IT Manager

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Performed at
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Acknowledgement

First I want to express my deep appreciation to Dr. Lorna Butler, Deanof the College of Nursing at the University of Saskatchewan, for providing the information and contacts for the internship appointments, and introducing me to the Urology department at the VG (Victoria General) hospital.

I want to thank Dr. David Bell, Professor of Urology and Deputy Head of the department of Urology at VG, for giving me this opportunity to work with Urology department at the VG hospital. This was a very unique experience and wonderful first step for me in the health informatics field.

I also want to thank Dr. Ricardo Rendon, Assistant Professor at the department of Urology, for being a great support and adviser for me and helping me with different projects.

I specially thank everyone at the Urology department for making me welcome in their family and helping me during my internship. This has been really wonderful experience for me working with the Urology department personnel.

Finally I would like to thank Dr. Raza Abidi, Director of Health Informatics and Dr. David Zitner, Director of Medical Informatics, at Dalhousie University and all of my compassionate and knowledgeable instructors for providing the valuable training during the whole program.

At the end I have to especially thank Dr. Abidi, Dr. Bell, Dr. Rendon, Dr. Ziitner and Dr. Paterson (Assistant Professor, Medical Informatics and Division of Medical Education) for being such a great support and adviser during my internship.

This report has been written by me and has not received any previous academic credit at this or any other institution.

Ashkan Kharazi

Executive Summary

Health informatics is a program that promotes and supports the use of health information in health services delivery, health management systems, research, learning and health policy development for the purpose of improving health outcomes and processes for people. (1)

Health informatics is based on necessary collaborations among a variety of interested groups and sectors including consumers, providers, educators, researchers, government, clinicians, industry and anyone else with a key interest in the process and outcomes. (1)

The author did his internship as an IT manager at the Urology department at the VG site of QE II hospital. He was responsible to manage different healthcare projects and basically making a connection between physicians and IT people.

Through his internship he could use the knowledge from classes and instructors in the real health environment and get hands on experience. This internship gave him an opportunity to realize that how the theory could be put into practice. He also learned about the challenges and how to deal with these challenges.

The most valuable lesson he learned during his internship was considering all the aspects of a project, especially dealing with the rules and policies related to patients' privacy.

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Introduction

Health Informatics is the knowledge, skills and tools which enable information to be collected, managed, used and shared to support the delivery of healthcare and to promote health. Health informatics has vast filed with many sub-specialties. (1)

One of the main purposes of health informatics is to create a communication between health providers and IT professionals to improve the outcome and the delivery of healthcare. The core program provides essential understanding and skills development related to information tools and technologies and aims to provide a conceptual understanding of health and health care system. (2)

There are some challenges that health informatics should deal with them:

   I.   IS (information Systems/Solutions) which deals with technical standards to ensure interoperability, reducing/ eliminating island systems and patients' privacy.

  II.   IT (Information technology) which deals with providing efficient systems, keeping them up to date, managing expectations, acceptance/adoption of the new systems and security of the systems.

 III.   IM (Information management) is providing information to make decisions and adoption of data standards.

The author experienced some of these challenges in his internship and he believes dealing with them is not always an easy job.

The Urology department at VG side of QE II hospital provides health care services on urinary tracts of males and females, and on the reproductive system of males. The staff at the Urology department also works with Dalhousie University. They do researches mostly on Cancers related to Urology. Through his internship at the Urology department, the author intended to learn about

the needs, expectations and requirements in a healthcare environment, healthcare providers (mostly physicians) and basically gain some hands on experience.

Objectives

It was the first time that the urology department had employed someone with health informatics background. So the author's initial objective was to introduce health informatics and tell the staff and physicians what he can do for them. After talking to physicians at the department the author found out there are lots of projects waiting to be done at the Urology department. He chose the following projects:

i.   Proving a website to store patients' records (existing records and new records).

ii. Providing a website for patients to go online and inform their physician about their condition after a surgery or a visit.

iii. Proving an online survey for a research at the Urology department.

iv. Providing access to MyNightingale software.

Description of the organization

QE II

Located in the heart of Halifax, Nova Scotia, the QEII is the largest adult academic health sciences centre in Atlantic Canada, occupying 10 buildings on two sites. It was created in 1996 with the merger of the Victoria General, Halifax Infirmary, Abbie J. Lane Memorial, Camp Hill Veterans' Memorial, Nova Scotia Rehabilitation Centre and the Nova Scotia Cancer Centre. In addition to providing care to tens of thousands of Atlantic Canadians each year, the QEII is a centre of excellence in health research. (3)

The QEII is made up of 10 buildings located on two sites; the Halifax Infirmary site and the Victoria General site.

