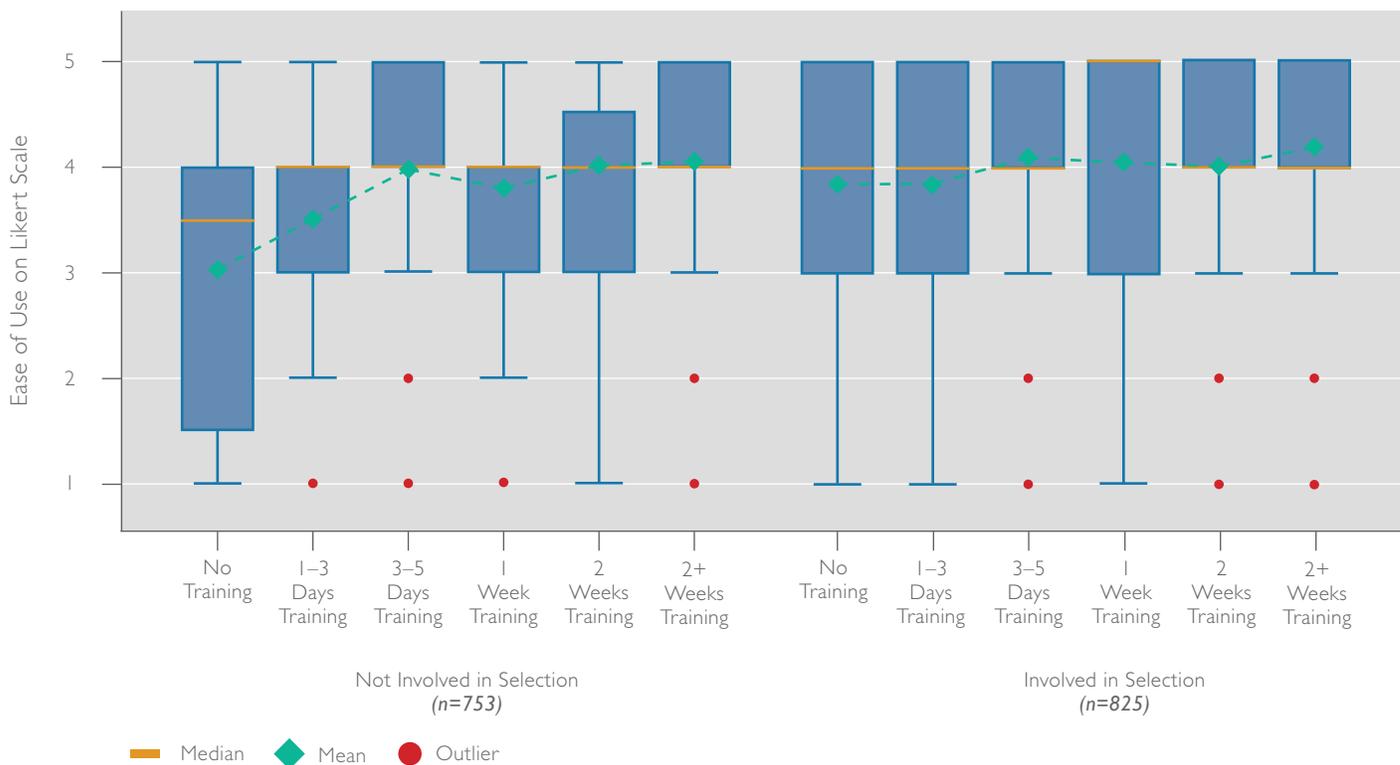
KEY FINDING #4

Check for Drug Interactions When Prescribing a New Medication

Ratings of the ease of use for checking drug interactions when prescribing a new medication followed a similar pattern. All levels of training were statistically significant (at least $p < 0.05$) compared to no training for those respondents not involved in EHR selection. The odds ratio of a physician rating this function as easy to use peaked at 4.93 at 2+ weeks. Similar to the ratings for maintaining an active medication allergy list, for those respondents involved in EHR selection the odds ratio improved slightly with additional training, but did not reach levels of statistical significance. Figure 7 highlights these findings.

