Identifying clinical workflows and Canadian requirements Allscripts Summer Internship Report 2016

By

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Performed at
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Acknowledgement and Endorsement

This internship report is written by Ying Albee Zhan in partial fulfillment of the requirements for the Master of Health Informatics Program, Dalhousie University. This report has been written by me and has not received any previous academic credit at this or any other institution.

I would like to express my deepest gratitude and appreciation to Ms. Jennifer MacGregor and Mr. Jaimes Blunt for this great opportunity to learn and grow during the internship at the Allscripts Richmond base. Ms. Jennifer MacGregor is the managing director, responsible for sales, services and operations of Allscripts Canada. And Mr. Jaimes Blunt is the mentor for the internship, who is also recognized as a senior solution manager, working in Toronto. I especially thank him for all efforts, he had made on red-eye flights to Richmond, B.C.

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(Signature)
Ying Zhan

Executive Summary

This internship took place in the Allscripts Richmond Office, B.C, starting May 16, 2016, and lasting for 13 weeks. This internship report was written to report the work performed by the author in a timely manner. The author worked under the supervision of Mr. Jaimes Blunt, with help from colleagues.

Within this period, two projects have been completed independently by the author, which are "Canadian Privacy and Security Standard for Electronic Medical Record (EMR)" and "Canadian Pharmacy Services". The objectives of these projects were to identify the Canadian requirements, to capture the workflow in a clinical setting, to model the business procedure and to document the Canadian Standard. The deliverables are several business process model and notation (BPMN) diagrams and a business requirement plans for each project. Several lessons can be taken from the internship, such as gaining from the culture within Allscripts, general reporting, researching and writing skills and professional business skills.

This report details the steps taken to perform the work and discusses the relevance to health informatics. A conclusion and some brief recommendations are at the end of this report.

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1. Introduction

With the development of information technology, it is a trend to implement computer-based records in a clinical setting instead of paper-based ones. While, the electronic health record is an effective approach for healthcare providers to collect and store patient health information in the 21st century. It has been widely implemented in many provinces across Canada, such as Alberta, Ontario and Manitoba. Since some products are imported from other places out of Canada, an upgrade for an EMR product is necessary to accommodate the standard which is required by law or other regulations.

Two projects performed at the Allscripts Richmond Office independently by the author will be discussed in this report.

The primary objectives of the first project (Canadian privacy and security standard for EMR) can be concluded as follows:

a) To collect information on Canadian Standard;

b) To learn from the existing EMR product;

c) To identify and model the workflows in the clinical setting;

d) To determine Canadian standard requirements.

The primary objectives for the second project (Canadian Pharmacy Services) can be concluded as follows:

a) To collect information on Canadian Standard;

b) To identify and model the workflows in the clinical setting;

c) To determine Canadian standard requirements.

The deliverables for the projects are BPMN diagrams and business requirements document for each project. Meanwhile, a final presentation is delivered to all associates at Allscripts in early August.

These projects utilized and strengthened the skills from class, such like drawing BPMNs diagram, some research skills, reporting skills and knowledges on project management which all refer to the core courses of Health Informatics program. By completing these projects, it equips the author with hands-on expertise in a real industrial environment.

This internship not only prepares the author's readiness for taking a job, but also provides a great learning experience of organizational culture. It is significant for the student to learn about teamwork and working individually. On the other hand, learning how to coordinate and communicate with colleagues can also be beneficial to the author.

2. Description of Allscripts

Allscripts Healthcare Solutions, Inc. is a Chicago-based company, initially founded in 1986. As one of the most innovative leaders in the healthcare field, the clients of Allscripts include 180,000 physicians, 45,000 physician offices, 2,500 hospitals, 19,000 post-acute facilities, 100,000 electronic prescribing physicians and 40,000 in-home clinicians (About us, 2016). Meanwhile, there are more than 7,000 employees from multiple locations, such as U.S, U.K, Canada, Australia, Singapore and India.

Allscripts offers comprehensive products to both patients and healthcare providers. The products focus on healthcare solutions for patient engagement, practice management, e-prescribing and health information systems. Sunrise clinical manager— a clinical solution for computerized physician order entry (CPOE) by Allscripts is recognized as 2014 best global software in KLAS. Allscripts Sunrise also named by black book market research as the most intelligent inpatient

electronic medical record for academic hospitals during the last two consecutive years. It provides functionalities for computer physician order entry, advanced clinical decision support and integrated medication management. Most significantly, the open architecture of "Sunrise Clinicals" enables the efficient connections between third-party devices and applications. There are other excellent products for acute care, ambulatory care, critical care, emergency care, surgical care, knowledge based medication administration, pharmacy, radiology and so on.

The values of Allscripts are focusing on client experiences, the leadership in the healthcare industry and aspiring employees to think differently. They respect all clients and put them the first priority. The culture in the organization is very open which not only imply the openness to their clients, but also the freedom for each team within the company to be aspired and innovated.

