PERCEIVED BENEFITS OF
INDIANA HEALTH INFORMATION EXCHANGE CLINICAL MESSAGING
APPLICATION BY PHYSICIAN PRACTICES

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DEDICATION

I would not have been able to achieve this goal without the love and support of many

friends, coworkers and family.   This is dedicated to:

My husband, Stephen M. Rowell with all my love

My parents: Robert and Glenna Heinz for teaching your children that there is no age limit

on dreams.

The HIM leadership team: Londa Bick, Janet Linquist, Joy Koors , Lenore Webb and

Eric Lindsay - Thanks for listening and listening and listening.   Your patience and

enthusiasm never fails to amaze.

The entire HIM department especially the Release of Information staff: Thanks for your

encouragement. I feel privileged to work with such a great group of people.

The staff and students, former and current, of the HIA program: Since I first walked into

the HIA classroom eight years ago I have had the time of my life.

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My research advisor and committee members: Anna McDaniel, Tom Penno, Ruth Walker and Alan Snell.   Thank you for your patience and guidance throughout this project.

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ABSTRACT

Ruth Heinz Rowell

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According to researchers, standardized health information exchange could save billions annually in the United States by eliminating redundant laboratory tests and cost associated with paper ordering and results reporting.

Indianapolis's Indiana Health Information Exchange (IHIE) Docs4Docs (D4D) application delivers results such as lab, radiology and dictation from the five major hospital systems in the Indianapolis area to local physician offices. Despite this technology, the release of information section at St Vincent still receives hundreds of calls a week for health information from local providers.

One explanation for the continued high volume of requests is that the local physician practices are not using D4D and may be resistant to new technology. Diffusion theory states that the rate of adoption of innovation is related to the user's perception of the attributes of the innovation rather than the actual attributes. A survey was developed to assess perception of benefits among users of D4D which would help explain resistance to technology.

The survey was sent to 404 users who had web access to D4D and who had at one time received results from St. Vincent Hospital through the application. One hundred and thirty seven (137) responses were analyzed using descriptive statistics.

The results of the study indicate that there is a high perception of benefits among D4D users as indicated by a satisfaction rating of 4.08 on a 5 point Likert scale. The users also reported that D4D was the most frequently used method of obtaining results from St. Vincent Hospital.

Further research will be necessary to determine possible reasons for the high number of requests for health information that is available through D4D. Despite existing technology there still is a large gap between results delivery through D4D and the health information needed for the continuum of care.

LIST OF TABLES AND FIGURES

ABBREVIATIONS

IHIE	Indiana Health Information Exchange
HIE	Health Information Exchange
CHIN	Community Health Information Network
AHIMA	American Health Information Management Association
RHIA	Registered Health Information Administrator
CHP	Certified in Healthcare Privacy
RHIO	Regional Health Information Organization
D4D	Docs4Docs
INPC	Indiana Network for Patient Care
EMR	Electronic Medical Record
HIM	Health Information Management
PDA	Personal Digital Assistant

CHAPTER ONE: INTRODUCTION AND BACKGROUND

Introduction to subject

"By computerizing health records, we can avoid dangerous medical mistakes, reduce costs and improve care."

---- President George W. Bush, State of Union address, January 20, 2004

In April 2004, President George W. Bush wrote an Executive Order to appoint a National Health Information Technology Coordinator. (Bush, 2004) The first coordinator, Dr. David Brailer was charged with developing a nationwide interoperable health information technology infrastructure that will enable most Americans have electronic health records by 2015.

In order to achieve the goals of improving healthcare, providers must access health information from a variety of sources, reducing errors and costs. (Bartschat et al., 2006) According to researchers, standardized health information exchange could save $77.8 billion annually in the United States by eliminating redundant laboratory tests and cost associated with paper ordering and results reporting. ("Connecting Communities: Making Inroads to Exchange Electronic Healthcare Data at the Local Level," 2005)

Dr. Brailer's initiative is not the first attempt at community information exchanges. Community Health Information Networks (CHINs) were attempted in the 1990s and experienced failure due to inability to achieve buy-in, lack of trust, data ownership issues, financing issues, and costs of technology. (Overhage, Evans, & Marchibroda, 2005) The newest entities, known as Regional Health Information Organizations (RHIO) or Health Information Exchanges (HIE) are the latest attempt at connecting health care information at the local level.

Importance of subject

Indianapolis's Indiana Health Information Exchange (IHIE) and its partner the Regenstrief Institute, are known throughout the United States as being in the forefront of the RHIO initiative. IHIE allows physicians to access information directly from their portal or through a hospital portal. Despite the availability of these technologies, release of information areas in local hospitals receive hundreds of calls a week for information that is available through IHIE or one of the hospital portals.

IHIE provides results such as dictation, lab, and radiology results through the DOCS4DOCS® (D4D) application. Information is delivered to the physicians through direct connectivity to an electronic health record, autofaxing or downloading from the IHIE portal. D4D will maintain reports for at least two years for future reference or in case a report is misfiled. (IHIE, 2006)

The Health Information Management Department (HIM) at St Vincent receives approximately 1500 requests for patient information from local physicians each week. As manager of release of information, I have analyzed physician requests to determine where efficiencies could be achieved. Over eighty percent of the requests received are from physicians on the St Vincent medical roster who can access information from D4D or the St Vincent portal, MyDocWeb. Other areas such as the Breast Center, the Radiology department and the Sleep Disorder Center have experienced similar problems with receiving multiple requests for results that could have been accessed through DOCS4DOCS®.

Not fully utilizing the technology creates a tremendous work load for release of information, as well as the physician office staff, raises labor and supply costs, and hampers timely retrieval of information for patient care.   Disaster planning makes alternate sources of retrieving information vital to quality patient care. During the Winter 2007 snow emergency only fifteen percent of the normal HIM staff was able to travel to work. Physician's offices that were not already using one of the electronic methods to retrieve data experienced significant delays in request processing time until all the staff returned and normal operations resumed.   Downtime and fax server issues at the hospital can also cause significant delays in retrieving information when DOCS4DOCS® is not used. No studies have addressed this problem; therefore underlying reasons that the technology is not being used are unclear.   Anecdotal accounts suggest that difficulty with the technology, lack of training and or communication for office staff, and lack of motivation to change may be among the reasons.

Background: IHIE and D4D

IHIE was created in 2004 as an extension of the existing network known as Indiana Network for Patient Care (INPC). The INPC collaboration between five major hospital systems in the Indianapolis area enables each hospital to send data feeds to a central repository that can then be accessed by any registered emergency department doctor in the city when patients present themselves for care.   The information is formatted into an information sheet covering basic reports such as laboratory or radiology that the physician can review or print to place in the patient's chart.   If detailed information is required, the physician can log in to the system to get more information.