Figure 7

Ease of Use: Check for Drug Interactions When Prescribing a New Medication By Length of Initial Training and Involvement in Selection (n=1,578)



Ease of Use scores for each category of training are statistically different from each other $p < 0.01$ when no training is used as the base category for individuals who were not involved in the selection of their EHR. There were not statistically significant differences $p < 0.05$ for individuals who were involved in the selection of their EHR.

The consistency of these findings (for individuals not involved in EHR selection) suggests that there is a positive correlation with training and usability for these basic EHR features related to Meaningful Use.

For more details, see Appendix 3.

KEY FINDING #5

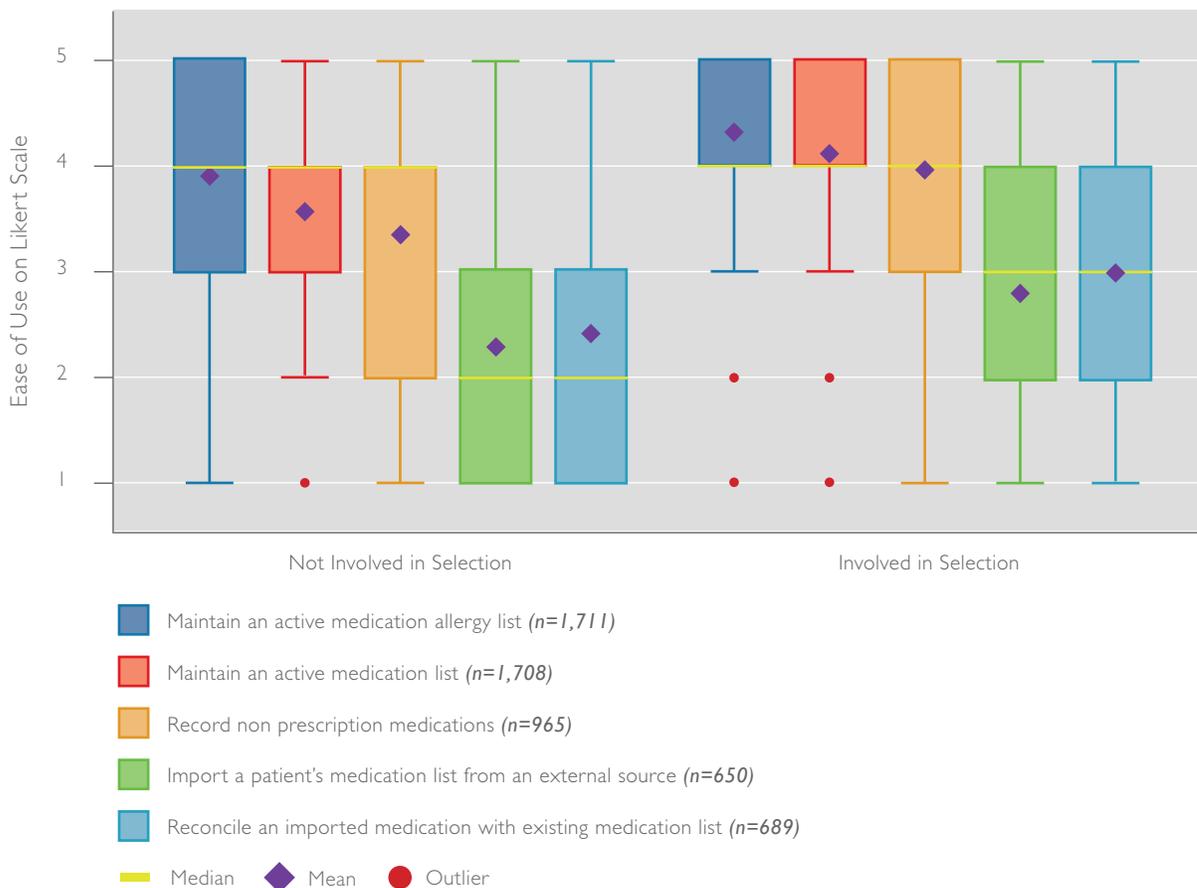
Ratings of ease of use for specific Meaningful Use measures varied significantly. More training—at least one week—was correlated with improvement in the reported usability of advanced EHR features (e.g. checking patient formulary, importing medication lists, medication reconciliation).

