

Volume XV Issue III Version I

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Abstract

Part of a well-designed health informatics implementation process includes the mechanisms put in place to help the day-to-day operators of the systems. Continual appraisal of these methods necessitates up-to-date investigations. Understanding critical elements which support a positive transition of health information technology (HIT) within healthcare facilities is the objective of the following research. To help develop these findings, a prospective postimplementation and use assessment survey was conducted on two hospitals in Central Texas. The population studied included RN case managers, social workers and supportive staff in the Continuum of Care departments at two Scott White Healthcare acute care facilities. The implementation process appeared to provide a mostly encouraging transition with a small number of components noted of concern to the staff. Areas of enhancement were revealed included improving training specific to job roles and supplying more fitting integration of processes and workflows.

Index terms— health informatics; evaluation, postimplementation.

1 I. Health Informatics Integrated System Post-Implementation Evaluation

When one speaks of a successful health information technology (HIT) system implementation, there are several dimensions that go into determining that success. While the satisfaction of the workforce is very important, it is only one dependent factor tied to how well the healthcare process has succeeded. How well current practices are redesigned to take advantage of the technology is a factor. Quality of the data is another influence. Confidence in the documentation and the information it contains an important aspect. How a system will work through barriers and enable facilitators are other dimensions of a successful implementation. Measurement of improvement to patient care is another facet. So many characteristics go into determining a successful implementation. Finding the right instruments to put into position before, during and after an HIT system implementation is an ongoing task that continually needs to be evaluated. As with the integrated systems, implementation standards need to be studied and enhanced to strive for even better success. A well designed process should allow for success that is on par or surpasses the importance of the former.

2 II. Background

A little over a decade ago, the Institute of Medicine put forward that improved patient safety, efficiency of health care delivery competences and quality of care would be realized by make use of an effective integrated HIT (Crossing the Quality Chasm: A New Health System for the 21st Century, 2001). More recently, government incentives and mandates have been placed on healthcare institutions advocating for their adoption of HIT systems (DHS, 2010). While there are legislative whys and wherefores that go into the need for an HIT system, the drive to have a system that helps the patient and staff needs to be the driving force in the desire to find mechanisms which encourage a positive and effective application.

The purpose of the research topic of interest is to identify elements necessary for a successful HIT system implementation at acute care hospital sites. The research study will help determine what critical elements are necessary to have in place in order for healthcare facilities to have a successful transition from an older medical record system to a new electronic medical record (EMR) system.

The research study will evaluate what operations should be set in place by healthcare facilities before transitioning to an HIT system. Moreover, the research will focus on possible ways to prevent issues that may develop during and from the implementation of the new electronic system. The study will survey employees of healthcare facilities who have already transitioned to an HITsystem and examine how they believe the implementation process could be been improved. Furthermore, barriers to a successful HIT system implementation will be attempted to be identified. As a final point, information found in the study will be used to synthesize material and identification of possible gaps in research.

Information found in the literature review was employed to integrate data and identify gaps in present research such as the need for greater variety of positions giving feedback. While several of the recommendations for successful implementation were similar, some studies had opposing views of nurses' attitudes after implementation. The type of support by the healthcare facility before and after implementation may have been a factor in these findings. Moreover, in the majority of studies, nurses were the population studied and findings were based on these responses.

Although in all five articles the implementation of a comprehensive HITsystem was being evaluated, rarely was health care personnel who work outside of direct patient care evaluated. No staff within areas such as admissions or billing was interviewed (Table 1).

3 III. Methodology

The methodology of the research study is parted into its research design, population, and data collection procedures. Additionally, the suitable data collection instrument is determined based on the research design and population. Applied to the study will be the appropriate data analysis.

A prospective post-implementation survey was used as the research method on the comprehensive HIT system within the facility healthcare system. The intent of the design was to help describe the current views of the healthcare staff in relation to the quality of the system, the implementation and its current operation.

Research was conducted at two acute care hospitals that recently rolled out the EMR system within the last year. The study population was end users of the integrated system within the Continuum of Care departments of acute care hospital sites in Temple, Texas. The first facility is a 64-bed pediatric specialty care and teaching hospital. The second is a 636-bed specialty care and teaching hospital. The health information technology employed was the commercial software system, Epic. The execution of the research study used the direction laid out in Health Informatics Research Methods: Principles and Practice (Layman, 2009).

4 a) Data Collection Procedures

Data collection was performed by anonymous submission online via REDCap (REDCap, 2009). Notification was given through the employer email system with permission from management. A cover letter was included stating participation was voluntary and not part of an institutional initiative (Figure ??). After one week, a reminder email was provided to the same staff. At the end of fourteen days, the link to survey was ended.

5 IV. Results

The following results describe the response rate and break down the demographics of the respondents.

6 a) Response Rate of Population

The response rate was determined to be 37.78%. One hundred seven possible respondents were emailed a cover letter and link to the autonomous website. Again, one week later the same cover letter and link were emailed to the same one hundred and seven staff members. The link was terminated one week later. In total, thirty-four valid surveys were completed.

7 b) Representativeness of Population

The staff ranged in age from younger than twenty-five to greater than sixty-six. The largest number of respondents was present in the fifty-six to sixty-five year age range (32.4%). The majority stated their computer proficiency as average (61.8%) and had prior EMR experience (55.9%). (Figure 5, 6 & 7; Table 3).

8 c) Research Questions

In developing an understanding of the attitude of the staff, the quality of the system, its information and the service provided regarding the HIT system were measured. Additionally, the particular aspects of the clinical data were analyzed. A five-level Likert scale was utilized to measure the employee's stance on the quality of the HIT system, the information within the HIT system, the service provided to support the HIT system and particular aspects related to the clinical information of the HIT system.

In regard to the quality of the system, a majority of the staff strongly agree that the system is consistently available (47.1%) and has acceptable security (50%). As for the system appropriately integrating with previous workflows, the employees were mostly divided between mildly agree (26.5%), moderately agree (29.4%) and strongly agree (29.4%). None of workers disagreed in a majority to any of the aspects measured related the quality of the system. The remainder moderately agreed that the system was easy to use (70%), its performance was reliable (44.1%), had acceptable response time (47.1%), provided effective communication between team members (41.2%), had acceptable exchange of information with other systems (38.2%) and enabled staff to perform work well (38.2%). (Figure ??; Table 3) The criteria measured related to the system's information was mostly seen as moderately agreeable. A majority of the staff moderately agree that the information is accurate (52.9%), relevant (47.1%), complete (47.1%) and has an acceptable layout (41.2%). An even number moderately agrees (41.2%) as strongly agree (41.2%) that the information is available when needed. (Figure ??; Table 4) In the three characteristics of service measured, a majority of staff moderately agreed that the implementation process (55.9%), level of training (47.1%) and on-going support (47.1%) is acceptable. (Figure ??; Table 5) Because most of the respondents do not work directly with the patients, the majority answered that they were not sure of the patient's satisfaction with clinicians' use of system (35.3%) or patient's concerns with system security and confidentiality (41.2%). A majority strongly believe that the clinical data has improved patient outcomes (41.2%), improved patient safety (41.2%), improved patient's knowledge of their health (38.2%) and improved clinical documentation (38.2%). A majority moderately believe the clinical data of the patient is accurate and valid (44.1%), the timely manner of the patient care services has increased (35.3%) and that there is an appropriate selection of patient care orders (35.3%). (Figure ??; Table 6) The standard deviation of the criteria within the four quality themes were calculated and presented within Table 7. Within Table 8, cross tabulations are provided based on prior EMR experience vs. each of the acceptability of quality of the system, information, service and clinical data. The number of staff with prior EMR experience (N=19) slightly outnumbered the staff with no prior experience (N=15). Having experience with an EMR system or having no experience did not appear to affect the acceptability. In the four measures, the respondents in both groups found the quality of the system, its information, its service and specifically the clinical area all moderately acceptable. From the four core categories, each quality set's comment section was reviewed for common themes applicable to productive transition of HIT systems. Within the system quality focus, interoperability between modules within the system and to other systems is a noted concern of staff. As one respondent stated, "communication in the system is available but isn't utilized as well as possible." Another staffer mentions that the system "doesn't consistently interface properly with Midas." (Figure ??) For the information quality, an issue raised was the inability to access information. The view of a Case Manager is different than that of a nurse which brings concern that information is not being interpreted in the same manner (Figure ??).

Figure 9

Figure 12 Figure 13

The largest numbers of concern are in relation to the service quality. One of the concerns is the training was not specific enough for particular job titles. An example given was a class attended by a Case Manager but included staff from the Admissions department. The class was taught using a task list for the Admissions department which was a "different view and way to enter" the system's authorization module. The Case Management felt the "class was not tailored enough" for their department. The same concern was noted by a staff member who not employed during the implementation but came after. She felt the training was inappropriate for her job description. Along the lines of training, it was mentioned for "more training services on over all process of Epic flow of documentation of a patient." (Figure ??) The staff to be unsure of how the system's modules are interconnected. Lastly, concerns were stated in regard to the timeliness of resolving issues. "IT is slow to respond and resolve issues when they arise" was the comment of one employee. For the final quality measure, the statements The survey concluded with more general questions related to the implementation process. The topics mentioned by the staff tended to reflect the appropriate training of staff with statements such as "training should have been more specific to my job" and "educate staff thoroughly to obtain the best results. Benefits stated my respondents were more in relation to the system such as "work flow is improved" and "faster access to information." (Figure 16)

9 V. Discussion

The significance of the results continues to help develop critical elements necessary for a successful transition to a new comprehensive system. The study focused on the end users' beliefs regarding the quality of the system and particularly, its information and service. Areas of enhancement were revealed included improving training specific to job and supplying more fitting integration of processes and workflows.