D4D builds on this foundation by using data feeds received from the participating hospitals to deliver clinical results to physicians. There are three methods of providing these results: fax, directly into electronic record systems and web access. If the practice chooses to sign up for web access, they can use whichever web portal is most comfortable. For example, if a physician is affiliated with multiple hospitals but is primarily affiliated with one, the physician may choose to use that hospital's portal to access D4D. The St Vincent physician portal known as MyDocWeb provides access to the D4D system as well as access to the medical record system for the Indianapolis and Carmel hospitals. The MyDocWeb uses a secure token methodology which is a major barrier to use of the physician portal due to the time it takes to get a token to the physician and the need for the physician to have the token on hand whenever access to the portal is needed. The physician may also use IHIE's portal to directly access the information if he or she does not want to use any of the hospital portals. Another user friendly feature is that the report maintains the hospital medical number even though the information is being distributed from one central system. (McDonald et al., 2005)

The IHIE website lists the following benefits to providers who use the system: Providers who receive clinical reports will directly benefit from the clinical messaging service by:

- Consistent report format with key information such as the patient's name located in the same place – easier and more reliable report interpretation
- Secure, electronic communications to other providers – they can forward results with comments or annotation to other providers: reduces the effort

required to share clinical results with other providers participation in the patient's care

- Single source for results from all participating data source: simplifies office workflow

- Results stored for two years for future reference: ease of replacing misplaced reports. Creates opportunities for improved office workflow. Results can be accessed from home simplifying follow-up of urgent results

- Delivery flexibility – results delivered as they become available or grouped together at times of the day you choose: greater workflow efficiency

- Single, community-wide 24/7 help desk for technical support and tracking results: reduces frustration and time when problems arise

- No cost to providers: data providers support the costs of the clinical messaging system   (IHIE, 2006)

CHAPTER TWO: LITERATURE REVIEW

Resistance to technology

According to Former Secretary of Health and Human Services, Tommy Thompson, "Some grocery stores have better technology than our hospitals and clinics." Many sources cite physician resistance to new IT as one of the major reasons healthcare has not embraced technology. (Dewan, Lorenzi, & Zheng, 2004; Lapointe & Rivard, 2006a; Poon et al., 2004)

End user resistance can be classified into three major categories, technical, functional and people resistance. Technical resistance is opposition to poor quality technology or infrastructure. Technical resistance can be beneficial because it forces improvements in the technology. The second type of end user resistance is functional. Functional resistance is how the information is entered, stored and presented. Poorly designed input screens or reports cause functional resistance. Finally, people resistance can involve anyone involved in providing, managing or receiving care. The most important question to the end user is "How will this affect me?" (Dewan et al., 2004)

"Most of the 50 to 70 percent of information systems implementations that fail are not the victims of flawed technology, but rather of organizational and people-related issues." (Dewan et al., 2004) Some writers believe that an understanding of power dynamics will explain the reasons physicians may resist technology. (Lapointe & Rivard, 2006b) Loss of autonomy, perceived low personal benefits, fear of wasted time, fear of loss of status and fear of looking ignorant are among the people related reasons. (Lorenzi, 2004)

Time is an important commodity for the busy physician. Some physicians have reported that it takes between one and one half to two hours per day recording information after a full day of seeing patients.   The old adage, "Time is money" is particularly true for most physicians.   As well, many physicians see these responsibilities as "clerical" tasks.   When asked to perform tasks that physicians previously could have told nursing staff to do, such as order medications, physicians perceive a change in power relationship between doctor and nurse.   (Lapointe & Rivard, 2006b) Some physicians may not have typing or computer skills and may fear looking incompetent.   For physicians who have been seen as highly educated and knowledgeable this can create another perceived loss of status and a feeling of incompetence.   Fear of the unknown or old fashioned stubbornness may play a role as well. (Poon et al., 2004)

Another way to look at resistance is by examining the object being resisted. Resistance can be classified into four basic types;

- Resistance to work environment and organizational changes

- Resistance to imposed changes such as regulations or reimbursement

- Resistance to a specific IT application or system because of quality issues in the system or in the implementation.

- Resistance to the perceived changer (us vs. them)   (Lorenzi, 2004)

Types of resistance range from passive resistance such as apathy or indifference to active resistance such as gathering allies and protesting changes.   The strength of the resistance may be directly related to the size of loss and its perceived importance. (Lapointe & Rivard, 2006b) In addition, the organization's response to resistance may increase clinician resistance to change and reinforce negative behaviors. (Lapointe &

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Rivard, 2006a) In a letter to the Canadian Medical Association journal, Cyril Gryfe of GHS Consultants Inc., Toronto, Ontario, states "I believe that the key to successful implementation lies not in trying to overpower this resistance but rather in circumventing it by exploiting a feature that meets with universal favour." (Gryfe, 2007)

In a similar vein, David Zitner reported that the problem was not the physician's resistance to change but technology that does not provide benefits to the physician. He talked about the widespread use of the PACS system in radiology because the technology allows digital radiology images to be sent electronically. (Zitner, 2006) If clinicians are made to understand how the systems conform to their own wants and needs, they will feel positive about change. (Lorenzi, 2004)

Resistance to DOCS4DOCS® might be explained with concepts from diffusion theory. According to diffusion theory rate of adoption of innovation is related to the user's perception of the attributes of the innovation rather than the actual attributes. "The relative advantage of an innovation, as perceived by members of a social system, is positively related to its rate of adoption." (Rogers, 1995)

Research Question

The proposed research question was: What are the perceived benefits of the DOCS4DOCS® application among St Vincent Hospital affiliated physician practices?

CHAPTER THREE: METHODOLOGY

Design

A quantitative, descriptive approach using a survey instrument with an ordinal scale of responses was used. According to Roger's theory, low user satisfaction scores would mean there could be some resistance to technology. (Rogers, 1995) The questions used were developed to see if perceived user satisfaction would verify expected resistance to technology.   The majority of the questions are based on IHIE's list of benefits of clinical messaging from their website.

Demographic questions about the size of the practice and the use of other technologies including an electronic health record were asked.   The intent for using these types of questions was to see if any trends emerged as to characteristics of practices that expressed a certain level of user satisfaction, i.e. practices that used more technology might have higher satisfaction scores for D4D.

To judge the relationship between use of the system and the perceived benefits, questions about the frequency of use of the system and other types of medical record retrieval were also asked.   In addition, there was a comment section provided so that users could express any additional remarks about the application that were not directly addressed in the questions. No direct identifiers on the respondent were requested or collected. (Appendix B) All of these questions were validated and approved by the thesis committee before being approved by the IUPUI/Clarian IRB board as an exempt study.

To determine the population for the survey, a list of physician practices that had received results from St. Vincent was obtained from IHIE. This list was sorted by type of access; fax, and web. Only practices that use the web version of DOCS4DOCS® were

chosen.   Since many practices have a single contact person for multiple office locations, the list was filtered to identify unique contact persons.   Using U.S. Mail the survey instrument was mailed to each unique contact. A stamped first class envelope with return address was enclosed.

Setting

This study was based at the St. Vincent Health Information Management (HIM) Department located at the 86th Street campus. This location handles requests for information for St Vincent Indianapolis, Women's, Carmel and Peyton Manning Children's Hospitals as well as several free-standing outpatient services such as the St Vincent Breast Center and St Vincent Outpatient Physical, Occupational and Speech Therapy facilities. The medical records for these locations have been on an imaging system since 1995 which allows the release of information staff to fax medical records directly from their workstation.

Prior to using D4D most results were auto-faxed to practices from either the transcription system or the individual testing system such as radiology. Many were still being mailed.   Because results frequently did not arrive in a timely fashion or could not be located, the HIM department was called upon to deliver results on demand.   Because they could get results from the HIM department almost immediately with a phone call or a fax, the hospital HIM department became the "file room" for many of our larger physician practices.   As more requests came from physician practices the workload of the release of information associates not only became a problem but results were frequently delivered more than once.   D4D was seen as a possible solution to this problem.

St Vincent was one of the founding members of IHIE and has been using the D4D application to handle results delivery for the last few years.   In addition, St Vincent affiliated physicians now have access to a web portal called MyDocWeb which allows them to complete their deficiencies and review records from any PC with web access. With these new technologies available, the HIM department expected to see a noticeable drop in the number of phone calls and faxes from our physician practices for results. Instead the number of phone calls and faxes has remained steady or even increased over time.   Because we had verified with IHIE that the physician practices were getting results from D4D we knew that many of the results were being delivered more than once.