EHR usability is difficult to quantify. However, higher ratings of ease of use (or usability) related to particular features of an EHR may indicate a greater likelihood that these functions will be implemented by clinicians in practice. Ease of Use ratings for a number of Stage I Meaningful Use (MU) measures indicate higher perceived usability for basic features compared to more advanced functions. For instance, the average ease of use score for checking a patient's formulary was 3.04 compared to 3.86 for maintaining a patient's medication allergy list. Similarly, importing a patient's medication list from an external source scored 2.43 compared to 3.86 for maintaining a patient's medication allergy list a 1.4 point decrease. The differences in usability noted in these examples were statistically significant $p < 0.01$.

Figure 9 highlights the differences in usability between some medication management features of EHRs. Respondents reported lower ease of use for importing and reconciling patient medication lists (i.e. more advanced functions).

Figure 9

Ease of Use for Medication Management Features By Involvement in Selection

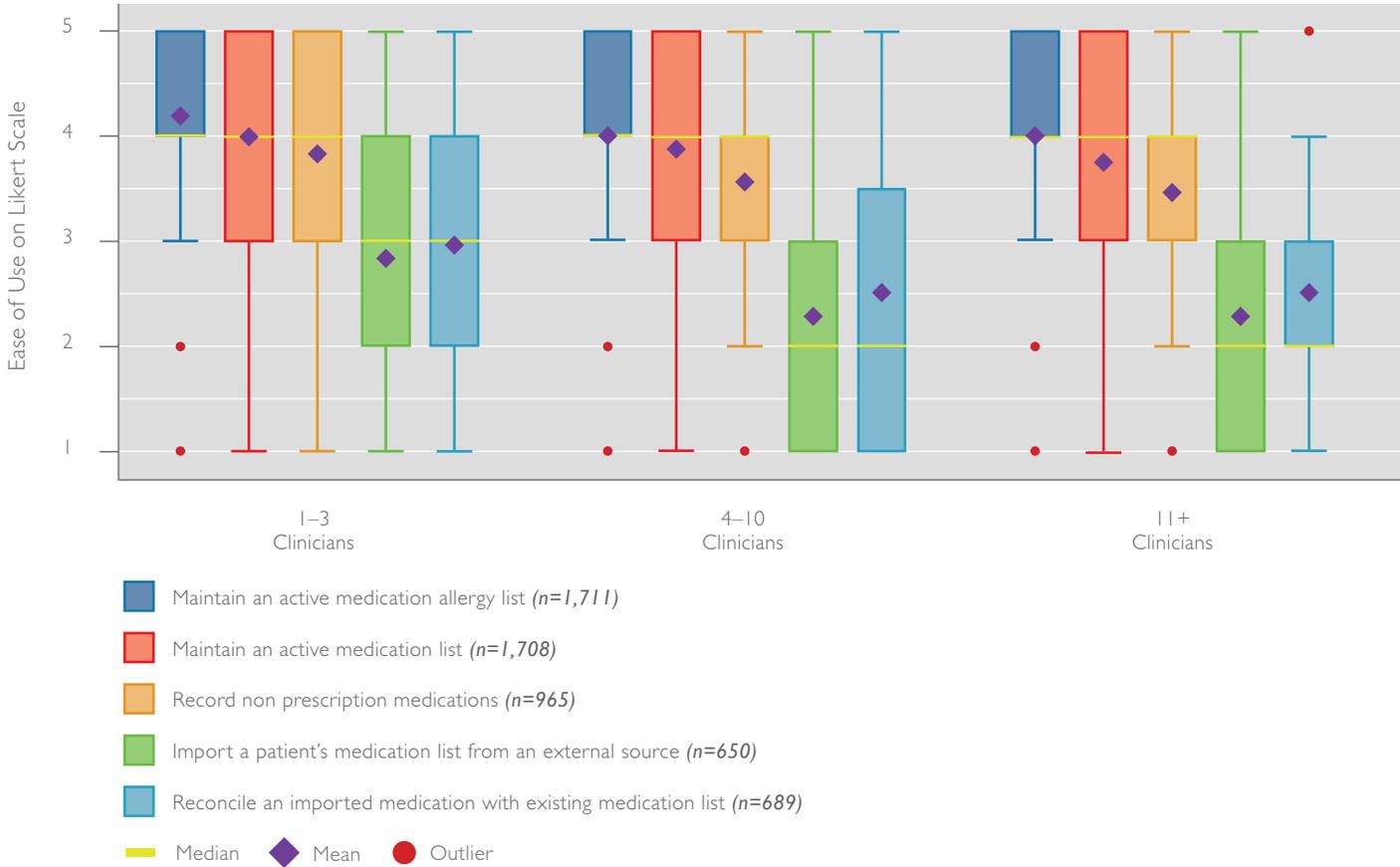


KEY FINDING #5

These findings were consistently demonstrated across all practice sizes. See Figure 10.