- ❖ Halifax Infirmary site buildings
    - ➢ Abbie J. Lane
    - ➢ Camp Hill Veterans' Memorial
    - ➢ Halifax Infirmary
- ❖ Victoria General site buildings
    - ➢ Bethune
    - ➢ Centennial
    - ➢ Centre for Clinical Research
    - ➢ Dickson
    - ➢ Mackenzie
    - ➢ Nova Scotia Rehabilitation Centre
    - ➢ Victoria

Affiliated with the Faculty of Medicine and Health Professions at Dalhousie University, the QEII is the largest teaching hospital in Atlantic Canada with more than 1,500 learners within the healthcare complex. The QEII is accredited by the Canadian Council on Health Services Accreditation. The QEII Foundation is a non-profit, charitable organization established to strengthen the QEII's ability to provide health care of the highest quality across Atlantic Canada. (3)

The Urology department

The Urology department is located at Victoria building. The Centennial and Victoria Buildings were part of the original Victoria General Hospital, now part of the QEII Health Sciences Centre,

these buildings border on the South Street side of the VG Site, with the main entrance facing north, toward the Bethune Building. The Centennial and Victoria Buildings contain both inpatient and outpatient services.

The Urology department is located on the fifth floor of the Victoria building. The staff consists of eleven doctors (three at IWK and the rest at VG), and around 35 nurses (full time and part time). The department has 26 beds and on the average the occupancy rate is 80%. The average days of stay for a patient are two. The number of surgeries related to the urology department from April 2006 to October 2006 was 3400 (the statistic for this year was not available yet).

Description of the work performed at the organization

Since it was the first time that the Urology department had employed someone with the health informatics background there were lots of projects awaiting to be done. Usually physicians, themselves had to find someone to do their projects. If the project was not something complicated the students who were doing their residency would do them (for example making a survey), otherwise they had to ask the IT department to do the project for them which takes a long time (for example making a website), since there is a long queue, so most of the time the best way is to find someone from outside the hospital to do the project.

Since the author had a limited time for his internship, at the first week of his internship he met with physicians at the urology department who had some projects. Between all the projects he picked the ones that were interesting to him and he thought are doable in the period of the time that he had.

Here are some of these projects:

> Development of a system to integrate the schedules of individual urologists with the office system, the hospital system and the clinic/OR schedules. There was a need to merge the schedules electronically.

> Wait times: Development of a database to monitor and analyze the wait times experienced by urology patients. There is a need to track when appointments are booked, how long it takes to get the appointment, where the patients are seen, for what diagnosis and if the patient had any ER visits while waiting to be seen. This project was one the projects that the author was really interested in, but unfortunately this project was already started.

> There was a database of 20,000+ patients in Dr. Gajewski's computer, He had a number of ideas of things that need to be further developed and analyzed.

> There was a new system for one of the physicians and ready for use in the clinic. the author was invited to come and attend the introduction to see if he also had any ideas of what might be possible.

The following are the projects that the author chose to do:

Electronic patient record

> A website to store patients' records: The project is now in a level that it can store/update visits and as requested it will notify the user of the updates. It also creates the reporting view (summery view) based on the visits of a patient; by double clicking on each visit in the reporting view it will display the 'Visit Form" with the information of that visit (which could be updated).

In the summary view there are three different colors for each procedure: Green which means "normal", yellow which means "caution" and Red which mean "abnormal". The user is also able to search for a specific record (it is possible to search based on MSI and HU number as well). Each box in the summary view represents a date, and it has an icon on it. The icon represents the procedure done on that special date.

Some other features of the system are:

a. Text Input for Radio/End urological Investigation,

b. Tumor Grade (1, 2, 3, to 1/3, 2/3, 3/3),

c. drop down menu for tumor stage,

d. the ability to provide the excel version of the records which can be used with SAS software for statistical calculation,

e. saving the past medical history and disease characteristics

f. saving the result from the patient's physical examination as well as the diagnostic investigations.

After the delivery of the project with above features if the physicians are interested, it is possible to move on to the second phase of the project with following features and modification:

1. Auto-calculation of Tumor Stage based on the given table as opposed to manually selecting a stage,

2. pt/Ct NM are clickable as opposed to a information dialog box,

3. Add Validations to the various forms (e.g. if you enter a wrong phone number or date the program tells the user before proceeding to next step).