 We currently have one FTE dedicated to requests from physician practices with an additional four FTE's assisting with phone calls on the day shift.   Night, weekend and holiday requests are handled by the Operations area of the HIM department. The HIM leadership continually looks for opportunities to leverage technology to reduce the number of requests while still providing timely health information necessary for continuing care. One of the ways we do this is by promoting a "self service" philosophy among our practitioners which encourages them to use the imaging system, MyDocWeb and D4D.

Survey Instrument

There were a total of 18 questions plus a space for comments.   Data were input into a Microsoft ® Excel spreadsheet and imported into SPSS ®. Comments were copied into a Word document and then summarized according to general themes.   The first section was designed to collect basic information about the practice, their familiarity with technology and their use of the Docs4Docs system. Each question contained two or more

categories and the results of this section were analyzed using frequency tables. The

second section of the survey asked 10 questions on user satisfaction with benefits of the

Docs4Docs application. The questions were derived from a list of benefits from the

Docs4Docs webpage as retrieved November 17th, 2006. The last question provided an

open area for any comments that had not been addressed in the survey questions.

<div align="center">Data Analysis</div>

Descriptive statistics were used to analyze the results of the survey.   Expected

results were a relationship between perception of benefits of the clinical messaging

system and use of the system. Results were calculated using a Likert scale of $1 - 5$ with 1

indicating that they strongly disagreed with the benefit described to 5 showing strong

agreement.   Three of the questions were reserve scored so they were recoded after the

data were input into SPSS®.   There were two questions that had "other" as one category

and allowed the responder a space to put additional information. Information added in

this space was reviewed to see if any additional categories should be added during

analysis. For the question concerning position in the practice an additional category of

coder was added during the analysis.   The question concerning who trained the user on

D4D did not yield any trends not already categorized.   The last survey question was an

open –ended question asking for comments.   Comments were reviewed for trends and

categorized for analysis. A simple bar chart was created to show the number of

comments in each category. (Figure 6)

CHAPTER FOUR: RESULTS

Sample

Using the list provided by IHIE 404 unique contacts were identified.   Surveys

returned within a four week period were included in the results. Two returned surveys

had to be eliminated from analysis because the responder crossed out "St Vincent" from

one or more questions and added another hospital name.   The resulting data were not

considered to be valid by the researcher.   The final valid number of completed surveys to

be analyzed was 137 or 34% of the original mailing.

The sample included six mutually exclusive categories of practice size as

determined by the number of physicians and/or nurse practitioners in the practice.   The

majority of responses came from single physician practices followed by practices with 2

– 3 practitioners. (Figure 1)

Figure 1: Numbers of physicians and/or nurse
practitioners in practice
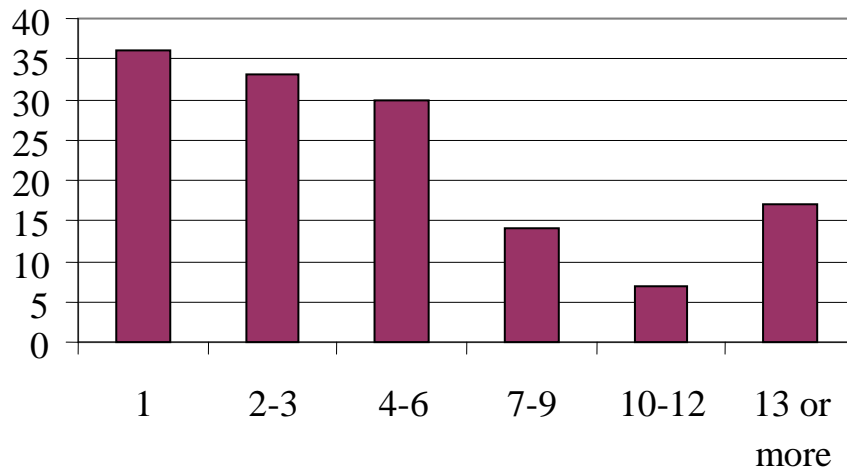
Respondents were categorized by position in the practice.   In the case of more than one response to this question, i.e. nurse and office manager, the response that most closely reflected their position in the practice rather than their training or background was used. Office manager was the job category most often picked by responders (43.6%) followed by other and nurse at 14.3% and 13.1% respectively.

Use of Electronic Medical Record and other technologies

 Asked whether the practice was using an electronic medical record (EMR), 64% of the respondents indicated that the practice did not.

In order to get an indication of the prevalence of various types of technology used the respondents were asked to mark all of the common technologies in use in the practice. Almost all practices (93.3%) responded that they used desktop PCs in their practices. More than half (61.9%) also used laptop PCs.   Cell phones (78.4%) are also widely used. PDAs (37.3%) and wireless devices (e.g. Blackberry) (27.6%) are used less frequently. Fifty one practices (38.1%) reported using electronic medical records in the practice. The practices reported using online databases for research in greater than half of the practices (56.7%).

These results were cross tabulated for size of practice. All size practices seem to equally use desktop PCs, cell phones and online databases. The results showed that the single practitioner practices were less likely to use PDAs, wireless devices, and EMRs than the other groups. The largest groups were more likely to have an EMR and use laptops while wireless devices were most often used in the practices. (Figure 2)

In general, the physician practices did not differ in their use of technology based on the size of the practice with the exception of an EMR which was more common in the larger practices.

Figure 2: Types of technology used
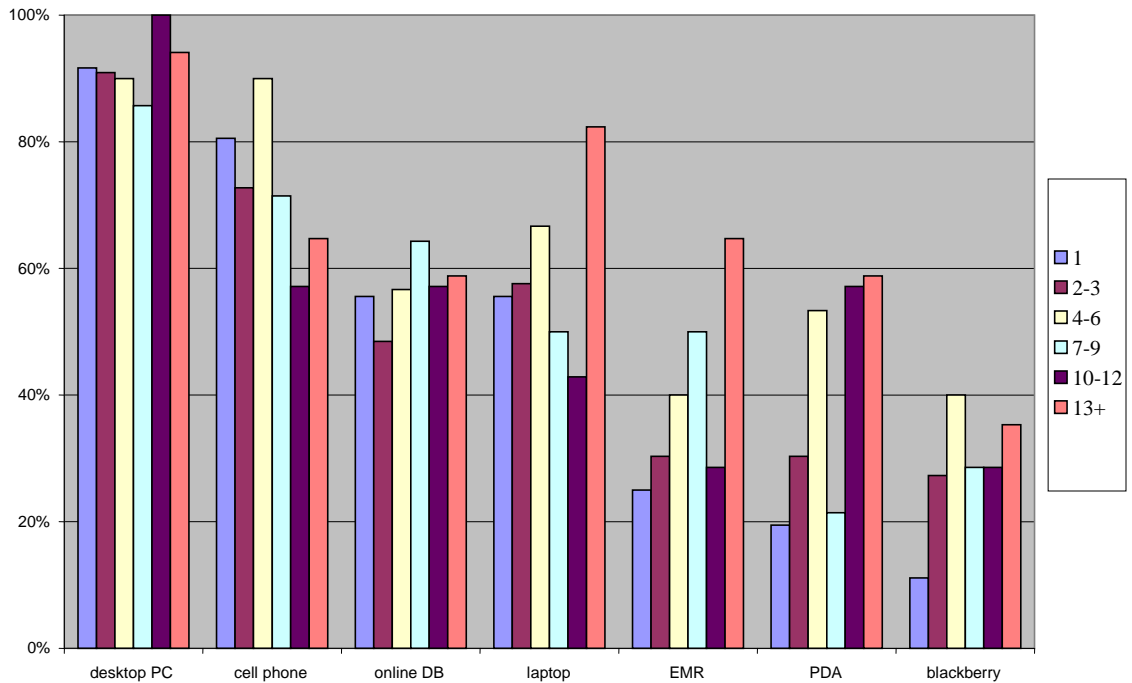
Frequency and methods of results retrieval

There were three questions designed to gauge the frequency of retrieving results through different methods.   As shown in Figure 3 most of the practices retrieved results through MyDocWeb either once a day (24%) or more than once a day (29%).   Forty eight percent of the practices said that they rarely contacted the HIM for results while forty four percent said that they never use the St Vincent portal.