Likewise, confirmatory aspects of current procedures were observed throughout the study. After the implementation, a greater part of the respondents appreciated many of the aspects of having the new technology such as the ease of use, the ability to access to documents within one system and timeliness of information. to make progress, staff will need motivation. Motivation is provided by allowing choices, knowledge and connection to the progress. As an illustration, the barrier of providing job-specific training could be tackled. Addressing the goal of job-specific training would acknowledge the staff concerns. Providing acknowledgement and recognizing

the concerns will engage the personnel. Respond quickly with a plan of action will continue the commitment. Finally, provided feedback will continue the support of a positive transition.

In close, understand the critical elements to support positive HIT transitions are essential but the continued engagement of end users is also vital. Before, during and after implementation, healthcare personnel need to feel competent and related to the transition. Two future studies are recommended. First, a study could be developed to correlate staff engagement to positive HIT changeovers. The second would still be covering the gap in present research which continues to be the need for greater variety of positions giving feedback.

10 VI. Conclusions

The subsequent conclusions and recommendations will provide a summary of findings. Along with the findings, conclusions related to the implications to a positive implementation process related to the study and previous studies are provided.

The participants were employed within the Continuum of Care departments of two acute care inpatient facilities. The majority of respondents declared themselves to be Case Management staff. This group includes RN Case Managers and Social Workers. The remaining staff was administrative support staff or management staff of the Continuum of Care departments.

The quality of the four areas of focus all was seen in a largely positive light. Over eighty percent of the respondents moderately or strongly agreed that the system was easy to use, had reliable performance, was consistently available and had an acceptable response time. While acceptable response time did have a ninetyseven percent positive response, one staffer did moderately disagree. Two other areas did contain responses that ranged from strongly agree to moderately or strongly disagree which were the acceptability of information exchange with other systems and the appropriate integration of previous workflows.

As the system information as a whole and the clinical information surveyed individually, the workers replied a mostly affirmative response or stated that they were unsure. Most felt the information was relevant, accurate and had an acceptable layout. A small minority mildly disagreed the information was complete (2.9%) or available when needed (6.9%). Within the clinical quality survey questions, the response of "Not Sure" was selected than any of the four quality specific areas. From the comments given by the respondents, this was due to the staff not working directly with the patients. Still, a majority strongly believed that the system had provided improved patient outcomes, patient safety, patient knowledge of their health and improved clinical documentation.

While the quality of service still received mostly agreeable responses, it provided the large number of comments of concern by the respondents. Although the majority of survey takers moderately agree the implementation process, level of training and on-going supports were acceptable, the three questions also had responses that included mild, moderate and strong disagreement. The primary issue noted appeared to be centered on job-specific training. Whereas the remarks did convey a desire to better understand the overall process of Epic, the many staff members mentioned the need for training related to "addressing case management." One employee mentioned that there were "many questions and frustrations expressed in classes and for a few months after" because "when (the staff) first took Epic training, it did not relate to what they did." (Figures 5 and 6).

Similar to previous studies, some of the same topics were observed in this study. As with other studies, the implementation process appeared to provide a mostly encouraging transition with a small number of components noted of concern to the staff. Similar to the study in "Transitioning from a computerized provider order entry and paper documentation system to an electronic health record: Expectations and experiences of hospital staff", positive characteristics observed included the quality and safety of patient care. Readily available allinclusive clinical documentation and the ability to locate patient demographic information quickly were additional benefits of transitioning.

Moreover, conceivable enhancements for future implementations were illustrated with the recent study. One feature of greater apprehension was highlighted by staff with two other concerns of smaller notation. As mentioned in the article "Learning from Within to Ensure a Successful Implementation of an Electronic Health Record", the few of the staff within the current study expressed the similar need for further attention to processes and workflows within the new HIT system. Another minor concern was improving the exchange of information with other systems. More than an ability that can be imparted to the staff during the transition process, the implementation of this the element may be a requirement on the quality of the system itself. The greatest concern appears to be appropriate staff training. While an understanding of the overall structure of Epic is wanted, a focus on more job-specific training was repeatedly articulated. In summary, the critical elements essential for a successful transition emerging from the study appear to include appropriate training, attention to incorporating processes and workflows, swift feedback to questions and concerns and attention to the staff impression and opinion regarding the HIT system and its implementation.



Figure 1: W



Figure 2: 6 Volume

1283

Participant Code: _____

Employee / Staff Perceptions Electronic Health Record System Survey

Instructions to Participants

The following survey is intended to help researchers from Drexel University better understand staff perceptions and attitudes about the quality of clinical documentation. Specifically we are interested in learning about your experience using an electronic health record and understanding what impact an electronic health record has on patient care, and how it affects you.

Please check one (1) response for each question. Thank you for completing this survey.

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Figure 3: Figure 1 :Figure 2 : 8 VolumeFigure 3 :

Participant Code: _____

Your Job Title _____ Date _____

Have you had prior experience outside of your facility with any electronic health records or computerized provider order entry systems? No ____ Yes ____ If yes, about how many years of experience _____

Years working in healthcare _____

Would you rate your computer knowledge as below average; average; above average; advanced? _____

Your Age _____ Gender _____

Please indicate the extent to which you agree with the following statements regarding the electronic health record.
Please check only one (1) response per item.

	Strongly Disagree	Moderately Disagree	Mildly Disagree	Mildly Agree	Moderately Agree	Strongly Agree
1. The <u>electronic health record</u> is consistently available	[]	[]	[]	[]	[]	[]
2. The <u>electronic health record</u> is subject to frequent system problems	[]	[]	[]	[]	[]	[]
3. The <u>electronic health record</u> is user-friendly	[]	[]	[]	[]	[]	[]
4. Sufficient support is available to use the <u>electronic health record</u>	[]	[]	[]	[]	[]	[]
5. The <u>electronic health record</u> features enable me to perform my work well	[]	[]	[]	[]	[]	[]
6. Patient care data being recorded is accurate and valid	[]	[]	[]	[]	[]	[]
7. Patients have concerns about the <u>electronic health record</u> security or confidentiality	[]	[]	[]	[]	[]	[]
8. Patient care services are provided in a timely manner	[]	[]	[]	[]	[]	[]
9. Patient care orders in the <u>electronic health record</u> are appropriate	[]	[]	[]	[]	[]	[]
10. The <u>electronic health record</u> contributes to the safety of patients	[]	[]	[]	[]	[]	[]
11. The <u>electronic health record</u> supports effective communication between most team members about patient care	[]	[]	[]	[]	[]	[]
12. The <u>electronic health record</u> contributes to patient outcomes	[]	[]	[]	[]	[]	[]

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Figure 4: Figure 5 :

Participant Code: _____

	Strongly Disagree	Moderately Disagree	Mildly Disagree	Mildly Agree	Moderately Agree	Strongly Agree
13. The <u>electronic health record</u> contributes to patient's knowledge of their health condition	[]	[]	[]	[]	[]	[]
14. The <u>electronic health record</u> is worth the time and effort required to use it	[]	[]	[]	[]	[]	[]
15. Overall, I am satisfied with the <u>electronic health record</u>	[]	[]	[]	[]	[]	[]
16. I think patients are satisfied with clinicians using the <u>electronic health record</u>	[]	[]	[]	[]	[]	[]
17. My department had a role in introducing the <u>electronic health record</u> at my facility	[]	[]	[]	[]	[]	[]
18. People who use the <u>electronic health record</u> should have had more to say about its design	[]	[]	[]	[]	[]	[]
19. I have first hand knowledge that problems with the <u>electronic health record</u> interfere with patient care	[]	[]	[]	[]	[]	[]
20. A reason for my facility's adoption of the <u>electronic health record</u> was the system's ability to exchange patient information with nursing homes and hospitals	[]	[]	[]	[]	[]	[]
21. Sufficient resources are provided for me to learn to use the <u>electronic health record</u>	[]	[]	[]	[]	[]	[]
22. Part of the increase in costs of healthcare is because of computers	[]	[]	[]	[]	[]	[]
23. What worked well or what are your concerns related to the system:						

Thank you for completing this survey.

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Figure 5: Figure 6 :

Canada Health Infoway SYSTEM AND USE ASSESSMENT SURVEY LOCATION DATE To Whom It May Concern: The Ministry of Health & Long-Term Care (MHLTC) and Canada Health Infoway (CHI) are conducting a benefits evaluation study in order to improve the quality of the information provided by the health information systems, as well as, the level of satisfaction amongst end-users. Your feedback and assistance with this survey will help MHLTC and CHI to develop better systems and deliver better services. The following survey consists of specific questions on: the ease and functionality, information quality, service quality related to CHI health information system implemented at your Hospital or Centre. The survey will take approximately 10-15 minutes to complete. Please circle the response that best represents your opinion. Information that is collected during this survey will be kept anonymous and confidential. Please return the completed survey using the enclosed postage paid self-addressed envelope. If you have any questions about the survey, please contact _____ Thank you in advance for your participation. Sincerely yours, Canada Health Infoway / SPONSOR Version Date: March 2007 1

Figure 6: Figure 7 :

Canada Health Infoway
SYSTEM AND USE ASSESSMENT SURVEY

SECTION 1. OVERALL USER SATISFACTION

1. In general, how satisfied are you overall with the system you are currently working with? By "system" we mean, the ease and functionality of the system itself, the quality of the information given and the quality of the services provided for the system.