Figure 10

Ease of Use: Medication Management Features By Size of Practice

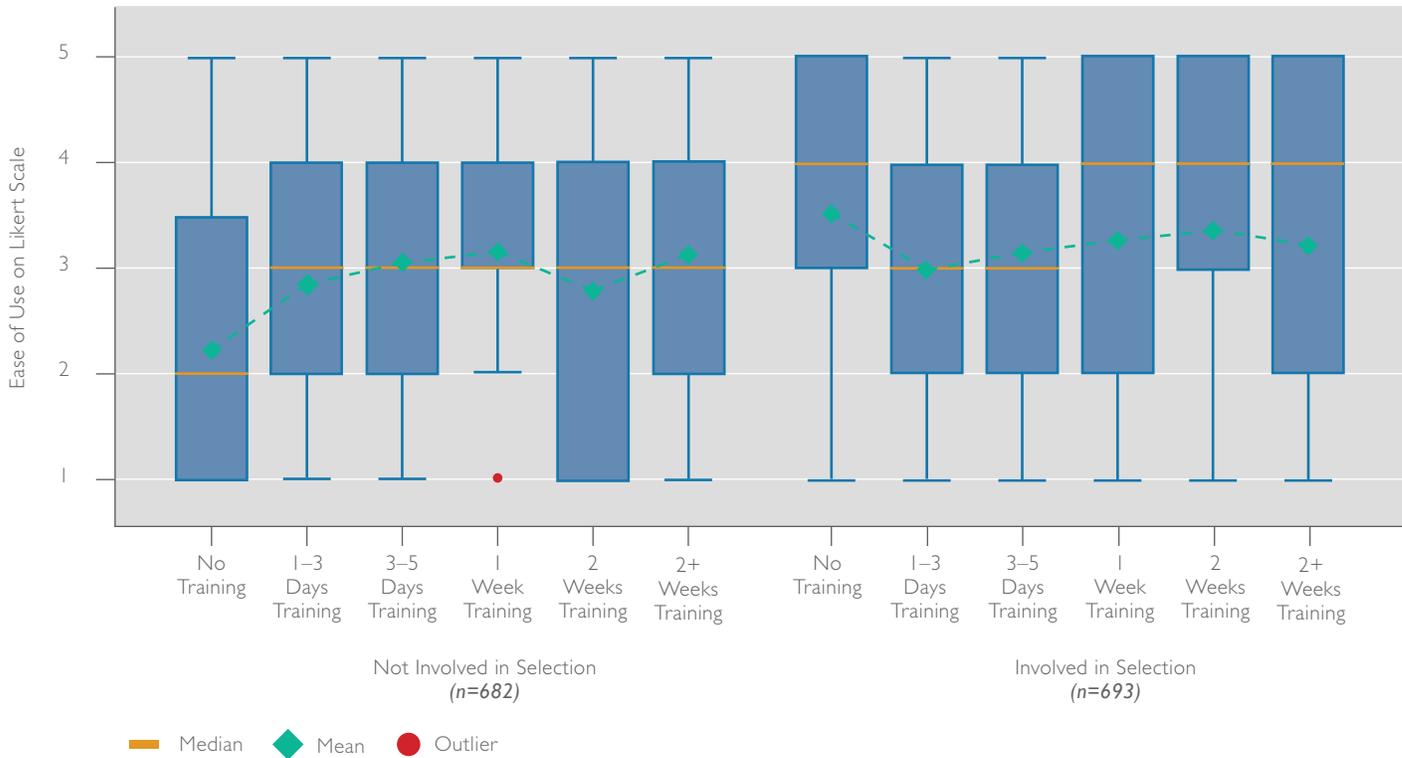


KEY FINDING #5

The maximum ease of use rating for checking patient formulary information (Figure 11) occurred after one week of training. This finding was more dramatic in the group of respondents not involved in the selection of the EHR in comparison to those who were involved in EHR selection—though the findings are consistent across both groups.