Figure 3: Percentage of frequency results requested by delivery method
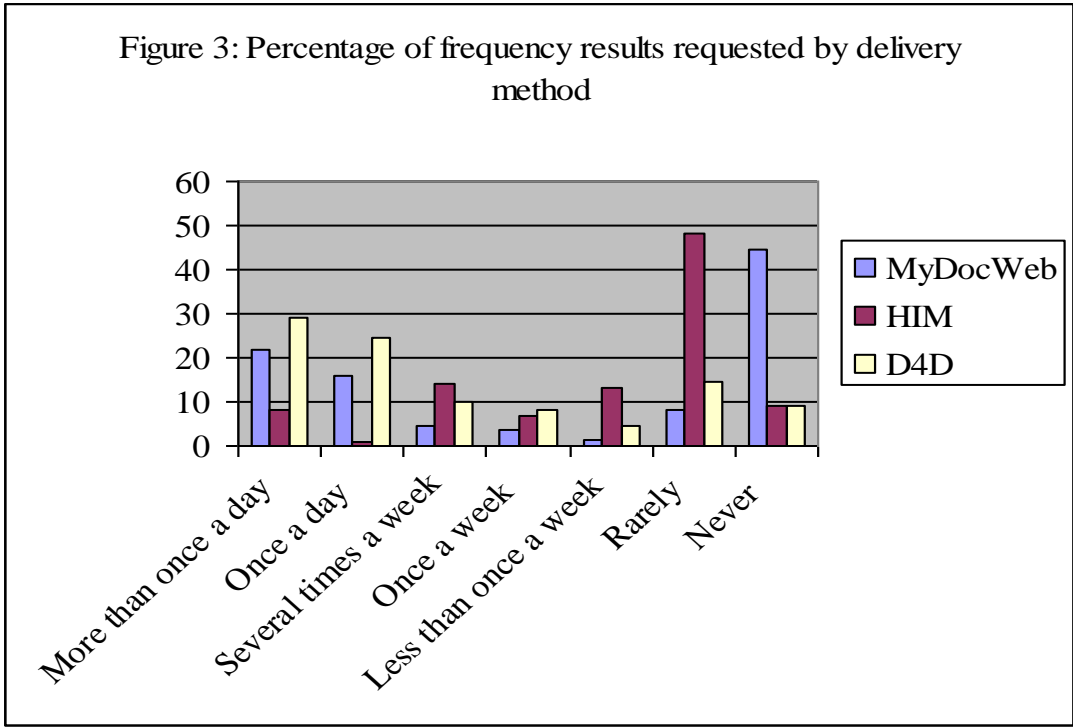
Training on D4D

One hundred and eight of the respondents (82%) indicated the IHIE personnel had trained the practice staff on D4D.

User satisfaction

User satisfaction on all questions reflected a mean of 4.08 on a 5 point Likert scale with a standard deviation of .516. (Table 1)

Table 1: User satisfaction with Docs4Docs

	N	Minimum	Maximum	Mean	Std. Deviation
Satisfaction w D4D	132	2.20	5.00	4.0828	.51598
Valid N (listwise)	132				

Individual benefits scored similarly with the highest mean 4.43 responding to the question stating that the Docs4Docs application improves workflow. The forward

function was the only stated benefit that the mean approached neutral. This was not

surprising as many of the respondents commented that they had never used the

forward function. (Figure 4)

Figure 4:User satisfaction with benefits of D4D
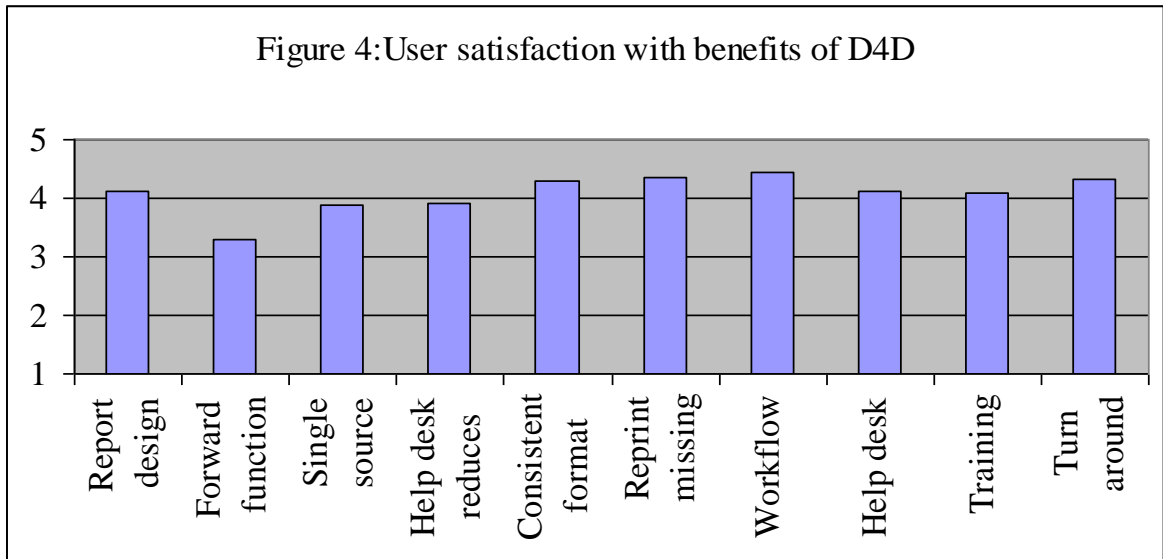
Cross tabulating the results by the number of physicians in the practice did not

show any differences in satisfaction between different size practices.   (Figure 5)