Highly satisfied ☐
 Moderately satisfied ☐
 Neither satisfied nor dissatisfied ☐
 Moderately dissatisfied ☐
 Not at all satisfied ☐

2. Please indicate your level of agreement or disagreement with each of the following statements below.

	Strongly Agree	Moderately Agree	Moderately Disagree	Strongly Disagree	Not Sure	Not Applicable
a.) The system improves my productivity	☐	☐	☐	☐	☐	
b.) The system improves the quality of care I can provide	☐	☐	☐	☐	☐	
c.) The system makes my job easier	☐	☐	☐	☐	☐	
d.) The system enhances our ability to coordinate the continuity of care	☐	☐	☐	☐	☐	
e.) The system improves our sharing of patient information amongst providers	☐	☐	☐	☐	☐	
f.) The system enhances the efficiency of ordering lab tests, X-rays, prescriptions, etc.	☐	☐	☐	☐	☐	☐
g.) The alerts, reminders and order set features (i.e. support tools) improve the quality of my decision-making	☐	☐	☐	☐	☐	☐

3. Are there aspects of the system that you would change, and if so, which ones would they be? Please describe your comments.

4. Do you have any experiences with the system where it has supported the provision of care? Please describe your comments.

Figure 7:

Canada Health Infoway SYSTEM AND USE ASSESSMENT SURVEY					
SECTION 2. SYSTEM QUALITY					
5. Based on your experiences to date with the system, how <u>acceptable</u> is the <u>quality of the system</u> itself (as described by the specific characteristics listed below)? Would you say it is:					
Highly acceptable	Moderately acceptable	Neither acceptable nor unacceptable	Moderately unacceptable	Not at all acceptable	
☐	☐	☐	☐	☐	
6. Please indicate your level of agreement or disagreement with each of the following statements below.					
	Strongly Agree	Moderately Agree	Moderately Disagree	Strongly Disagree	Not Sure
a.) The system is easy to use	☐	☐	☐	☐	☐
b.) The response time is acceptable	☐	☐	☐	☐	☐
c.) The system is integrated with my workflow	☐	☐	☐	☐	☐
d.) The system security is acceptable	☐	☐	☐	☐	☐
e.) The system features enable me to perform my work well	☐	☐	☐	☐	☐
f.) The system is reliable in its performance	☐	☐	☐	☐	☐
g.) Overall, the quality of the system is excellent	☐	☐	☐	☐	☐
SECTION 3. INFORMATION QUALITY					
7. In general, when thinking about the <u>quality of the information</u> provided by the system, do you find the quality of the information to be:					
Highly acceptable	Moderately acceptable	Neither acceptable nor unacceptable	Moderately unacceptable	Not at all acceptable	
☐	☐	☐	☐	☐	
8. Please indicate your level of agreement or disagreement with each of the following statements below.					
	Strongly Agree	Moderately Agree	Moderately Disagree	Strongly Disagree	Not Sure
a.) The information is complete	☐	☐	☐	☐	☐
b.) The information is quickly provided	☐	☐	☐	☐	☐
c.) The information provided is accurate	☐	☐	☐	☐	☐
d.) The information provided is relevant	☐	☐	☐	☐	☐
e.) The information is available when I need it	☐	☐	☐	☐	☐
f.) The format and layout of the information is acceptable	☐	☐	☐	☐	☐
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Figure 8:

**Canada Health Infoway
SYSTEM AND USE ASSESSMENT SURVEY**

SECTION 4. SERVICE QUALITY

9. In general, when thinking about the quality of the services (i.e. technical support and training services) provided for the system, do you find the quality of these services to be:

Highly acceptable Moderately acceptable Neither acceptable nor unacceptable Moderately unacceptable Not at all acceptable
☐ ☐ ☐ ☐ ☐

10. Please indicate your level of agreement or disagreement with each of the following statements below.

	Strongly Agree	Moderately Agree	Moderately Disagree	Strongly Disagree	Not Sure
a.) The implementation process at this Hospital or Centre was acceptable	☐	☐	☐	☐	☐
b.) The current level of training is acceptable	☐	☐	☐	☐	☐
c.) The level of on-going support provided is acceptable	☐	☐	☐	☐	☐

SECTION 5. PUBLIC HEALTH SURVEILLANCE SPECIFIC

-TO BE COMPLETED BY PUBLIC HEALTH SURVEILLANCE PERSONNEL ONLY -

11. Please indicate your level of agreement or disagreement for each of the following statements below.

	Strongly Agree	Moderately Agree	Moderately Disagree	Strongly Disagree	Not Sure
a.) The system improves the detection and management of reportable diseases	☐	☐	☐	☐	☐
b.) The system improves the management of immunization process	☐	☐	☐	☐	☐

Figure 9:

Canada Health Infoway SYSTEM AND USE ASSESSMENT SURVEY				
SECTION 6. SYSTEM USAGE				
12. In a typical day, how many times do you 'use' the system?				
_____ Number of times, a day				
Always ☐ Rarely ☐				
13. In a typical week, please indicate the number of days in which you use the system.				
_____ Number of days, a week				
14. Please estimate what percent of your patients do you use the system?				
_____ % patients (FILL IN)				
Don't know ☐				
15. How likely are you to <u>recommend</u> the system to other healthcare providers at other Hospitals or Centres?				
Definitely ☐	Probably ☐	May or may not ☐	Probably Not ☐	Definitely not ☐
16. Given a choice, would you like to increase or decrease your future use of the system that you are currently working with? Would that be a significant or moderate increase / decrease, or would you like your future use to stay the same?				
Significant Increase ☐	Moderately Increase ☐	Moderately Decrease ☐	Significant Decrease ☐	<u>REMAIN THE SAME</u> ☐
SECTION 7. OTHER COMMENTS				
17. Do you have any other comments you would like to make regarding the system ?				

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Figure 10:

**Canada Health Infoway
SYSTEM AND USE ASSESSMENT SURVEY**

SECTION 8. DEMOGRAPHIC INFORMATION

18. What is your profession?

- | | | | |
|------------------------------------|--------------------------|---|--------------------------|
| Administrative support staff | ☐ | Family physician | ☐ |
| Imaging technologist | ☐ | Specialist physician (please specify below) | ☐ |
| Laboratory technician | ☐ | <input type="text"/> | |
| Nurse | ☐ | Other (please specify below) | ☐ |
| Pharmacist | ☐ | <input type="text"/> | |

19. How would you describe your "use" of the system? (Check all that apply)

- | | | | |
|--|--------------------------|---|--------------------------|
| I use the system for clinical decision making | ☐ | I use the system to both access patient information and in clinical decision making | ☐ |
| I use the system to access patient information and support the clinical decision maker | ☐ | | |

20. How long have you been using the system?

- | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Less than a month | 1-3 months | 4-6 months | 7-12 months | 1-2 years | 3-5 years |
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

21. Currently, how do you receive your patient results?

_____ % FAX _____ % SYSTEM _____ % OTHER (please specify / write below)

22. How would you rate your computer proficiency?

- | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| None | Basic | Average | Advanced | Expert |
| ☐ | ☐ | ☐ | ☐ | ☐ |

23. Please check the response(s) that best describe the settings where you work.

- | | | | | |
|---|--------------------------|---|-----------|--------------------------|
| Academic / Teaching Hospital | ☐ | } a. Do you work within the emergency department? | Yes | ☐ |
| Community Clinic / Health Center | ☐ | | No | ☐ |
| Community Hospital | ☐ | | | |
| Nursing Home / Long Term Care Facility | ☐ | | | |
| Private Office / Clinic | ☐ | | | |
| Other (please specify/write answer below) | ☐ | | | |

24. Where are you located?

- | | | | |
|-----------------------------|--------------------------|----------------------------|--------------------------|
| Alberta | ☐ | Nunavut | ☐ |
| British Columbia | ☐ | Ontario | ☐ |
| Manitoba | ☐ | Prince Edward Island | ☐ |
| New Brunswick | ☐ | Quebec | ☐ |
| Newfoundland | ☐ | Saskatchewan | ☐ |
| Northwest Territories | ☐ | Yukon | ☐ |
| Nova Scotia | ☐ | | |

**THANK YOU FOR YOUR HELP IN IMPROVING THE INFORMATION SYSTEM.
PLEASE RETURN YOUR COMPLETED QUESTIONNAIRE USING THE ENCLOSED, POSTAGE
PAID ENVELOPE.**

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Figure 11: Figure 14 Figure 15

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Epic System Post-Implementation and Use Assessment Survey

Basic Information

- 1) Select your primary work location:
 - ☐ Baylor Scott & White Brenham Hospital
 - ☐ Baylor Scott & White College Station Hospital
 - ☐ Baylor Scott & White McLane Children's Hospital
 - ☐ Baylor Scott & White Round Rock Hospital
 - ☐ Baylor Scott & White Taylor Hospital
 - ☐ Baylor Scott & White Temple Continuing Care Hospital
 - ☐ Baylor Scott & White Temple Hospital

- 2) Select your profession:
 - ☐ Advanced Practice Staff (i.e. Physician Assistant, Nurse Practitioner, CRNA)
 - ☐ Allied Health Staff (i.e. PT, OT, SLP, Respiratory, Technician, Technologist)
 - ☐ Administrative Support Staff (i.e. Administrative Assistants, Receptionists, Case Management Assistants)
 - ☐ Case Management Staff (i.e. Nurse Case Manager, Social Worker)
 - ☐ Clinical Support Staff (i.e. CNA, HUC)
 - ☐ HIM/Coding Staff (i.e. Claim Adjustment Coordinator, Coding Specialist)
 - ☐ IT Staff (i.e. Application Analyst, Server Engineer)
 - ☐ Nursing Staff (i.e. LVN, RN)
 - ☐ Pharmacist
 - ☐ Physicians (Resident)
 - ☐ Physicians (Fellow)
 - ☐ Physicians (Less than 3 years post-residency)
 - ☐ Physicians (Greater than 3 years post-residency)
 - ☐ Other

- 3) If job title not provided in previous question, please provide: _____

- 4) Select your age range:
 - ☐ 25 or younger
 - ☐ 26 to 35
 - ☐ 36 to 45
 - ☐ 46 to 55
 - ☐ 56 to 65
 - ☐ 66 or older

- 5) How would you rate your computer proficiency?
 - ☐ None
 - ☐ Basic
 - ☐ Average
 - ☐ Advanced
 - ☐ Expert

- 6) Have you had prior experience outside of your facility with any electronic medical record system?
 - ☐ Yes
 - ☐ No

Figure 12:

Page 2 of 7

7) If answer to previous question is "Yes", how many years experience do you have working with an electronic medical record system?