There are some screen shots of the website in the appendix A.

Technical information

The author used Flex for the frontend, and ruby on Rails for the backend (services). Ruby on rails is then connected to a database system such as MySql (but it can be any other database such as postgres, sqllite, etc.). Currently MySql is used for the database.

The website can be run on a web server that host html files and Flex (or really .swf Flash files) can be hosted on the same server too. As for Ruby on Rails (RoR) is an open source/free environment. Ideally and for performance purposes, it is better to have it run on a Unix-based system (so any distribution of Linux/Unix, or Mac OS X) but If this is not feasible, then Windows server will do the job, with lower performance (slower response time).

The program (server and client) will take about 5-10MB and the rest would be the data stored on database over time and since we are dealing with text data (no heavy image/blob, etc) there is no need for huge space on server. If we want to be very accurate, we have to perform some mathematical analysis on the subject and make some assumptions. If we have 2GB of space that should be enough for tens of thousands of patients, if not more.

Follow up website

➢ Developing a website for patients to go online after a visit or a surgery:

Patients can go on line and tell their physician about their condition. This can be used to avoid the follow up calls after surgery and also the information can be used for research. The website is very user friendly and most of it contains drop down menus to make the use of the website easy for everyone. The submitted form then will be send to the physician's email. This website works with any kind of email (physicians can use their email any email address they like).

The screen shots from the website are available in the appendix B.

Online survey

➢ An online survey for a Urology's research: The survey has around 10 questions and it is a web based survey. A link to the survey will be send to each person and by clicking on the link, the survey will show up and then after the submission of the survey, the result will be save on a website which is password protected. The website also provides some basic statistical information about the results. The survey could be opened once if a participant opens the survey he/she should finishes the survey, so each person can fill out the survey just once this is to avoid the duplicates.

Objectives of the survey

I.   To demonstrate variability within Canadian urologists in their surveillance of non-invasive superficial bladder cancer.

II. To confirm that frequent cystoscopic examination is unnecessary in the surveillance of non-invasive superficial bladder cancer based on the experience at our centre.

III. To demonstrate the need for, and contribute to the creation of, Canadian guidelines on surveillance of non-invasive, superficial bladder cancer.

For the security issues I could not provide any screen shots of the survey, since it has not been launched yet.

MyNightingale

➢ Access to My Nightingale for the Urology department: we started from the beginning which was making the request and doing paper works and providing the requirements to get My Nightingale. The author was very interested to do the training and actually work with My Nightingale but it took long time to actually get it and unfortunately it was end of his internship, so I could not attend the training.

How work relates to health informatics

Health Informatics is an integrated research and learning program with health as its focus and information technology as the enabler.Iit is based on necessary collaborations among different groups and sectors including consumers, providers, government, clinicians, etc. (4)

The program has a strong ethical standard and base and deals with the management and use of health information. It includes the understanding and use of computing skills and information management techniques derived from several disciplines including mathematics, statistics, and philosophy. (4)

All of the projects that the author did during his internship dealt with different aspects of health informatics. For example *the electronic patient record system*, *the online survey* or *the follow up website* all needed a very good understanding of:

- ❖ Computing skills and information management, since creating a website (especially a website that needs to be secure) requires technical and managerial skills. Having the tools and knowledge certainly are require for doing a project but for finishing the project on time with the required quality and limited budget, sure is an important issue too.
- ❖ Ethical standards, since there is sensitive information about patients. In his internship the author learned how to deal with this issue. Ethical standards have different forms and although some time we might think we have solved this issue that is not always the case. As a matter of fact this was one of the main reasons that the author was late in delivering *the electronic patient record system* project.
- ❖ Consumers/clinicians, since clinicians do not like systems that are not user friendly (which makes sense, because they are busy with medical work and they rather work with paper and pen than a complicated system) and complicated and if wanted to make something useful we

had to be very considered about it, that is why the author had lots of meeting with clinicians and showed them lots of demos before handing over the final system.

❖ Other groups involved in department like the IT people. In his internship the author was so optimistic about everything and underestimated the fact that finishing a project does not mean that the job is done, there is one more important step after that which is putting the project in use! Sometimes it requires collaboration with other parties which may take time. For example at the IT department there is queue for dealing with IT issues and even when it is our turn there are other problems that need to be discussed with these other parties.