Figure 5: Satisfaction with benefits of Docs4Docs by practice size
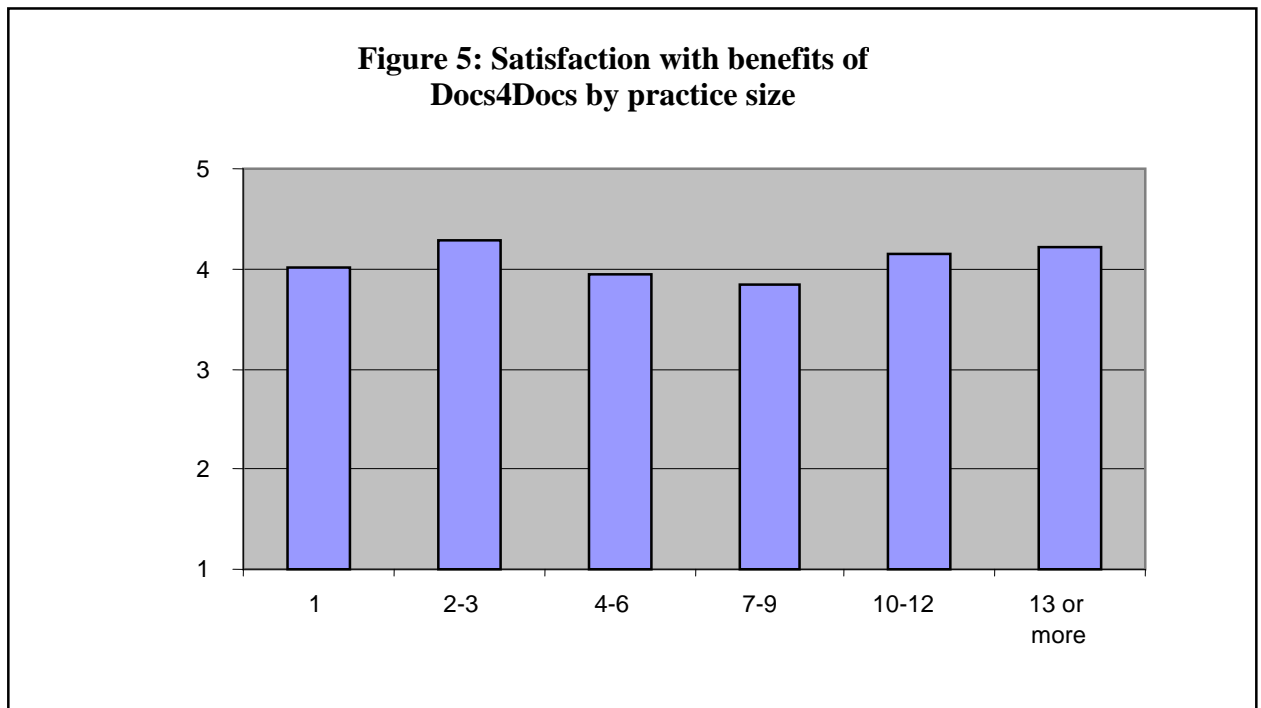
More than half of the respondents chose to make comments.   The most frequent

comment concerned never using the forward function. The user satisfaction with this

function was rated as very close to neutral which makes sense if most users are not using

the function.

Many of the comments were positive especially concerning the Helpdesk being

responsive.   The most frequent complaints were duplicate reports received from the

hospital and labs, searching by medical record number being difficult and no training on

the system. Additional comments included not being able to separate reports by different

locations of the same practice, Docs4Docs not working with the practice EHR, and

access difficulties. The most frequent suggestion was that practices be able to access

patient information on referred or new patients. (Figure 6)

Figure 6: Comments from users
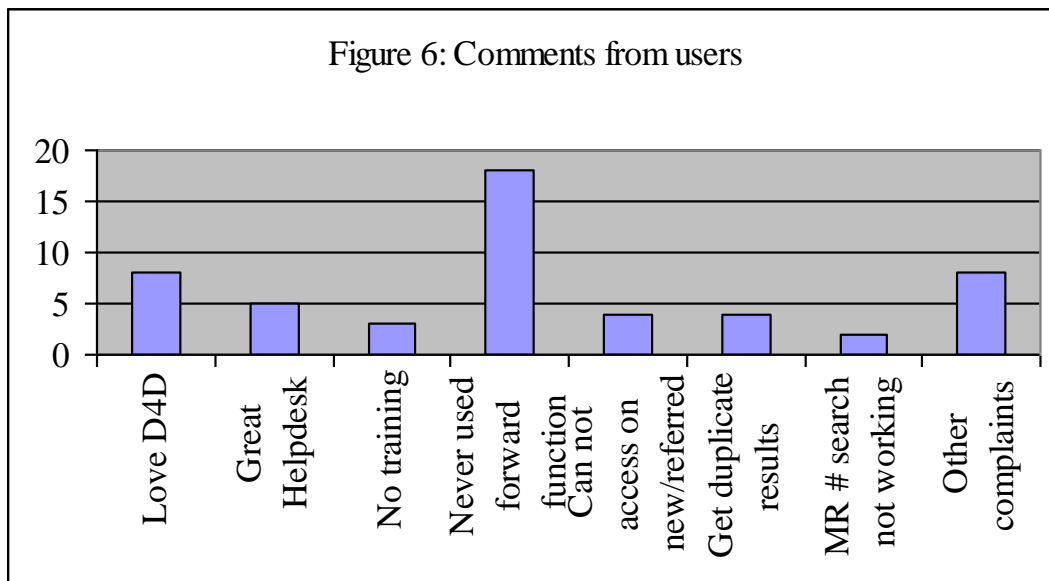
CHAPTER FIVE: DISCUSSION

Discussion of results

Prior to conducting this research study an analysis of physician requests found that 80% of the requests received by the release of information staff were from St. Vincent affiliated physicians. The remaining 20% were requests from physicians that may not have had results delivered through D4D because they were outside the local area or not affiliated with any of the local hospitals. Since all results are now being delivered through D4D, there was a question as to why so many requests were still coming to the HIM department. It was hypothesized that there was user resistance to the D4D technology which could be shown through low perception of benefits.

This research study indicates that this hypothesis was not supported. Web-based users of the D4D technology not only had a high perception of the benefits but also used the system more frequently than calling the HIM department for results.

One explanation is there is a survey bias in that D4D users who have a high perception of the system and use it frequently could have been more likely to return the survey. An alternate explanation is that it is not a resistance to new technology that affects D4d usage and therefore we still have more research to do if we wish to identify the reasons the HIM department is not seeing a reduction in the number of requests from affiliated physician practices.

As indicated by some of the comments it could be that many of the requests are for results by physician practices which were not originally associated with the treatment i.e. specialists that have had the patient referred. The strict security and privacy policies

for D4D which only allow the ordering or "copy to" physicians to access results may inhibit provider access for new patients. Use of the forward feature might overcome this limitation.

Another possible reason for the large volume of requests is that the type of health information needed is not part of the results delivery through the D4D system. For example, emergency room records are not delivered through D4D but there is a high rate of follow-up on these visits.

One of the biggest problems may be that the HIM Department at St. Vincent does a very good of a job providing just in time access to information. This practice, combined with a policy of allowing physician offices to request results even if they have been delivered through D4D, gives no incentive for physician offices to change their practices. The release of information staff hears comments such as:

"It is easier to call you",

"The person with the D4D access is busy right now"

"I am a nurse and only our medical records clerks have access to that system."

It may be that a change in philosophy of providing just in time services will have to happen before anything is going to change at the physician offices. The difficulty is identifying when the need is urgent. Currently many physician offices routinely wait until the patient is in the office to request information even though they know the patient is coming in for several days or weeks. This practice pushes those requests into a "STAT" situation when it would not necessarily be urgent. The difficulty is having the resources to be able to triage requests for information and provide additional education to the offices while still providing timely service to our customers.

There are other technological barriers that should also be explored such as the current requirement for physicians to have key fob identity tokens in order to access records through the St. Vincent physician portal, MyDocWeb.

Implications for the future

Until truly interconnected medical records exists, the local HIM department is still going to be a large participant in the sharing of health information for the continuum of care. However, changes in policy at the hospital level, removal of technological barriers such as key fob identity tokens combined with continued education to the physician offices have the potential to impact the number of requests received by release of information.

IHIE has made a good start in connecting local healthcare providers through the D4D results delivery but there still is a large gap between results delivery and President Bush's vision of an interoperable national health information network.

CHAPTER SIX: CONCLUSION

Limitations

No attempt was made to contact users who did not respond to the survey. This could result in a non-response bias. Physicians represented a small percentage of users so physician resistance was not directly addressed. The cover letter contained an error regarding population under study. The letter stated that the user was being contacted because they were employed by "practices affiliated with St. Vincent". The survey was actually sent to any practice that had received results from St. Vincent at any time whether or not they were affiliated with St Vincent. This error may have decreased the number of responses because users did not think that they met the criteria for the study.