☐ Less than 2 years
☐ 2-5 years
☐ More than 5 years

8) How long have you been using the current Baylor Scott & White Epic system?

☐ Less than a month
☐ 1-3 months
☐ 4-6 months
☐ 7-11 months
☐ 1-2 years

EPIC SYSTEM QUALITY - Please read each statement and indicate the response that is closest to your belief.

	Strongly Agree	Moderately Agree	Mildly Agree	Mildly Disagree	Moderately Disagree	Strongly Disagree	Not Sure
9) The system is easy to use.	☐	☐	☐	☐	☐	☐	☐
10) The system is reliable in its performance.	☐	☐	☐	☐	☐	☐	☐
11) The system is consistently available.	☐	☐	☐	☐	☐	☐	☐
12) The system's response time is acceptable.	☐	☐	☐	☐	☐	☐	☐
13) The system supports effective communication between team members.	☐	☐	☐	☐	☐	☐	☐
14) The system's ability to exchange patient information with other systems is acceptable.	☐	☐	☐	☐	☐	☐	☐
15) The system has been integrated appropriately with my previous workflows.	☐	☐	☐	☐	☐	☐	☐
16) The system features enable me to perform my work well.	☐	☐	☐	☐	☐	☐	☐
17) The system security is acceptable.	☐	☐	☐	☐	☐	☐	☐
18) Based on your experiences to date with the Epic system, how acceptable is the quality of the system itself as described by the specific characteristics listed above?				☐ Highly Acceptable ☐ Moderately Acceptable ☐ Neither Acceptable nor Unacceptable ☐ Moderately Unacceptable ☐ Not at all Acceptable			
19) Comments related to Epic's System Quality (If possible, please provide which question number the comment is related to.)							

Figure 13:

EPIC INFORMATION QUALITY - Please read each statement and indicate the response that is closest to your belief.							
	Strongly Agree	Moderately Agree	Mildly Agree	Mildly Disagree	Moderately Disagree	Strongly Disagree	Not Sure
20) The information provided is relevant.	☐	☐	☐	☐	☐	☐	☐
21) The information provided is accurate.	☐	☐	☐	☐	☐	☐	☐
22) The information is complete.	☐	☐	☐	☐	☐	☐	☐
23) The format and layout of the information is acceptable.	☐	☐	☐	☐	☐	☐	☐
24) The information is available when I need it.	☐	☐	☐	☐	☐	☐	☐
25) When thinking about the quality of the information provided by Epic in general, how do you find the quality of the information to be?	☐ Highly Acceptable ☐ Moderately Acceptable ☐ Neither Acceptable nor Unacceptable ☐ Moderately Unacceptable ☐ Not at all Acceptable						☐
26) Comments related to Epic's Information Quality (If possible, please provide which question number the comment is related to.)							

Figure 14:

EPIC SERVICE QUALITY - Please read each statement and indicate the response that is closest to your belief.							
	Strongly Agree	Moderately Agree	Mildly Agree	Mildly Disagree	Moderately Disagree	Strongly Disagree	Not Sure
27) The implementation process at my facility was acceptable.	☐	☐	☐	☐	☐	☐	☐
28) The current level of training at my facility is acceptable.	☐	☐	☐	☐	☐	☐	☐
29) The level of on-going support provided at my facility is acceptable.	☐	☐	☐	☐	☐	☐	☐
30) When thinking about the quality of the services (i.e. technical support and training services) provided for Epic in general, how do you find the quality of these services to be?	☐ Highly Acceptable ☐ Moderately Acceptable ☐ Neither Acceptable nor Unacceptable ☐ Moderately Unacceptable ☐ Not at all Acceptable						☐
31) Comments related to Epic's Service Quality (If possible, please provide which question number the comment is related to.)							

Figure 15:

EPIC CLINICAL QUALITY - Please read each statement and indicate the response that is closest to your belief.							
	Strongly Agree	Moderately Agree	Mildly Agree	Mildly Disagree	Moderately Disagree	Strongly Disagree	Not Sure
32) The system contributes to improved patient outcomes.	☐	☐	☐	☐	☐	☐	☐
33) The system contributes to the safety of the patients.	☐	☐	☐	☐	☐	☐	☐
34) The system contributes to the patient's knowledge of their health condition.	☐	☐	☐	☐	☐	☐	☐
35) The patients are satisfied with the clinicians using the system.	☐	☐	☐	☐	☐	☐	☐
36) The patients have concerns about the system's security and confidentiality.	☐	☐	☐	☐	☐	☐	☐
37) The patient care data being recorded is accurate and valid.	☐	☐	☐	☐	☐	☐	☐
38) The patient care services are able to be provided in a <u>more</u> , <u>timely</u> manner.	☐	☐	☐	☐	☐	☐	☐
39) The selection of patient care orders in system is appropriate.	☐	☐	☐	☐	☐	☐	☐
40) The system contributes to improved clinical documentation.	☐	☐	☐	☐	☐	☐	☐
41) Based on your experiences to date with the Epic system, how acceptable is the clinical data of the system itself as described by the specific characteristics listed above?	☐ Highly Acceptable ☐ Moderately Acceptable ☐ Neither Acceptable nor Unacceptable ☐ Moderately Unacceptable ☐ Not at all Acceptable						
42) Comments related to Epic's Clinical Quality (If possible, please provide which question number the comment is related to.)							

Figure 16:

GENERAL COMMENTS
43) What specific features of Epic are especially appreciated?
44) What specific aspects of Epic could be improved on by the vendor?
45) Do you have any lessons learned since the Epic system implementation?
46) Do you have additional goals related to Epic that you or your department have not yet completed?
47) Have there been any unexpected benefits gained for your department or the organization since implementing Epic?

Figure 17:



Figure 18:

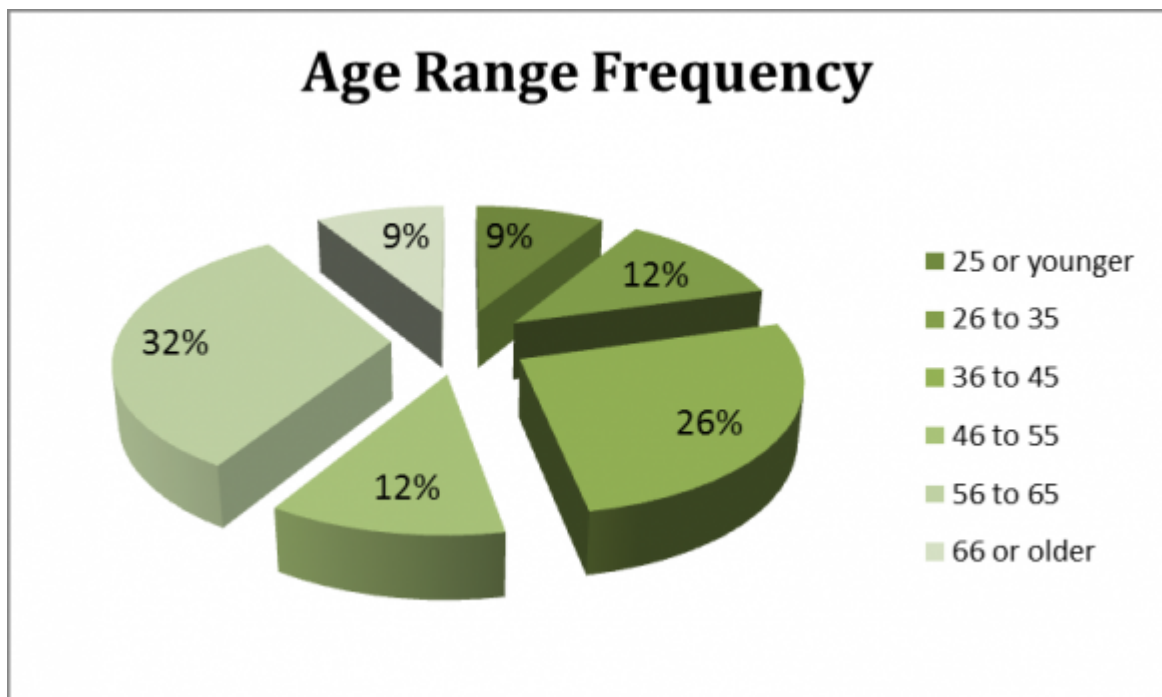


Figure 19:

Computer Proficiency Frequency

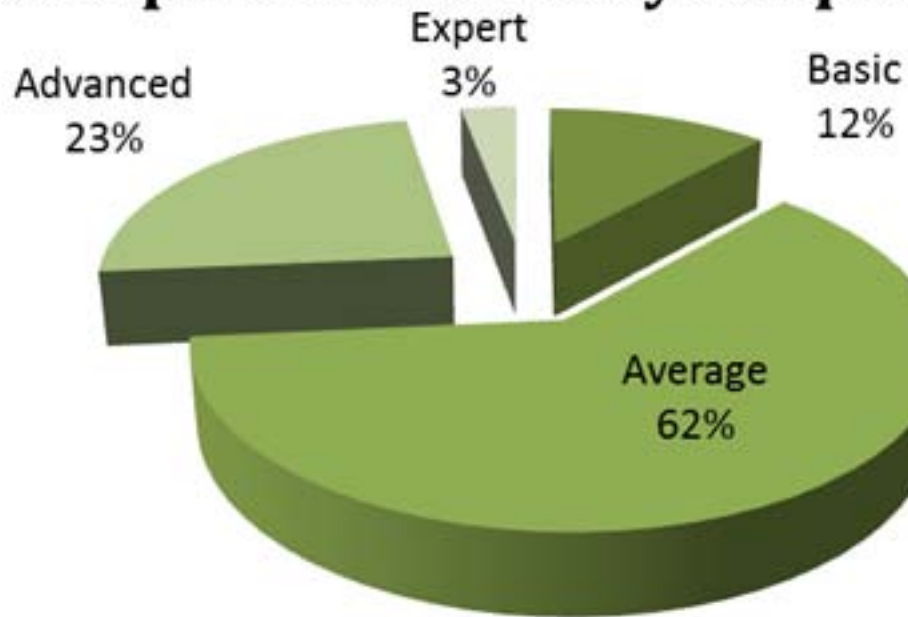


Figure 20:

Prior EMR Experience Frequency

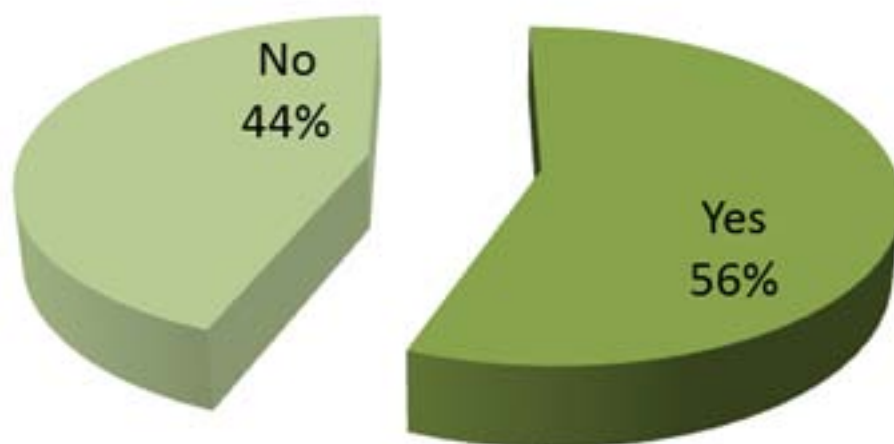


Figure 21:

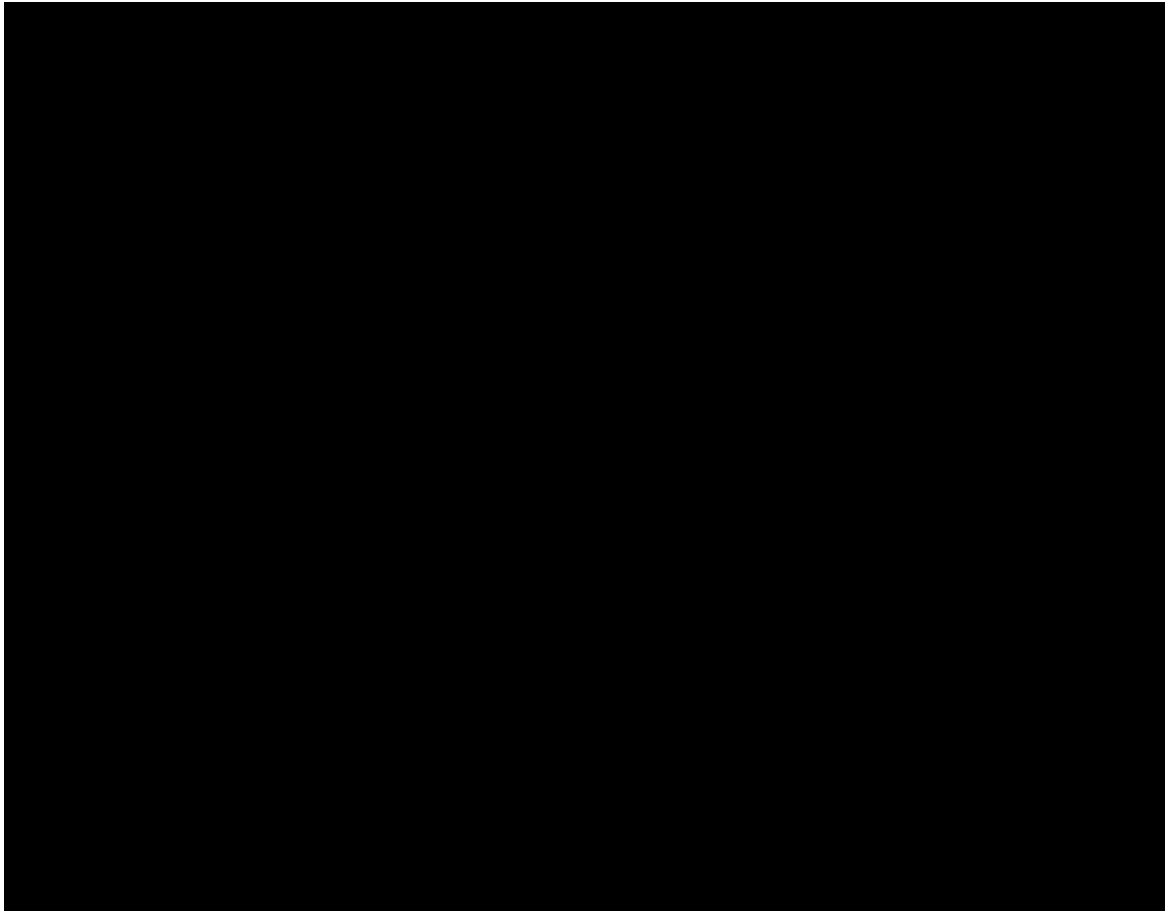


Figure 22:

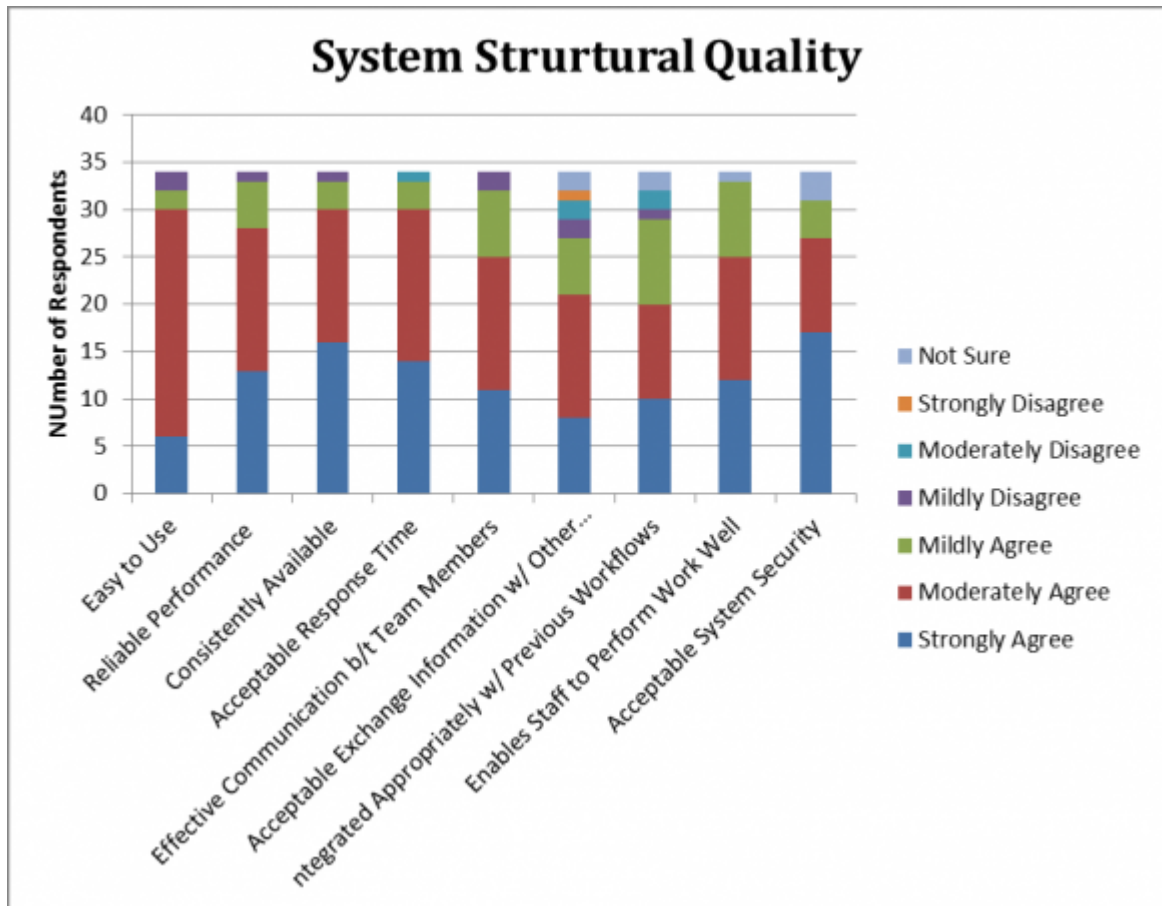


Figure 23:

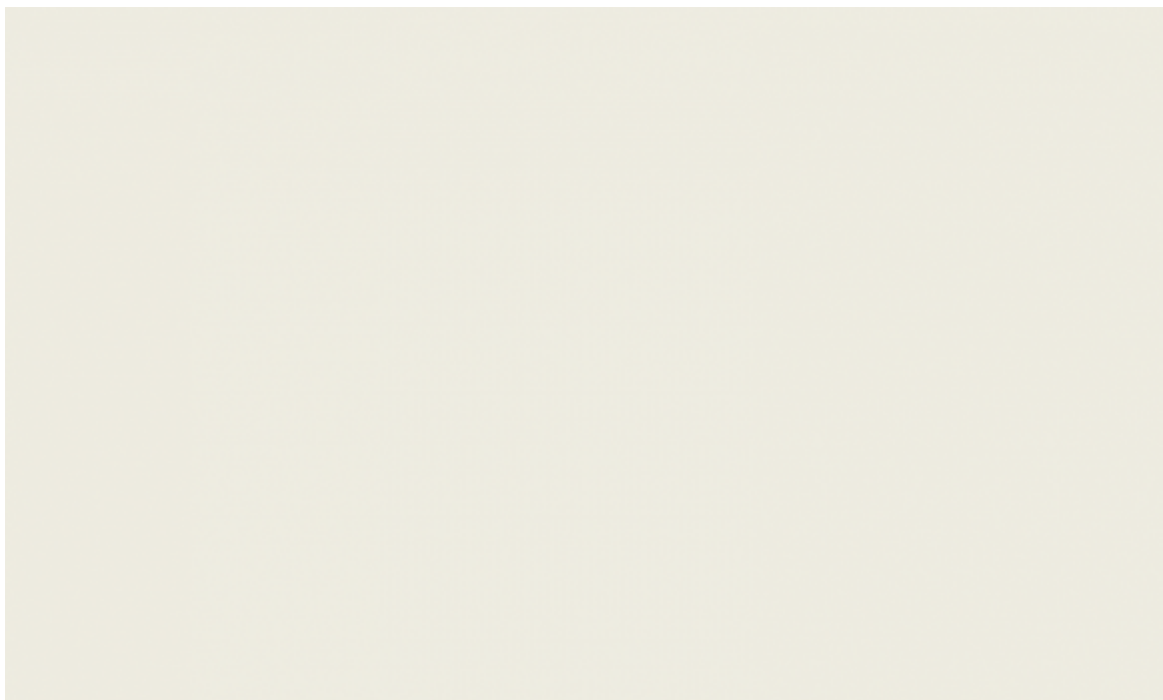


Figure 24:

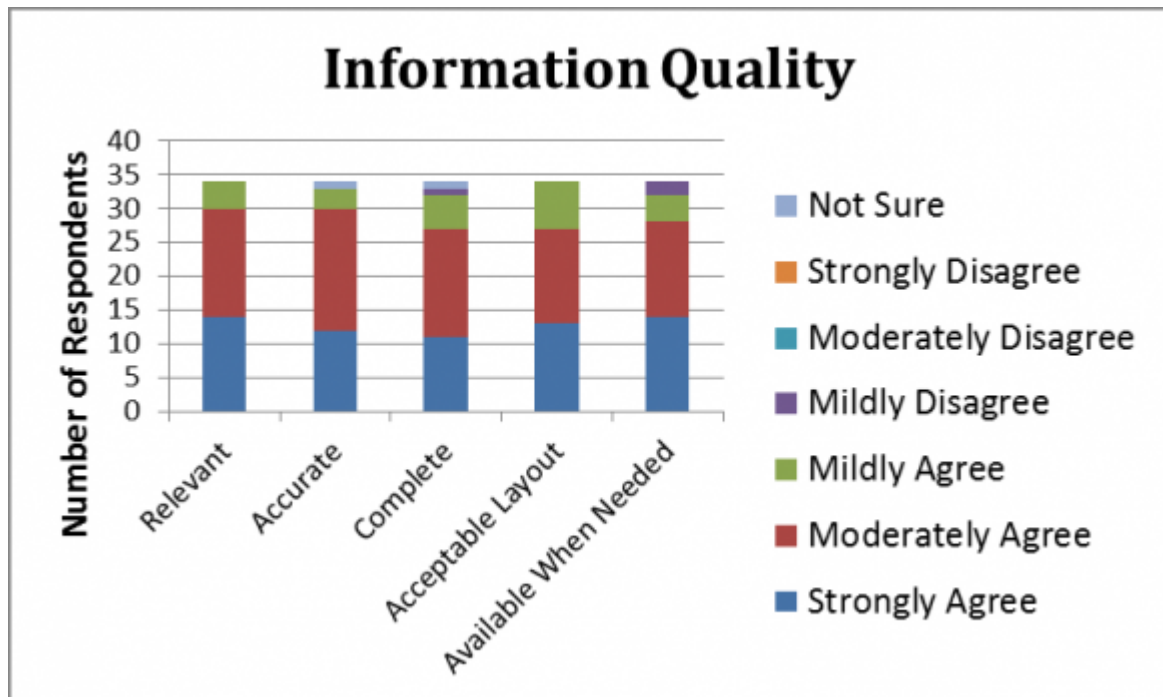


Figure 25:

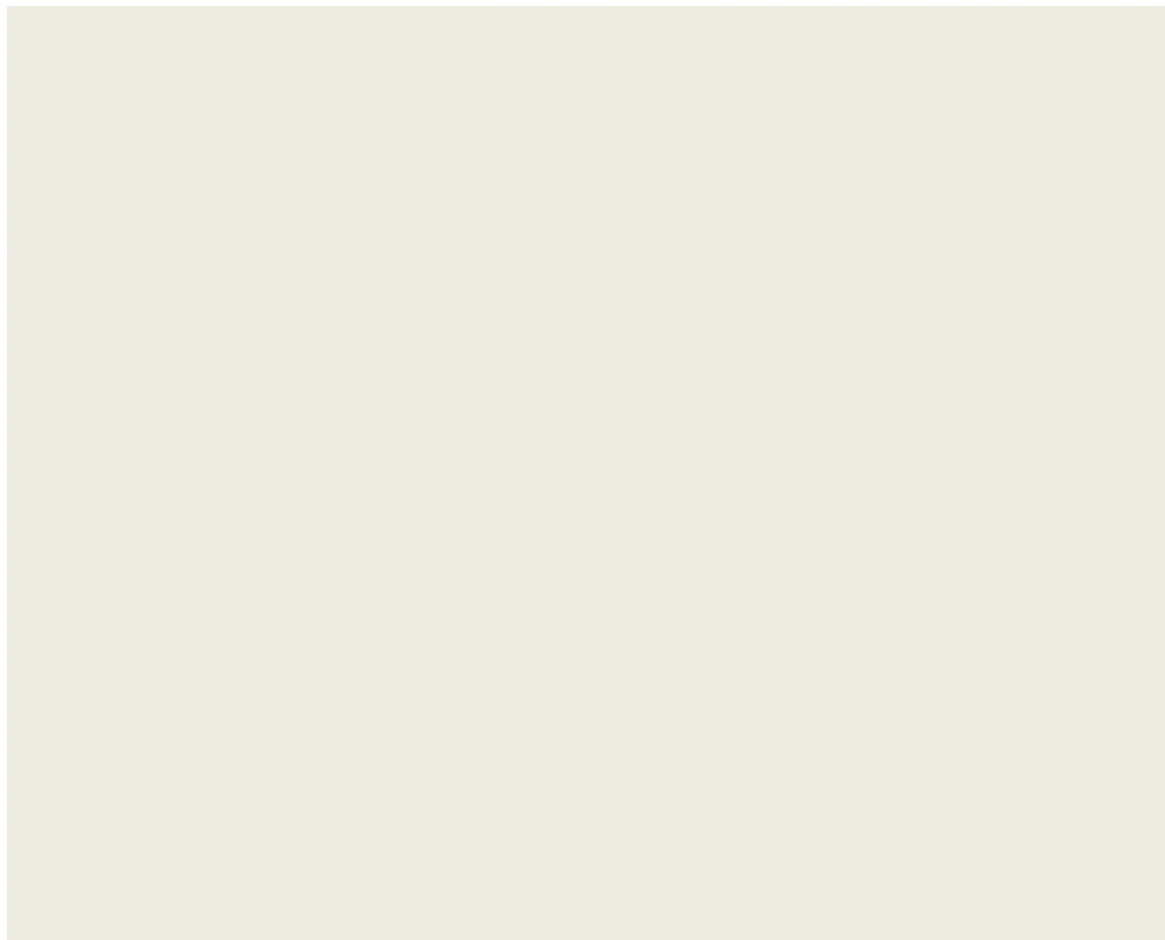


Figure 26:

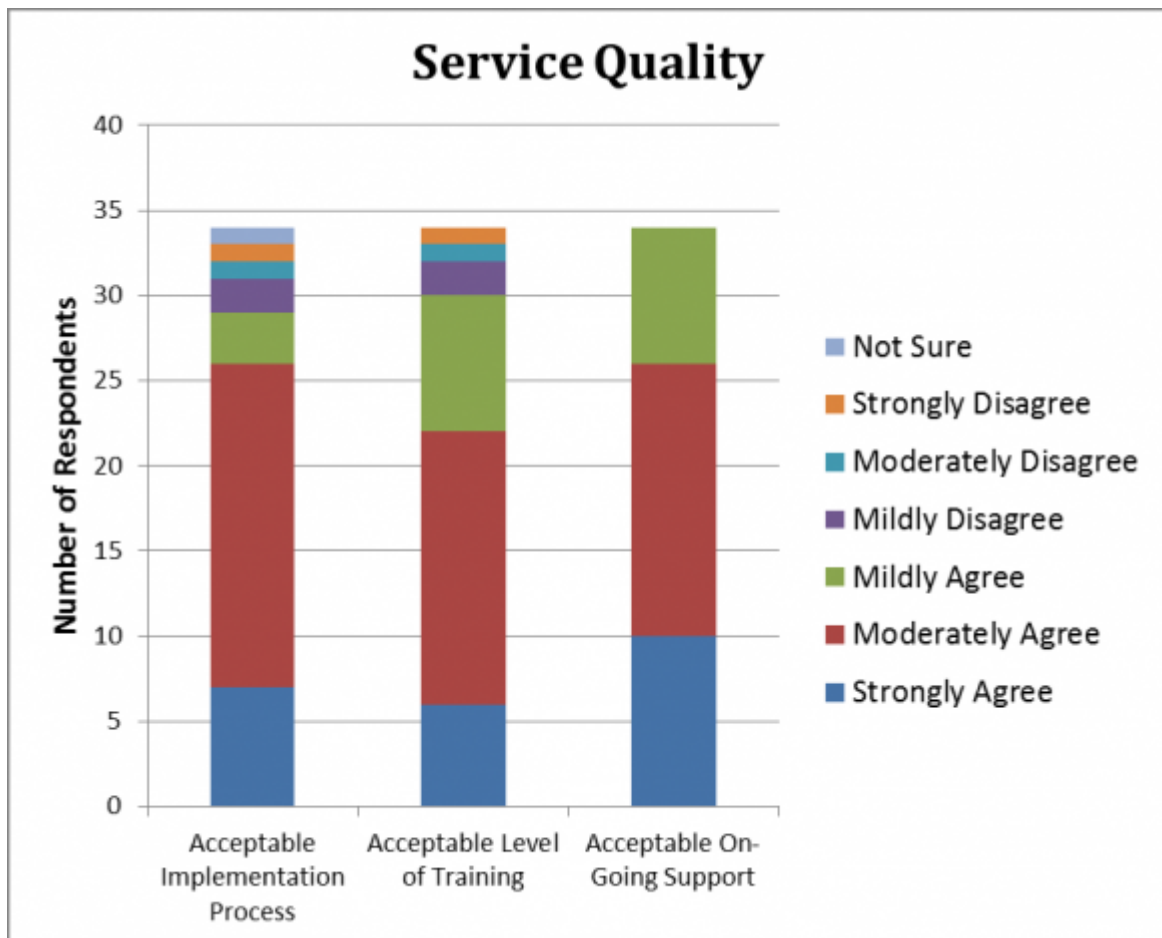


Figure 27:

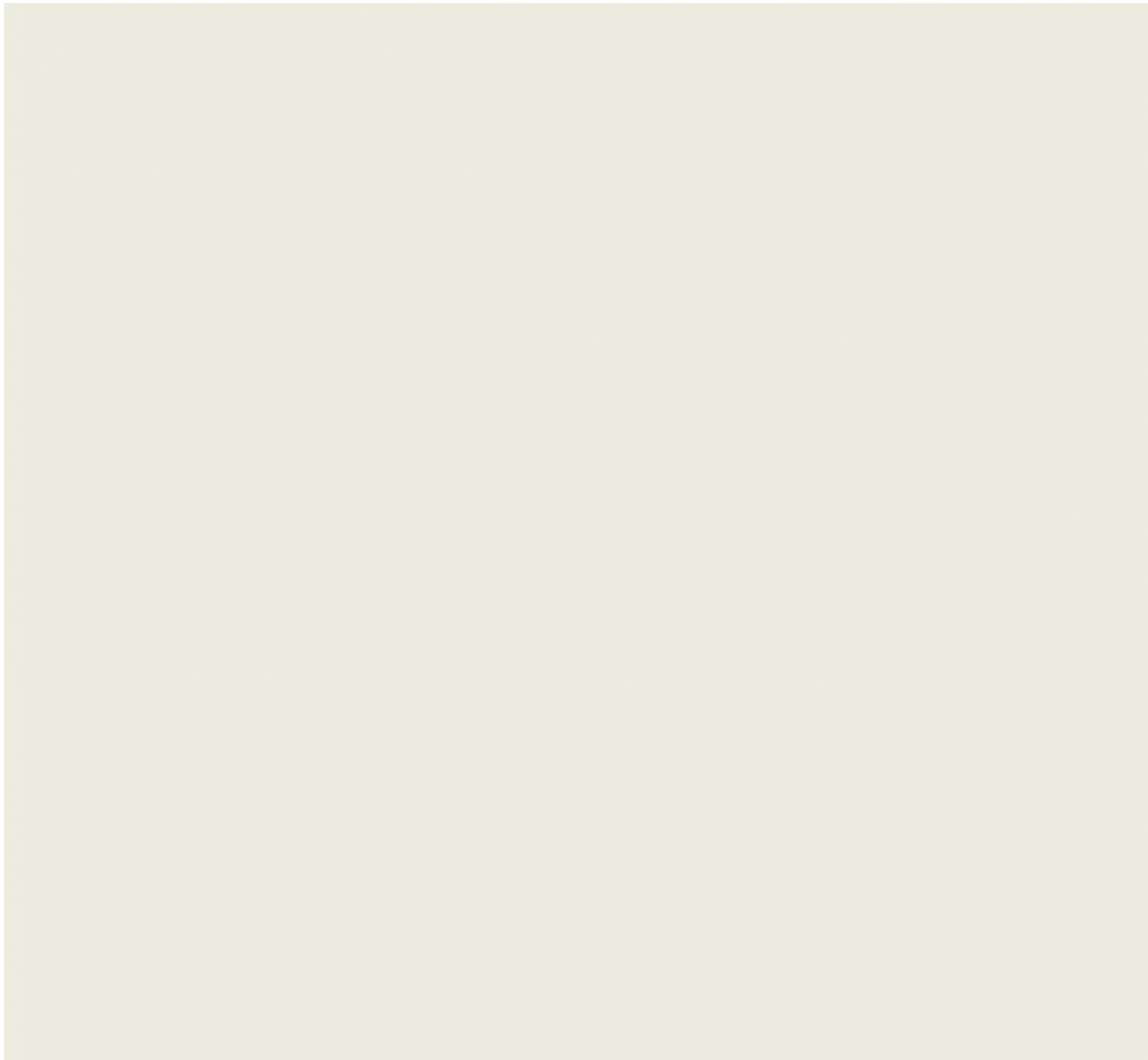


Figure 28:

1

Figure 29: Table 1

3

		Profession		Cumulative Percent	Valid Percent	Percent
		Frequency				
Valid	Administrative Support Staff	2		5.9	5.9	5.9
	Case Management Staff	29		85.3	85.3	91.2
	Other	3		8.8	8.8	100.0
	Total	34		100.0	100.0	
		Age Range		Cumulative Valid Percent	Percent	
		Frequency	Percent			
Valid	25 or younger	3	8.8	8.8	8.8	
	26 to 35	4	11.8	11.8	20.6	
	36 to 45	9	26.5	26.5	47.1	
	46 to 55	4	11.8	11.8	58.8	
	56 to 65	11	32.4	32.4	91.2	
	66 or older	3	8.8	8.8	100.0	
	Total	34	100.0	100.0		
		Computer Proficiency		Cumulative Valid Percent	Percent	
		Frequency	Percent			
Valid	Basic	4	11.8	11.8	11.8	
	Average	21	61.8	61.8	73.5	
	Advanced	8	23.5	23.5	97.1	
	Expert	1	2.9	2.9	100.0	
	Total	34	100.0	100.0		
		Prior EMR Experience		Cumulative Valid Percent	Percent	
		Frequency	Percent			
Valid	Yes	19	55.9	55.9	55.9	
	No	15	44.1	44.1	100.0	
	Total	34	100.0	100.0		

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Figure 30: Table 3 :

4

		System -Easy to Use			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	6	17.6	17.6	17.6
	Moderately Agree	24	70.6	70.6	88.2
	Mildly Agree	2	5.9	5.9	94.1
	Mildly Disagree	2	5.9	5.9	100.0
	Total	34	100.0	100.0	
		System -Reliable Performance			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	13	38.2	38.2	38.2
	Moderately	15	44.1		82.4
	Mildly Agree	5	14.7	14.7	97.1
	Mildly Disagree	1	2.9	2.9	100.0
	Total	34	100.0	100.0	

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Figure 31: Table 4 :

4

		Information -Relevant			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	14	41.2	41.2	41.2
	Moderately Agree	16	47.1	47.1	88.2
	Mildly Agree	4	11.8	11.8	100.0
	Total	34	100.0	100.0	