As a health informatician (IT manager) at the urology department the author had to deal with these issues so the clinicians did not need to worry about them. The author just updated clinicians on the status of the projects. The clinicians liked the fact that there is someone they can discuss the projects they have in mind with him and possibly make them happen. The author thinks that some of the ideas that these clinicians have are really good, which was somehow surprising for him because the author used to think that most clinicians do not really like to work with the technology, but working at the urology department showed him otherwise.

A problem and the corresponding solution

One major problem that the author had was with *the electronic patient record* project. The website was created (phase one) and it was ready to be used by clinicians at the urology department. The plan was the website being used for couple of months by two physicians and during these months if there is something that these physicians think should be changed or be added to the website they let the author know so that the final version is as good as possible, but when the author talked to the IT department and asked for getting space on the hospital server, the IT people started to question the project. On behalf of the urology department the author had

to show a demo to people at the IT department and after they saw the demo they started to question the security of the website. The website was already password protected to be used **only** by physicians. Since they were so concerned with the security of the website, the author suggested making the following changes:

- ➢ The website will not store the patent's name entirely (or at least the system is not searchable by name) instead each patient has a security code or some sort of identification (ID) (perhaps we could just use patient's HU number/MSI number)
- ➢ The patients will be informed about the system and they will asked to sign an agreement that they allows physicians to put their information on the system (of course they will be educated about the benefits and possible risks of having their information stored on a system instead of paper)
- ➢ Encryption of all the communication between the client/server (this was the last option)

The author and the IT department agreed on making the first two changes in return to having access to the hospital server. After about a month neither the urology department nor the author heard from the IT department, since it already took couple of weeks for the author and the IT department to achieve an agreement, after a month the author and physicians at the urology department decided to get a server for the department and launch the system so the two clinicians can try it, and by the time the "testing" phase is over hopefully we can launch the final version on the hospital server to be used by more clinicians. Author thinks that this was the best solution which they should have done earlier.

Conclusions

One of the most important aspects of health informatics is to use technology to improve the quality of health outcomes. This requires cooperation between different groups. The most important collaboration is between physicians and IT people and this is an important aspect of health informatician's job.

During the Author's internship at Vg hospital (urology department) Author used technology to make different projects in order to improve the health outcomes and that required making a good connection between the physicians and Tech people.

The Author's internship was a great opportunity to have some hands on experience in a health care environment with different groups of people involved in the environment, especially physicians and IT people. Some of the projects were not as easy and smooth as the author thought they would be so it was very fortunate that he dealt with these issues during his internship, while having the support of his supervisor and instructors. Having these great mentors made the process of learning easier and faster. After all, the important point is that the author learned how to use the training from the class in a work environment.

Recommendations

This internship was a great opportunity for author to work with various groups of peoples in a health care environment. Although author had done IT projects before, these projects were very different and author learned a lot about health care related projects.

The author learned very valuable lessons during his internship; he needs to strength his knowledge about dealing with patient's privacy (learning more about the policies and rules and also solutions to deal with this issue in projects).

The author also needs to strength his sense of time management , which includes considering all aspects of the project from beginning, especially the potential risks and problems, because the author dealt with very understanding people in his internship he could get some extra time but he knows that is not the case most of the time at job.

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Appendix A

Screen shots of the *Electronic patient record system*

➢ This is the first page of the website. As it is shown in the figure, it has the First name and Last name columns in it which was deleted from the final version and instead the patients will be searched by either HU/ MSI number.