Additionally the question posed about whether the practices had an EMR did not define the components of a fully functional EMR which should contain:

1. Task lists/Messaging

2. E-prescribing

3. Electronic Order Entry

4. Documentation capabilities

Because the question did not give this level of detail, the physician offices are likely to have overstated the actual numbers of functional EMRs.

Further research

Further research should look at the types of health information that are requested yet not available through D4D to see if this is a significant number of requests. It would also be valuable to see how many requests could be done through D4D if referring

physicians would use the forward function.   A study targeting other hospitals and how their affiliated practices use the D4D system would be beneficial.

An additional study would look at those practices that do not use D4D to see what social or technological barriers exist to prevent widespread expansion of the application.

Summary

Users agree with the stated benefits of the Docs4Docs application and use it more often than other methods to retrieve results.   These findings agree with the diffusion theory that stated that the perception of the benefit is the key to successful implementation of an innovation. (Rogers, 1995)

The problem of the number of requests made to the HIM department remains. Because the Docs4Docs system only allows access by providers if they are listed as a provider on the result, there is still a large need for results delivery on patients that have been referred to other providers.

Because some of the success of IHIE may be attributed to the security of the records in the current model, expanding the application so that any physician in the network can access records is going to be a difficult challenge.   Some of this may be addressed with strict security and access policies but much work will need to be done on the public, including physicians, perception of the safety of the patient records. Even now Congress continues to look at new bills which would reduce the ability of RHIOs to share information for the continuum of care by allowing patients the ability to "opt out" of electronic exchanges.   Everyone wants patient information, especially their own and their families protected, the goal of a truly accessible medical record is too important to ignore.

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Appendix A: Letter of Invitation

Dear,

As you may know, the Indiana Health Information Exchange (IHIE) was formed in February 2004 by a unique collaboration of institutions to extend the infrastructure and software built by Regenstrief Institute scientists into clinical settings. Key support has come from Indianapolis' five hospital systems, which were the first to use IHIE's flagship service, the DOCS4DOCS® service.   One goal of the DOCS4DOCS® system is to create a clinical messaging system that will provide Indianapolis area hospital and physician practices with clinical data essential to treatment decisions and quality patient outcomes.

I am a graduate student in health informatics at the Indiana University School of Informatics. As part of my graduate studies, I have designed a survey to evaluate satisfaction with the DOCS4DOCS system; I am interested in your opinions about IHIE clinical messaging system (for example, lab and x-ray reports) and your satisfaction with accessibility of clinical information. You are invited to participate in a brief survey, enclosed with this letter. Please complete the questionnaire and return it in the self-addressed stamped envelope included. You do not need to include your name on the survey, but please indicate your role (e.g., doctor, nurse, office staff).

Your participation in this survey is completely voluntary. If you agree to participate, you will play an important role in improving the delivery of clinical results. Evaluation is a critical component of any process improvement plan. Except for your time and inconvenience, there are no foreseeable risks for you in participating in this study.

Reading this letter and returning the survey indicates that you understand the above information and give your consent to participate in the survey.

You have been contacted because you are listed as the IHIE/Docs4Docs contact person for one or more practices affiliated with St. Vincent.   If you are not the primary user of the Docs4Docs application, we would appreciate you forwarding this letter and the survey to that person.

If you have any questions about the research please contact me, Ruth Rowell at rlheinz@iupui.edu or my faculty adviser, Dr. Anna M. McDaniel at amcdanie@iupui.edu. You may also reach Dr. McDaniel at her office number (317) 274-8095.

Sincerely,

Ruth H. Rowell, RHIA, CHP

Appendix B: Survey Instrument

Please select the best answer for each question.

1) How many physicians and/or nurse practitioners are in this practice?
   a. ☐ 1
   b. ☐ 2 -3
   c. ☐ 4- 6
   d. ☐ 7 -9
   e. ☐ 10 - 12
   f. ☐ 13+

2) Does your practice use an Electronic Health Record (EHR)?
   a. ☐ Yes
   b. ☐ No

3) What is your position in the practice?
   a. ☐ Physician or Nurse Practitioner
   b. ☐ Health Information manager or supervisor
   c. ☐ Office or Practice Manager
   d. ☐ Medical Records clerk
   e. ☐ Physician assistant
   f. ☐ Nurse
   g. ☐ Medical assistant
   h. ☐ Other

4) How often does your practice obtain clinical information from St. Vincent by accessing the St Vincent physician portal (MyDocWeb)?
   a. ☐ More than once a day
   b. ☐ Once a day
   c. ☐ Several times a week
   d. ☐ Once a week
   e. ☐ Less than once a week
   f. ☐ Rarely
   g. ☐ Never

5) How often does your practice obtain clinical information from St. Vincent by calling or faxing a request to the Health Information Department?
   a. ☐ More than once a day
   b. ☐ Once a day
   c. ☐ Several times a week
   d. ☐ Once a week
   e. ☐ Less than once a week
   f. ☐ Rarely
   g. ☐ Never

6) How often does your practice obtain clinical information from St. Vincent by accessing DOCS4DOCS?
    a. ☐ More than once a day
    b. ☐ Once a day
    c. ☐ Several times a week
    d. ☐ Once a week
    e. ☐ Less than once a week
    f. ☐ Rarely
    g. ☐ Never

7) I received training on DOCS4DOCS from:
    a. ☐ IHIE/DOCS4DOCS employees
    b. ☐ Someone at my practice
    c. ☐ Other _____

For the next question, please mark all that apply.

8) What types of technology are used in your practice by physicians or other associates? (Check all that apply)
    a. ☐ PDA
    b. ☐ Cell phone
    c. ☐ Wireless handheld devices (such as a Blackberry)
    d. ☐ Laptop
    e. ☐ Desktop PC
    f. ☐ Online databases for researching
    g. ☐ Electronic medical record system

Please answer the following questions about your perception of the DOCS4DOCS product.

9) The information on the reports from DOCS4DOCS is difficult to use because of the way the reports are designed.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

10) It is easy to share results with other providers using the forward function in DOCS4DOCS.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

11) DOCS4DOCS simplifies office work flow by providing a single source for results such as labs, radiology reports and dictation from multiple facilities.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

12) The IHIE/DOCS4DOCS 24 hour help desk reduces frustration and time when problems arise.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

13) Consistent formatting such as having the patient name in the same place makes DOCS4DOCS reports easy to read and use.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

14) Being able to search the DOCS4DOCS web application and reprint misplaced reports is a benefit to our practice.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

15) Using DOCS4DOCS complicates our workflow and makes our office less efficient.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

16) I am rarely able to get assistance from the IHIE Help Desk when having problems accessing or working in the DOCS4DOCS website.
   ✓ (NOT THE ST VINCENT MYDOCWEB HELPDESK)

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

17) I received adequate training on DOCS4DOCS.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

18) DOCS4DOCS improves turnaround time on results because it eliminates phone calls and faxes to the hospital Health Information/Medical Records department.

☐ Strongly Disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly Agree

19) Please feel free to provide any additional feedback or comments about DOCS4DOCS.