Figure 11

Ease of Use: Checking Patient Formulary By Length of Initial Training and Involvement in Selection (n=1,375)



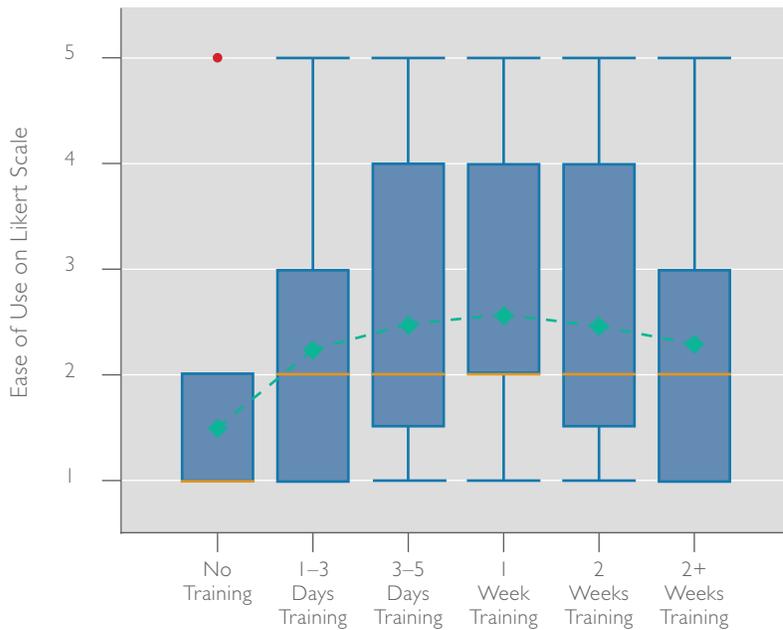
Ease of Use scores for each category of training are statistically different from each other $p < 0.01$ for those not involved in selection when no training is used as the base category.

Importing medication lists from external sources and reconciling such lists with the EHR are two additional Stage 1 MU requirements that could be considered advanced functions. Meaningful Use Menu Set Measure #7 addresses the need to reconcile medication lists when patients move from one setting of care or provider to another.

Our analysis demonstrates that, unless individuals received at least one week of training, they indicated low ease of use ratings for importing a patient's medication list from an external source and reconciling that data with an existing medication list. Figures 12 and 13 highlight these findings. The odds ratio of a physician reporting ease of use for importing a medication list peaked at one week with an odds ratio of 8.91 ($p < 0.01$).

KEY FINDING #5

Figure 12

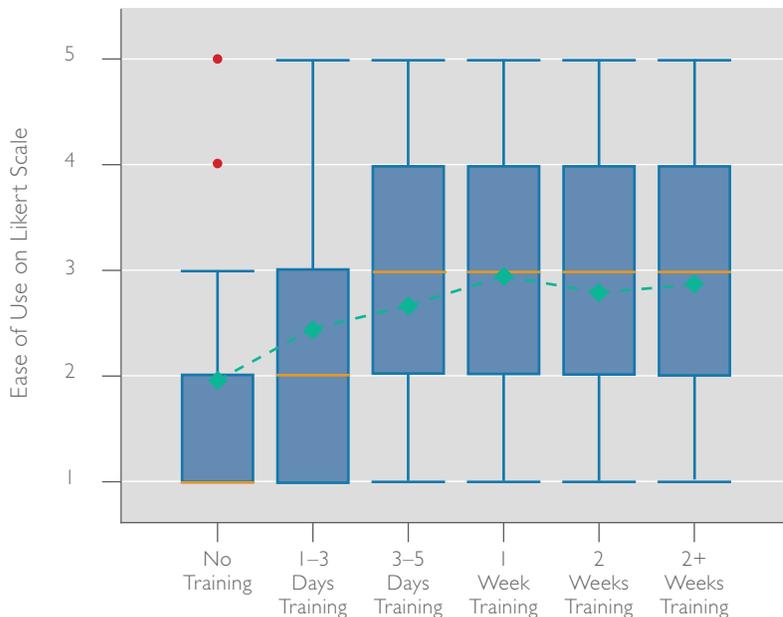


Ease of Use:
Importing a Medication List From
an External Source
(e.g. Surescripts, HIE[†])
By Length of Initial Training
(n=650)

Median Mean Outlier

Ease of Use scores for each category of training are statistically different $p < 0.01$ when no training is used as the base outcome.