[Note: © 2015 Global Journals Inc. (US)]

Figure 32: Table 4 :

Service -Acceptable Implementation Process

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Strongly Agree	7	20.6	20.6	20.6
Moderately Agree	19	55.9	55.9	76.5
Mildly Agree	3	8.8	8.8	85.3
Mildly Disagree	2	5.9	5.9	91.2
Moderately Disagree	1	2.9	2.9	94.1
Strongly Disagree	1	2.9	2.9	97.1
Not Sure	1	2.9	2.9	100.0
Total	34	100.0	100.0	

Service -Acceptable Level of Training

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Strongly Agree	6	17.6	17.6	17.6
Moderately Agree	16	47.1	47.1	64.7
Mildly Agree	8	23.5	23.5	88.2
Mildly Disagree	2	5.9	5.9	94.1
Moderately Disagree	1	2.9	2.9	97.1
Strongly Disagree	1	2.9	2.9	100.0
Total	34	100.0	100.0	

[Note: © 2015 Global Journals Inc. (US)]

Figure 33: Table 5 :

Improved Patient Outcomes				
	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Strongly Agree	14	41.2	41.2	41.2
Moderately Agree	11	32.4	32.4	73.5
Mildly Agree	6	17.6	17.6	91.2
Not Sure	3	8.8	8.8	100.0
Total	34	100.0	100.0	
Improved Safety of Patient				
	Frequency	Percent	Valid Percent	
Valid Strongly Agree	14	41.2	41.2	41.2
Moderately Agree	12	35.3	35.3	76.5
Mildly Agree	6	17.6	17.6	94.1
Not Sure	2	5.9	5.9	100.0
Total	34	100.0	100.0	
Improved Knowledge of Health by Patients				
	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Strongly Agree	13	38.2	38.2	38.2
Moderately Agree	10	29.4	29.4	67.6
Mildly Agree	4	11.8	11.8	79.4
Mildly Disagree	2	5.9	5.9	85.3
Not Sure	5	14.7	14.7	100.0
Total	34	100.0	100.0	
Patient Satisfied w/ Clinicians Use of System				
	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Strongly Agree	7	20.6	20.6	20.6
Moderately Agree	8	23.5	23.5	44.1
Mildly Agree	6	17.6	17.6	61.8
Mildly Disagree	1	2.9	2.9	64.7
Not Sure	12	35.3	35.3	100.0
Total	34	100.0	100.0	
Concerns w/ Security & Confidentiality by Patients				
	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Strongly Agree	4	11.8	11.8	11.8
Moderately Agree	2	5.9	5.9	17.6
Mildly Agree	3	8.8	8.8	26.5
Mildly Disagree	6	17.6	17.6	44.1
Moderately Disagree	3	8.8	8.8	52.9
Strongly Disagree	2	5.9	5.9	58.8
Not Sure	14	41.2	41.2	100.0
Total	34	100.0	100.0	

[Note: © 2015 Global Journals Inc. (US)]

Figure 34: Table 6 :

		N	Descriptive Statistics			
			Minimum	Maximum		
	System -Easy to Use	34	1		4	
	System -Reliable Performance	34	1		4	
	System -Consistently Available	34	1		4	
	System -Acceptable Response Time	34	1		5	
	System -Effective Communication b/t Team Members	34	1		4	
	System -Acceptable Exchange Information w/ Other Systems	34	1		7	
Volume XV	System -Integrated Appropriately w/ Previous Workflows	34	1	1	1	7
Is-	Security Information -Relevant Information	34	1	1	1	7
sue	-Accurate Information -Complete Information	34	1	1	1	3
III	-Acceptable Layout Information -Available When Needed Service	34	1	1		7
Ver-	-Acceptable Implementation Process Service	34				3
sion	-Acceptable Level of Training Service	34				4
I 30	-Acceptable On-Going Support System -Acceptable System Perform Work Well	34				7
Year	to	34				6
2015		34				3
		34				7
(D		N	Descriptive Statistics Minimum Maximum			
D D						
D)						
K						
Medical	Clinical -Improved Knowledge of Health by Patients	34	1	1	1	7
Re-	Clinical -Patient Satisfied w/ Clinicians Use of Sys-	34	1			7
search	tem Clinical -Concerns w/ Security & Confiden-	34				7
	tiality by Patients Clinical -Patient Care Date is	34				7
	Accurate and Valid					
Global	Clinical -Timely Manner of Patient Care Services	34	1	1	1	7
Jour-	Increased Clinical -Appropriate Selection of Patient	34				7
nal	Care Orders Clinical -Improved Clinical Documen-	34				7
of	tation Valid N (listwise)	34				
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Figure 35: Table 7 :

8

		Count	Prior EMR Experience		
			Yes	No	Total
Acceptability of the Quality of the Epic System	Highly Acceptable		7	7	14
	Moderately Acceptable		9	7	16
	Neither Acceptable nor Unacceptable		2	1	3
	Moderately Unacceptable		1	0	1
Total			19	15	34
Acceptability of the Quality of the Information Provided in Epic * Prior EMR Experience					
		Count	Prior EMR Experience		
			Yes	No	Total
Acceptability of the Quality of the Information Provided in Epic	Highly Acceptable		8	8	16
	Moderately Acceptable		10	6	16
	Neither Acceptable nor Unacceptable		1	1	2
Total			19	15	34
Acceptability of the Quality of the Services Provided for Epic * Prior EMR Experience					
		Count	Prior EMR Experience		
			Yes	No	Total
Acceptability of the Quality of the Services Provided for Epic	Highly Acceptable		7	4	11
	Moderately Acceptable		7	7	14
	Neither Acceptable nor Unacceptable		3	2	5
Moderately Unacceptable			2	2	4
Total			19	15	34
Acceptability of the Clinical Data within Epic * Prior EMR Experience					
		Count	Prior EMR Experience		
			Yes	No	Total
Acceptability of the Clinical Data within Epic	Highly Acceptable		7	5	12
	Moderately Acceptable		8	8	16
	Neither Acceptable nor Unacceptable		4	2	6
Total			19	15	34

Figure 36: Table 8 :

-
- [Harris et al.] , Paul A Harris , Robert Taylor , Robert Thielke , Jonathon Payne , Nathaniel Gonzalez , G Jose
 .
- [Department Of Health and Services ()] , Human Department Of Health , Services . <http://www.gpo.gov/fdsys/pkg/FR-2010-07-28/pdf/2010-17210.pdf> *Health Information Technology: Initial Set* 2010. 75 (144) p. . (Federal Register)
- [Kirkendall et al. ()] , E S Kirkendall , L M Goldenhar , J L Simon , D S Wheeler , S Spooner . 2013.
- [Laramée et al. ()] ‘A Comparison of Nurse Attitudes Before Implementation and 6 and 18 Months After Implementation of an Electronic Health Record’. A S M Laramée , A.-B Bosek , M D R N Shaner-Mcrae , H D R F Powers-Phaneuf , TM R . *CIN: Computers, Informatics, Nursing* 2012. 30 (10) p. .
- [Sokolow et al. ()] ‘A new instrument for measuring clinician satisfaction with electronic health records’. P S Sokolow , J P Weiner , K H Bowles , H P Lehmann . 10.1097/NCN.0b013e31821a1568. *Comput Inform Nurs* 2011. 29 (10) p. .
- [Health Infoway ()] *Canada Health Infoway System And Use Assessment Survey*, Canada Health Infoway . <http://healthit.ahrq.gov/health-it-tools-and-resources/health-it-survey-compendium/canada-health-infoway-system-and-use> 2007.
- [Crossing the Quality Chasm: A New Health System for the 21st Century ()] *Crossing the Quality Chasm: A New Health System for the 21st Century*, 2001. The National Academies Press.
- [Layman, E., Watzlaf, V. (ed.) ()] *Health informatics research methods: Principles and practice*, Layman, E., & Watzlaf, V. (ed.) 2009. Chicago, IL: American Health Information Management Association.
- [Ibm Spss Statistics ()] Ibm Spss Statistics . *Statistics Coach*. Retrieved from Help section of IBM SPss Statistics, 2013.
- [Laramée et al. ()] ‘Learning From Within to Ensure a Successful Implementation of an Electronic Health Record’. A S Laramée , M Bosek , C A Kasprisin , T Powers-Phaneuf . *CIN: Computers, Informatics, Nursing* 2012. 30 p. .
- [Ward et al. ()] ‘Nurses’ Perceptions of How Clinical Information System Implementation Affects Workflow and Patient Care’. M M Ward , S Vartak , T Schwichtenberg , D S Wakefield . 510.1097/NCN. *Computers Informatics Nursing* 2011. 1090b101 3e31822b38798. 29 (9) p. .
- [Conde (2009)] ‘Research electronic data capture (REDCap) -A metadata-driven methodology and workflow process for providing translational research informatics support’. Conde . *J Biomed Inform* 2009 Apr. 42 (2) p. .
- [Brace (2014)] *The Science of Engagement. Present at the Memorial Hermann Case Management Retreat*, Rod Brace . 2014. April 11. 2014.
- [Transitioning from a computerized provider order entry and paper documentation system to an electronic health record: Expectations and experiences of hospital staff]. *International Journal of Medical Informatics*
- [Spetz et al. ()] ‘What determines successful implementation of inpatient information technology systems?’. J Spetz , J F Burgess Jr , C S Phibbs . *American Journal of Managed Care* 2012. 18 (3) p. .