➢ This is the patient information page. When a physician clicks on patient name(HU/MSI numebr) this page will show the information for that patient. In this page we have the demographic information as well as information about patient's health. the Author will try to keep the first and last name in this page, so physicians could make sure they are looking at a right patient's record. Since it is not the first page and unless physican does not click on the *Demographic-visit* tab it does not show anything, the author thinks it is a good idea to keep the names in this page (it is not certain since there is one last meeting with IT department before launching the systm).
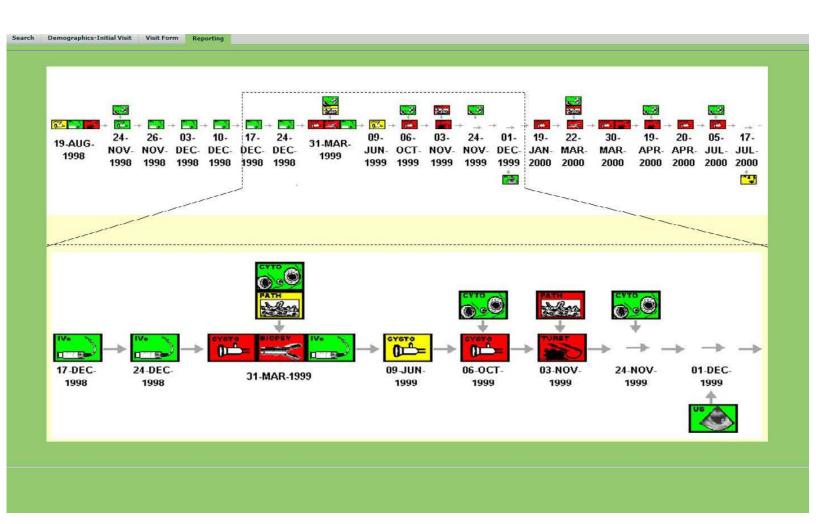
> *The Demographic-visitpage continus*

Search   Demographics-Initial Visit   Visit Form   Reporting

History of invasive TCC of the bladder [Positive ▼]
History of superficial TCC of lower urinary tract [Positive ▼]
History of invasive TCC of lower urinary tract [Positive ▼]
History of any other cancer [Positive ▼]

Physical Exam

Normal [Yes ▼]

Findings [   ]

Diagnostic Investigations

Lab Data

Creatinine [   ]
LDH [   ]
Alk Phos [   ]
Serum [Ca] [   ]
[Na] [   ]
[K] [   ]
[Cl] [   ]
Albumin [   ]

Cytology [▼]

Radiological Investigations

Endourological Investigation

> *The Demographic-visitpage continus*

➢ This is the reporting page which in author's idea is the most interesting page. This page is like a calendar for patients. It has all information from the first visit to the last visit.

Appendix B

Screen shots of the *Follow up website*

First name	John
Last name	Black

Date of Birth 3 ▼ August ▼ 1977 ▼

Sex ☑ Male
☐ female

Type of visit ○ Check up
○ Follow up check up
    Surgery
○ Other [ ]

Date of visit 10 ▼ September ▼ 2008 ▼

Presenting symptoms
☑ Hematuria ☐ Weight Loss
☐ Nocturia ☐ Uragency
☑ Flank Pain ☑ Supra-public pain
☑ Dysuria ☐ None
☐ Other [ ]

Medication(s)
1) Pill X Dosage twice a day
2) Pill Y Dosage every 6 hrs
3) [ ] Dosage [ ]

Overall Condition feeling better just having some headaches

Tel	902 412 3456
E-mail	John@hlfx.ns.ca
Address	1234 Spring Rd. Apt 345

Submit

> ➢ After a patient fills out the form and clicks on the submit button he/she will be informed whether the submission was successful and the physician will receive the following email:

Here is the information submitted from 24.138.28.196 on Wednesday, December 19th, 2007 at 12:17 pm
----
First name: John

Last name: Black

Birthday-Day: 3

Birthday-Month: August

Birthday-year: 1977

Sex - Male: checked

Type of Visit - Surgery: Checked

Visit-day: 10

Visit-month: September

Visit-year: 2008

Presenting symptoms - Hematuria: checked

Presenting symptoms - Dysuria: checked

Presenting symptoms - Supra-public pain: checked

Presenting symptoms - Flank Pain: checked

Medications-1: Pill X

Dosage-1: twice a day

Medications-2: Pill Y

Dosage-2: every 6 hrs

Overall condition: feeling better just having some headaches

Tel: 902 412 3456

Address: 1234 Spring Rd.
Apt 345
B3H 6K9

E-mail: John@hlfx.ns.ca

Satisfactory letter

Capital Health

DALHOUSIE UNIVERSITY
Inspiring Minds
Faculty of Medicine

December 19, 2007

RE: Ashkan Kharazi

To Whom It May Concern:

Ashkan functioned as an Intern in the Department of Urology facilitating IT services. He was responsible for overseeing development of a database for patients with transitional cell carcinoma. This has come to fruition and he facilitated greatly with the external consultants on this project. He was instrumental in interaction between the Department and the QEII IT Department. He was also involved in initial steps of implementation of an electronic medical record for patients with prostate cancer.

Yours very truly,

David G. Bell, M.D., F.R.C.S.C.
Interim District Department Chief, Capital Health
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DGB/dlb

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