The mission of Allscripts is to be a most influential global leader by delivering effective, high quality and financial efficient solutions in healthcare industry. The vision of Allscripts is to enable smarter healthcare.

3. Description of the projects in Allscripts

In order to upgrade and make further development on the products, the need of identifying Canadian requirements has been grown. During the internship, the author has been signed to multiple projects. The first project is "Canadian Privacy and Security Standard for EMR", beginning at May 12 to June 17, 2016. And the second one is "Canadian Pharmacy Services", starting after finishing the first project. Although the scope for these two projects are different, the objectives and deliverables are similar ones.

3.1 Canadian Privacy and Security Standard for EMR

3.1.1 Current problems

In the current process, there are primarily two actors involved: one is the health information management system administrators, while the other one is the individual healthcare providers. Once the patient visit starts, administrators and providers are both in charge of the medical records.

There is a theme of functionalities in the system which needs to be emphasized. This theme supports the locking or unlocking statues of single or multiple sessions (such as patient orders, results or prescriptions) in the patient records. Once healthcare providers log into the system, they can lock those sessions at the time of creation or modification according to patient privacy preferences. Within this theme, the functionalities include partially locking the information and locking all information. Additionally, only can the authors of specific information override the message no matter the session is locked or open for viewing.

Nowadays, as required by Personal Health Information and Protection Act (Personal Health Information Protection Act, 2004) (PHIPA), the policy needs to be followed for patient information management. The requirement also takes other associate legislation into account.

3.1.2 Proposed process

In the proposed process, tasks can be performed by individual providers and administrators. Providers are the health professionals who are going to offer health solutions to patients, while administrators are administrative staffs.

When the patient arrives, both administrators and providers need to sign the electronic user agreement at first. Then, several tasks, including stating patient consent, determining the clinical capacity to consent and recording the patient consent (conditional consents, partial consents) will

automatically send to providers. Administrators can support to authorize temporary substitute decision makers, add and manage consent directives and authorize providers to collect patient information. Individual providers are able to collect patient information with or without consent, indirectly collect, release disagreement, restrictedly external disclosure, and automatically release and disclosure. If providers could not get the consent from patients, they can also break the rule to restrictedly get patient information when the situation is urgent. However, their names and the actions' date will be captured and recorded in patient records as a part of PHI. Challenging the PHI, granting access to HIC, specify degree to lock PHI and generating statistical report can be performed by administrators at the same time. Then, an alert can be set for authorized individual providers. Right after the completeness of PHI, the PHI will keep in the system for a certain amount of period, according to the regulations. The administrators can pass the PHI to other successors or destroy them as required.

3.1.3 The requirement plan

According to the process, a requirement plan has been taken out and 28 requirements has been generated in a total.

The themes of each requirement are shown as follows:

Theme	Feature Request
Capable of stating the knowledgeable consent	The knowledgeable consent should provide the purposes of the collection, use or disclosure, as the case may be.
Able to record the knowledgeable consent	This function includes recording and maintaining the consents, enabling role-based access control. (e.g., Entries accessible to clinical in emergency; Entries accessible to direct care teams; Entries accessible to administrative staff; Entries not accessible to research staff.)

Theme	Feature Request
Add a time limit for retaining PHI	The PHI should be retained for the duration of time required according to the HIC's statutory and policy requirements to the extent reasonable and practical.
Add restrictions on the accuracy of PHI	PHI shall be as accurate, complete and up to date as is necessary for the purposes for which it is to be used. The restrictions support the accurate entry of PHI into system (such as input validation controls) and protect the integrity of PHI through its information security practices.
Able to establish consent directives	The consent directives specification enables clinicians to create and manage patient information requests regarding who they want their information shared with. It allows patients to control the collection, use and disclosure of their PHI, within Ontario's privacy legislative, regulatory and policy frameworks.
Able to determine the clinical incapacity	The clinical incapacity of an individual to consent to the collection, use or disclosure of PHI should be determines by a HIC.
Able to disclosure	This function enables a HIC to disclosure PHI about an individual with or without the consent.
Able to challenge the accuracy and completeness of PHI	This function enables individuals to ask the HIC to correct any inaccurate or incomplete information.
Able to manage consent directives	This function includes creating and revoking consent directives, overriding directives, and logging and alerting of overrides.
Ability of conditionally consent	Patients can place a condition on their consents to have HIC collect, use or disclose PHI about individuals. The condition is not effective to the extent that it purports to prohibit or restrict any recording of PHI by a HIC that is required by law or by established standards of professional practice or institutional practice.
Ability of transferring to successor	A HIC may transfer records of PHI about an individual to the custodian's successor if the custodian makes reasonable efforts to give notice to the individual before transferring the records or, if that is not reasonably possible, as soon as possible after transferring the records.
Capable of partial consenting	Patients may be capable of consenting to the collection, use or disclosure of some parts of PHI, but incapable of consenting with respect to other parts.
Enable to authorize a substitute decision-maker	A substitute decision-maker can be authorized to consent on behalf of the individual to the collection, use or disclosure of personal health information about the individual, the substitute decision-maker may make the