Figure 13



Ease of Use:
Reconcile an Imported
Medication List
Usability Score
by Length of Initial Training
(n=684)

Median Mean Outlier

Ease of Use scores for each category of training are statistically different from each other $p < 0.01$ when no training is used as the base outcome.

[†] Surescripts is the network predominantly used in the US to distribute e-prescriptions and information on e-prescriptions (www.surescripts.com). HIE refers to Healthcare Information Exchange(s).

KEY FINDING #5

Data presented in Key Findings #4 and #5 suggest that the length of initial training to achieve an optimum level of usability pertaining to basic EHR functionality is 3–5 days and that the use of more advanced functionality may require training beyond 3–5 days in order to attain reasonable usability ratings. This makes intuitive sense. However, data presented in Key Finding #3 demonstrate that almost 50% of respondents received 3 or fewer days of training. In fact, 65% of respondents received 5 days or less of initial training.

Achieving reasonable ratings for ease of use for some advanced functionality necessary to achieve MU required more training than to achieve similar ratings of ease of use for basic functions. While this is not surprising, it does have implications for the design of EHR implementation strategies and training.

For more details on this analysis, see Appendix 4.

SUMMARY

This initial report from AmericanEHR Partner demonstrates that training for EHR users is highly variable and that length of initial training is correlated with overall satisfaction and ease of use (usability) with both basic and advanced EHR functions—especially for individuals not involved in EHR selection. Further, some higher level EHR functions required for MU were rated lower on usability and required more training than for basic functions.

While these findings may not be surprising, the levels of training at which higher overall satisfaction and usability improved suggest that facilitating better EHR uptake and use may be achieved with less time, expense, and effort than some might expect. In addition, the data suggest that involvement in EHR selection may result in lower training requirements and could lead to higher levels of overall satisfaction and usability. While unique attributes of the respondents involved in EHR selection may have influenced these findings, the supposition that early exposure to EHR features, functions and characteristics during product reviews and participation in decision-making could lead to these findings is reasonable—but merits additional study.

We were surprised to find that almost 50% of respondents received three or fewer days of training given the complexity of current EHR systems and the pressure to achieve MU. The percentage of respondents reporting this low level of training was highest for individuals in practices of 11+ clinicians. It is possible that larger practices deploy other methods of ensuring clinicians receive appropriate EHR guidance, such as placement of coaches alongside clinicians after implementation in lieu of additional pre-implementation training. Additional research may help determine the cause(s) of this finding in order to determine if different models of training/implementation are better with respect to achieving overall satisfaction with EHRs and high usability.

CONCLUSION

This report from AmericanEHR Partners is our initial contribution in support of higher quality, more effective, safe, and efficient delivery of health care through the use of health information technology. We decided to focus on some very pertinent issues related to EHR satisfaction and usability but plan to release additional reports in the near future on other relevant and timely topics. In a separate document, issued simultaneously with this one, we provide our analysis of EHR satisfaction ratings and market share. Collectively, these two analyses demonstrate the power and potential of our collaboration with professional societies and content partners.

AmericanEHR Partners is dedicated to exploring the unanswered questions from this report and to improving our ability to collect, analyze, and report findings from our surveys. We invite suggestions, comments, and queries—especially from health services researchers interested in collaborating on future efforts. You can contact us at info@americanehr.com.

ABOUT AMERICANEHR PARTNERS

AmericanEHR Partners has been developed by Cientis Technologies and the American College of Physicians.

[AmericanEHR Partners](#) provides physicians, state and federal agencies, vendors, and funding organizations across the United States with the necessary tools to identify, implement, and effectively use Electronic Health Records (EHRs) and other healthcare technologies.

[Cientis Technologies](#) is an international developer of web-based tools to assist clinicians and their medical practice teams in the selection, adoption, and use of Electronic Health Records systems and related healthcare technologies. The Cientis Technologies platform helps clinicians improve care and enhance efficiency through education on the effective use of health information technology.