Appendix C: Survey Results

Practice and User Information

	How many providers?	Does practice use EMR?	Position in Practice	How often do you get info from MyDocWeb?	How often do you get info by calling/faxing HIM?	How often do you get info from DOCS4DOCS?	Training Source
N Valid	137	134	133	133	135	131	131
Missing	0	3	4	4	2	6	6

How many physicians and/or nurse practitioners are in this practice?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	36	26.3	26.3	26.3
	2-3	33	24.1	24.1	50.4
	4-6	30	21.9	21.9	72.3
	7-9	14	10.2	10.2	82.5
	10-12	7	5.1	5.1	87.6
	13 or more	17	12.4	12.4	100.0
	Total	137	100.0	100.0	

Does your practice use an Electronic Health Record (EHR)?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	48	35.0	35.8	35.8
	no	86	62.8	64.2	100.0
	Total	134	97.8	100.0	
Missing	0	3	2.2		
Total		137	100.0		

What is your position in the practice?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MD-NP	7	5.1	5.3	5.3
	HIM	4	2.9	3.0	8.3
	Office mgr	58	42.3	43.6	51.9
	Med Records	8	5.8	6.0	57.9
	PA	2	1.5	1.5	59.4
	Nurse	18	13.1	13.5	72.9
	Med Assistant	14	10.2	10.5	83.5
	Coder	3	2.2	2.3	85.8
	Other	19	13.9	14.3	100.0
	Total	133	97.1	100.0	
Missing	0	4	2.9		
Total		137	100.0		

How often does your practice obtain clinical information from St. Vincent by accessing the St Vincent physician portal (MyDocWeb)?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	More than once a day	29	21.2	21.8	21.8
	Once a day	21	15.3	15.8	37.6
	Several times a week	6	4.4	4.5	42.1
	Once a week	5	3.6	3.8	45.9
	Less than once a week	2	1.5	1.5	47.4
	Rarely	11	8.0	8.3	55.6
	Never	59	43.1	44.4	100.0
	Total	133	97.1	100.0	
Missing	0	4	2.9		
Total		137	100.0		

How often does your practice obtain clinical information from St. Vincent by calling or faxing a request to the Health Information Department?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	More than once a day	11	8.0	8.1	8.1
	Once a day	1	.7	.7	8.8
	Several times a week	19	13.9	14.1	22.9
	Once a week	9	6.6	6.7	29.6
	Less than once a week	18	13.1	13.3	42.9
	Rarely	65	47.4	48.1	91.0
	Never	12	8.8	8.9	100.0
	Total	135	98.5	100.0	
Missing	0	2	1.5		
Total		137	100.0		

How often does your practice obtain clinical information from St. Vincent by accessing DOCS4DOCS?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	More than once a day	38	27.7	29.0	29.0
	Once a day	32	23.4	24.4	53.4
	Several times a week	13	9.5	9.9	63.4
	Once a week	11	8.0	8.4	71.8
	Less than once a week	6	4.4	4.6	76.3
	Rarely	19	13.9	14.5	90.8
	Never	12	8.8	9.2	100.0
	Total	131	95.6	100.0	
Missing	0	6	4.4		
Total		137	100.0		

I received training on DOCS4DOCS from:

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	IHIE staff	108	78.8	82.4	82.4
	Someone at practice	15	10.9	11.5	93.9
	other	8	5.8	6.1	100.0
	Total	131	95.6	100.0	
Missing	0	6	4.4		
Total		137	100.0		

Types of Technology used in Practice

		PDA	Cell phone	Blackberry	Laptop	Desktop PC	Online db	EMR
N	Valid	134	134	134	134	134	134	134
	Missing	3	3	3	3	3	3	3

PDA

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	84	61.3	62.7	62.7
	yes	50	36.5	37.3	100.0
	Total	134	97.8	100.0	
Missing	0	3	2.2		
Total		137	100.0		

Cell phone

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	29	21.2	21.6	21.2
	yes	105	76.6	78.4	100
	Total	134	97.8	100.0	
Missing	0	3	2.2		
Total		137	100.0		

Wireless devices such as Blackberry

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	97	70.8	72.4	72.4
	yes	37	27.0	27.6	100.0
	Total	134	97.8	100.0	
	0	3	2.2		
Missing					
Total		137	100.0		

Laptop

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	51	37.2	38.1	38.1
	yes	83	60.6	61.9	100.0
	Total	134	97.8	100.0	
Missing	0	3	2.2		
Total		137	100.0		

Desktop PC

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	9	6.6	6.7	6.7
	yes	125	91.2	93.3	100.0
	Total	134	97.8	100.0	
Missing	0	3	2.2		
Total		137	100.0		

Online Database

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	58	42.3	43.3	43.3
	yes	76	55.5	56.7	100.0
	Total	134	97.8	100.0	
Missing	0	3	2.2		
Total		137	100.0		

EMR

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	83	60.6	61.9	61.9
	yes	51	37.2	38.1	100.0
	Total	134	97.8	100.0	
Missing	0	3	2.2		
Total		137	100.0		

Technology Frequencies

		Responses		Percent of Cases
		N	Percent	N
What technology used in practice?(a)	PDA	50	9.5%	37.3%
	Cell phone	105	19.9%	78.4%
	Blackberry	37	7.0%	27.6%
	Laptop	83	15.7%	61.9%
	Desktop PC	125	23.7%	93.3%
	Online db	76	14.4%	56.7%
	EMR	51	9.7%	38.1%
Total		527	100.0%	56.2%

Number of Providers crosstabulated with types of technology

			How many providers?						Total
			1	2-3	4-6	7-9	10-12	13 +	
What technology used in practice?(a)	PDA	Count	7	10	16	3	4	10	50
	Cell phone	Count	29	24	27	10	4	11	105
	Blackberry	Count	4	9	12	4	2	6	37
	Laptop	Count	20	19	20	7	3	14	83
	Desktop PC	Count	33	30	27	12	7	16	125
	Online db	Count	20	16	17	9	4	10	76
	EMR	Count	9	10	12	7	2	11	51
Total		Count	36	32	29	13	7	17	134

User satisfaction with Docs4Docs

	N	Minimum	Maximum	Mean	Std. Deviation
Satisfaction w D4D	132	2.20	5.00	4.0828	.51598
Valid N (listwise)	132				

Mean scores of user satisfaction by question

	N	Minimum	Maximum	Mean	Std. Deviation
Report design	130	1	5	4.13	.866
Forward function	115	1	5	3.29	.672
Single source	129	1	5	3.89	1.245
Help desk reduces time	129	1	5	3.91	.884
Consistent format	130	1	5	4.28	.758
Reprint missing	130	1	5	4.36	.807
Workflow	129	1	5	4.43	.799
Help desk	130	2	5	4.11	.865
Training	131	1	5	4.08	.865
Turn around times	131	1	5	4.31	.894
Valid N (listwise)	110				

Number of Providers crosstabulated with User Satisfaction

How many providers?		N	Minimum	Maximum	Mean	Std. Deviation
1	Satisfaction w D4D	35	3.00	4.70	4.0123	.43760
	Valid N (listwise)	35				
2-3	Satisfaction w D4D	33	3.50	4.90	4.2766	.36437
	Valid N (listwise)	33				
4-6	Satisfaction w D4D	26	2.67	4.80	3.9483	.51652
	Valid N (listwise)	26				
7-9	Satisfaction w D4D	14	2.20	5.00	3.8504	.85834
	Valid N (listwise)	14				

10-12	Satisfaction w D4D	7	3.20	4.78	4.1540	.54909
	Valid N (listwise)	7				
13 or more	Satisfaction w D4D	17	3.33	4.89	4.2196	.43782
	Valid N (listwise)	17				

		Report design	Forward function	Single source	Help desk reduces time	Consistent format	Reprint missing	Workflow	Help desk	Training	Turnaround times
N	Valid	130	115	129	129	130	130	129	130	131	131
	Missing	7	22	8	8	7	7	8	7	6	6

Information is easy to use because the way reports are designed

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	1.5	1.5	1.5
	Disagree	6	4.4	4.6	6.2
	Neutral	11	8.0	8.5	14.6
	Agree	65	47.4	50.0	64.6
	Strongly Agree	46	33.6	35.4	100.0
	Total	130	94.9	100.0	
Missing	0	7	5.1		
Total		137	100.0		

It is easy to share information using the forward function

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	1	.7	.9	.9
	Disagree	5	3.6	4.3	5.2
	Neutral	75	54.7	65.2	70.4
	Agree	28	20.4	24.3	94.8
	Strongly Agree	6	4.4	5.2	100.0
	Total	115	83.9	100.0	
Missing	0	22	16.1		
Total		137	100.0		

Docs4Docs simplifies work flow by providing single source for results from multiple providers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	14	10.2	10.9	10.9
	Disagree	4	2.9	3.1	14.0
	Neutral	11	8.0	8.5	22.5
	Agree	53	38.7	41.1	63.6
	Strongly Agree	47	34.3	36.4	100.0
	Total	129	94.2	100.0	
Missing	0	8	5.8		
Total		137	100.0		

24 hour Help desk reduces time and frustration

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	2.2	2.3	2.3
	Disagree	2	1.5	1.6	3.9
	Neutral	32	23.4	24.8	28.7
	Agree	58	42.3	45.0	73.6
	Strongly Agree	34	24.8	26.4	100.0
	Total	129	94.2	100.0	
Missing	0	8	5.8		
Total		137	100.0		

I am able to get assistance from the Help Desk

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	3	2.2	2.3	2.3
	Neutral	33	24.1	25.4	27.7
	Agree	41	29.9	31.5	59.2
	Strongly Agree	53	38.7	40.8	100.0
	Total	130	94.9	100.0	
Missing	0	7	5.1		
Total		137	100.0		

Consistent format makes reports easy to read

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	2.2	2.3	2.3
	Neutral	6	4.4	4.6	6.9
	Agree	70	51.1	53.8	60.8
	Strongly Agree	51	37.2	39.2	100.0
	Total	130	94.9	100.0	
Missing	0	7	5.1		
Total		137	100.0		

Being able to reprint missing reports is a benefit

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	1.5	1.5	1.5
	Disagree	3	2.2	2.3	3.8
	Neutral	6	4.4	4.6	8.5
	Agree	54	39.4	41.5	50.0
	Strongly Agree	65	47.4	50.0	100.0
	Total	130	94.9	100.0	
Missing	0	7	5.1		
Total		137	100.0		

Docs4Docs makes our workflow more efficient

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Agree	3	2.2	2.3	2.3
	Agree	1	.7	.8	3.1
	Neutral	4	2.9	3.1	6.2
	Disagree	50	36.5	38.8	45.0
	Strongly Disagree	71	51.8	55.0	100.0
	Total	129	94.2	100.0	
Missing	0	8	5.8		
Total		137	100.0		

I received adequate training on Docs4Docs

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	3	2.2	2.3	2.3
	Disagree	4	2.9	3.1	5.3
	Neutral	14	10.2	10.7	16.0
	Agree	69	50.4	52.7	68.7
	Strongly Agree	41	29.9	31.3	100.0
	Total	131	95.6	100.0	
Missing	0	6	4.4		
Total		137	100.0		

Docs4Docs improves turnaround times

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	4	2.9	3.1	3.1
	Disagree	2	1.5	1.5	4.6
	Neutral	8	5.8	6.1	10.7
	Agree	53	38.7	40.5	51.1
	Strongly Agree	64	46.7	48.9	100.0
	Total	131	95.6	100.0	
Missing	0	6	4.4		
Total		137	100.0		

References:

Bartschat, W., Burrington-Brown, J., Carey, S., Chen, J., Deming, S., Durkin, S., et al. (2006). Surveying the RHIO landscape: A description of current RHIO models, with a focus on patient identification. *Journal of AHIMA 77*(1), 64A-D.

Bush, G. W. (2004). Executive order: Incentives for the use of health information technology and establishing the position of the National Health Information Technology Coordinator. Retrieved 5/3/06, 2006

Connecting communities: Making inroads to exchange electronic healthcare data at the local level. (2005). *Quality Letter for Healthcare Leaders, 17*(8), 2-10.

Dewan, N. A., Lorenzi, N. M., & Zheng, S. (2004). Overcoming resistance to new technology. *Behavioral Health Management January/February 2004*, 28-32.

Gryfe, C. (2007). *Canadian Medical Association Journal* (Vol. 176, pp. 659).

IHIE. (2006). Website Retrieved 11/17/2006, 2006, from www.ihie.org/benefits.htm

Lapointe, L., & Rivard, S. (2006a). Getting physicians to accept new information technology: insights from case studies *Canadian Medical Association Journal 174*(11), 1573-1578.

Lapointe, L., & Rivard, S. (2006b). A multilevel model of resistances to information technology implementation. *MIS Quarterly, 29*(3), 461-491.

Lorenzi, N. M. P., & Riley, R. T. . (2004). *Managing Technological Change: Organizational Aspects of Health Informatics* (2 ed.). New York: Springer Science + Business Media, Inc.

McDonald, C. J., Overhage, J. M., Barnes, M., Schadow, G., Blevins, L., Dexter, P. R., et al. (2005). Perspective; The Indiana Network for Patient Care: A working local health information infrastructure. *Health Affairs, 24*(5), 1214-1220.

Overhage, J. M., Evans, L., , & Marchibroda, J. (2005). Communities' readiness for

    health information exchange: Landscape in 2004. *Journal of the American*

    Medical Informatics Association, 12(2), 107-112.

Poon, E. G., Blumnethal, D., Jaggi, T., Honour, M. M., Bates, D. W., & Kaushal, R.

    (2004). Overcoming barriers to adopting and implementing computerized

    physician order entry systems in U.S. hospitals *Health Affairs*(July/August 2004),

    184-190.

Rogers, E. M. (1995). *Diffusion of Innovations* (Fourth ed.). New York The Free Press.

Zitner, D. (2006). Physicians will happily adopt information technology. *Canadian*

    Medical Association Journal, 174(11), 1583-1584.

Ruth Heinz Rowell

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Education

Indiana University/IUPUI, Indianapolis IN

Master of Science, Health Informatics	2008
Bachelor of Science, Health Information Administration	2000
Graduated with High Honors	

Professional Experience

St Vincent Health, Indianapolis, IN   2000 – present
Health Information Management Department

Coder/Abstracter	2000 – 2002
Privacy Coordinator	2002 – 2007
Manager, Release of Information	2007 - present

ARM Financial Group, Louisville KY   1997 -1999
Investment Operations Clerk

PNC Bank, Louisville, KY   1977- 1996
Trust Department

Securities clerk, Central Securities	1977- 1981
Trust Officer, Assistant Manager Safekeeping	1981- 1993
Trust Officer, Federal Funds Trader	1994 – 1996

Teaching Experience

Indiana University/IUPUI, Indianapolis, IN
School of Informatics
Health Information Administration Program

Adjunct Faculty, Release of Information	2008
Guest Lecturer, Release of Information to Law Enforcement	2007

Ivy Tech Community College, Indianapolis, IN
Health Information Technology Program

Adjunct Faculty, Curriculum Development	2006

Professional Affiliations

American Health Information Association, member	1999 – present
Indiana Health Information Association	1999 – present
Legislative Chair	2006 – present
Central Indiana Health Information Association	1999 – present
Treasurer 2nd term	2007- present
Treasurer 1st term	2002- 2004
Indiana HIPAA Privacy Workgroup	2003-2004
Financial Women International	1981 – 1996