[American College of Physicians](#) is the largest medical specialty organization and the second-largest physician group in the United States. ACP members include 132,000 internal medicine physicians (internists), related subspecialists, and medical students. Internists specialize in the prevention, detection, and treatment of illness in adults. Follow ACP on [Twitter](#) and [Facebook](#).

APPENDICES



APPENDIX I: PARTNER PROFESSIONAL SOCIETIES

PROFESSIONAL SOCIETY PARTNERS

- American Academy of Allergy, Asthma & Immunology (AAAAI)
- American Academy of Dermatology (AAD)
- American Academy of Neurology (AAN)
- American Academy of Physician Assistants (AAPA)
- American College of Physicians (ACP)
- American College of Rheumatology (ACR)
- American College of Surgeons (ACS)
- American Osteopathic Association of Medical Informatics (AOAMI)
- American Psychiatric Association (APA)
- American Society of Clinical Oncology (ASCO)
- Infectious Disease Society of America (IDSA)
- Renal Physicians Association (RPA)
- Society of General Internal Medicine (SGIM)

CONTENT PARTNERS

- American Academy of Professional Coders (AAPC)
- American Health Information Management Association (AHIMA)
- Healthcare Information and Management Systems Society (HIMSS)

APPENDIX 2: DETAILED ANALYSIS OF KEY FINDING #2

We performed an ordered logistic regression analysis of the data to determine the statistical significance of the findings with individuals receiving no training as the base outcome. Individuals who were not involved in the selection of their EHR system had the highest odds of being satisfied with their system after 3–5 days of training and 2+ weeks of training.

OVERALL SATISFACTION		
Factor Change in Odds for Individuals Not Involved in Selection with No Training as the Base Outcome (n=578)		
Length of Training	p-value	Odds Ratio
1–3 Days	0.029	2.52
3–5 Days	0.006	3.51
1 Week	0.026	3.04
2 Weeks	0.047	2.74
2+ Weeks	0.001	5.05

Physicians who were involved in the selection of their EHR system had slightly higher odds of being satisfied with their EHR system after 3–5 days and 2 weeks of training, but these differences did not achieve statistical significance.

OVERALL SATISFACTION		
Factor Change in Odds for Individuals Involved in Selection with No Training as the Base Outcome (n=378)		
Length of Training	p-value	Odds Ratio
1–3 Days	0.817	0.87
3–5 Days	0.796	1.17
1 Week	0.803	0.86
2 Weeks	0.613	1.38
2+ Weeks	0.69	0.78

APPENDIX 3: DETAILED ANALYSIS OF KEY FINDING #4

The ordered logistic regression analysis showed that the differences observed for individuals who were involved in the selection of their EHR were statistically different $p < 0.01$ for each category of training. We also found that as the amount of training increased the odds of physicians rating their as more usable also increased, when no training was used as the reference outcome. We did see a slight dip at the one week level with odds of 3.47 compared to 4.12 for 3–5 days.

EASE OF USE MAINTAIN ACTIVE MEDICATION ALLERGY LIST		
Factor Change in Odds for Individuals Not Involved in Selection with No Training as the Base Outcome (n=805)		
Length of Training	p-value	Odds Ratio
1–3 Days	0.004	2.75
3–5 Days	0	4.12
1 Week	0.003	3.47
2 Weeks	0.001	4.45
2+ Weeks	0	7.08

For individuals that were involved in the selection of their EHR system we saw a smaller increase in the odds of finding the systems more usable with peaks at 1 week and 2+ weeks but these differences were not statistically significant.

EASE OF USE MAINTAIN ACTIVE MEDICATION ALLERGY LIST		
Factor Change in Odds for Individuals Involved in Selection with No Training as the Base Outcome (n=882)		
Length of Training	p-value	Odds Ratio
1–3 Days	0.719	1.13
3–5 Days	0.276	1.47
1 Week	0.234	1.53
2 Weeks	0.488	1.30
2+ Weeks	0.189	1.60

APPENDIX 3: DETAILED ANALYSIS OF KEY FINDING #4

Similar findings were found for ease of use pertaining to checking for drug interactions when prescribing a new medication. The findings for individuals who were not involved in selection were statistically significant $p < 0.05$

EASE OF USE CHECK DRUG INTERACTIONS		
Factor Change in Odds for Individuals Not Involved in Selection with No Training as the Base Outcome (n=750)		
Length of Training	p-value	Odds Ratio
1-3 Days	0.041	2.04
3-5 Days	0.001	3.70
1 Week	0.029	2.51
2 Weeks	0.044	2.30
2+ Weeks	0	4.93

As in other cases, the increases were less substantial in the group who were involved in the selection of their EHR and were not statistically significant.

EASE OF USE CHECK DRUG INTERACTIONS		
Factor Change in Odds for Individuals Involved in Selection with No Training as the Base Outcome (n=821)		
Length of Training	p-value	Odds Ratio
1-3 Days	0.681	0.86
3-5 Days	0.439	1.35
1 Week	0.438	1.35
2 Weeks	0.712	1.16
2+ Weeks	0.229	1.59

APPENDIX 4: DETAILED ANALYSIS OF KEY FINDING #5

We performed an ordered logistic regression analysis of the data on checking a patient's formulary to determine the statistical significance of the findings, with individuals receiving no training as the base outcome.

The odds ratio of physicians reporting ease of use with checking a formulary was highest at 1 week and 2+ weeks ($p < 0.05$) for individuals not involved in the selection of their EHR; however, the differences observed at 2 weeks did not achieve levels of statistical significance when compared to individuals with no training.

EASE OF USE CHECK PATIENT FORMULARY		
Factor Change in Odds for Individuals Not Involved in Selection with No Training as the Base Outcome (n=679)		
Length of Training	p-value	Odds Ratio
1-3 Days	0.039	2.12
3-5 Days	0.011	2.73
1 Week	0.003	3.58
2 Weeks	0.165	1.85
2+ Weeks	0.002	3.51

For individuals who were involved in the selection of the EHR system, we observed a decrease in the odds of being satisfied with the system at 2+ weeks when no training was used as the base outcome. However, this was not statistically significant and may be an anomaly. Ratings for no training were quite high, as noted in Figure 11. The trend for increased usability as training increases was maintained if one discards the responses for no training.

EASE OF USE CHECK PATIENT FORMULARY		
Factor Change in Odds for Individuals Involved in Selection with No Training as the Base Outcome (n=688)		
Length of Training	p-value	Odds Ratio
1-3 Days	0.066	0.51
3-5 Days	0.28	0.66
1 Week	0.815	0.91
2 Weeks	0.849	0.93
2+ Weeks	0.625	0.83

APPENDIX 4: DETAILED ANALYSIS OF KEY FINDING #5

We performed an ordered logistic regression analysis of the data to determine the correlation between training and usability of importing and reconciling a patient's medication list and used individuals receiving no training as the base outcome. We found that for all of the different categories of training that they were statistically different from each other $p < 0.01$. We also found a substantial increase in the odds of individuals rating the systems as they received more training on the use of the system. Due to the smaller number of respondents for these questions, we did not analyze the data for individuals involved and not involved in the selection of their EHR system separately as we did with other questions.

Individuals who received more training on the use of the system found importing a patient medication list easier when compared to those with no training. The odds for ease of use peaked at one week with an odds ratio of 8.91 ($p < 0.01$).

EASE OF USE IMPORTING A PATIENT MEDICATION LIST FROM AN EXTERNAL SOURCE Factor Change in Odds for Training Duration With No Training as the Base Outcome (n=645)		
Length of Training	p-value	Odds Ratio
1-3 Days	0.004	5.3423
3-5 Days	0.001	7.8017
1 Week	0	8.9181
2 Weeks	0.001	8.5707
2+ Weeks	0.001	7.4095

As with importing a medication list, individuals receiving more training on the use of the system found it easier to reconcile an imported medication list. The odds peaked after one week of training with an odds ratio of 5.8 ($p < 0.01$).

EASE OF USE RECONCILE AN IMPORTED PATIENT MEDICATION LIST Factor Change in Odds for Individuals By Length of Additional Training and No Training as the Base Outcome (n=684)		
Length of Training	p-value	Odds Ratio
1-3 Days	0.042	2.8111
3-5 Days	0.004	4.6499
1 Week	0.001	5.8045
2 Weeks	0.006	4.502
2+ Weeks	0.004	4.6198



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