Theme	Feature Request
	request, give the instruction or take the step on behalf of the individual.
Ability to communicate lockbox instructions	This functions enable to communicate lockbox instructions to downstream systems.
Ability to log automated releases and disclosures	This function supports the system to automated releases and disclosures (e.g., to GP via autofax) including but not limited to: method of release, date, recipient name and recipient contact information.
Ability to alert authorized individuals	This function can alert authorized individuals when a lock/consent directive override occurs.
Ability to release the statement of disagreement	This function enables releasing of the statement of disagreement along with the relevant information, where instructed to do so by the patient, whether the release is manual or automated.
Ability to insert, attach or link the statement to the relevant piece of information	It supports insert, attach or link the statement to the relevant piece of information in a way that is obvious to the healthcare staff where a correction is refused and the patient writes a statement of disagreement.
Ability to generate statistical report	A statistical report can be generated for reporting to information and privacy commissioner of Ontario. It also enables to maintain detailed record of disclosure.
Ability of indirect collection	In many conditions, a HIC may collect PHI about an individual indirectly.
Capable to collect PHI directly without consent	A HIC may collect PHI about an individual directly from the individual, even if the individual is incapable of consenting, if the collection is reasonably necessary for the provision of health care and it is not reasonably possible to obtain consent in a timely manner.
Ability of authorize to collect	Non-HIC can be authorized to collect the PHI, which a HIC may disclose to them.
Ability to restrict external disclosure of specific pieces of information	This function restricts external disclosure of specific pieces of information, while maintaining accurate and complete information (e.g., not autofax a visit note to a GP, while recording that the GP referred the patient for the visit).
Ability to specify the degree to which information can be locked	It specifies the degree to which information can be locked (e.g., entire patient record, a specific document, all documents within episode or range of dates, research data, specific user and specific pieces of information).
Ability to have an electronic user agreement	An electronic user agreement can be signed at regular intervals and logged with user credentials.

Theme	Feature Request
Enable to grant access to PHI on informal requests	An HIC can grant an individual access to a record of PHI if the individual makes an oral request for access or does not make any request for access.
Ability to manually destroy sessions	This function can manually destroy sessions at any sign of tampering.

3.2 Canadian Pharmacy Services

This project focuses on pharmacy services for all pharmacists and prescribers in Ontario, Alberta, New Brunswick, Saskatchewan and Manitoba. In order to customize the product to fit into Canadian Standard (Canadian Pharmacy Association, 2011), a requirement plan is necessary to be documented. The services include: 1) adapting a prescription; 2) therapeutic substitution; 3) prescribing in emergency; 4) renewing a prescription; 5) administration of medication by injection and immunization. A brief description of the workflow for each service will be provided in the report and a requirement plan will also be followed.

3.2.1 Adapting a prescription and therapeutic substitution

When an existing prescription arrives, a pharmacist needs to gather all patient health information related to the prescription and review if a modification is necessary. Then, it comes to a decision point. If the modification is not necessary which may imply the end of a treatment in that case, the action as refusal to fill the prescription, will be written in the system and followed by the pharmacist. If the modification is required, then the pharmacist needs to assess the patient and the therapy which a patient may receive. If the patient would like to adhere to it, and the treatment is safe and effective, the process ends here as the prescription filled. However, if the therapy is not safe or effective enough, or the patient may not desire to adhere, the therapy needs to be re-assess and potential alternatives need to be provided. If the problem in the therapy cannot

be solved, an appropriate action in regards to the drug therapy problem needs to be taken, and this action is required to be stored in the system. If the problem can be solved, the consent needs to be obtained from the patient. After that, the pharmacist is allowed to alter the dosage, formulation, and regiment or substitute the medication. Next to it, the new prescription will be reduced to writing and sent to the original prescriber as a notification. The both prescriptions retain in the system.

3.2.2 Prescribing in Emergency

Prescribing in emergency starts with the similar process as adapting a prescription. When an existing prescription arrives, a pharmacist needs to gather all patient health information related to the prescription and assess the patient at the beginning. The action of assessment needs to be captured and recorded. Following that, a pharmacist needs to assess the potential therapy for the patient. If the treatment is not safe or effective, and the prescribing is not in the best interest of the patient, the process ends here as fail to fill the prescription. This action will be written in the system as well. If the therapy is effective and safe, and the prescribing is in the best interest of the patient, a consent needs to be obtained. Then, the pharmacist can prescribe a limited amount of medication to the patient in emergency. Next to it, the prescription will be reduced to writing and sent to regulated health professionals. The pharmacist needs to provide a follow-up and monitoring plan. And all related records for that patient need to retain in the system.

3.2.3 Renewing a prescription

When a renewal for a prescription comes, the pharmacist needs to gather patient health information and assess the patient along with the therapy. If the therapy is effective and safe, the pharmacist is going to compare with the original prescription to see if that's from the same facility.

If the original prescription comes from the same pharmacy, a consent needs to be obtained and the prescription can be renewed with an appropriate supply. If it is not from the same facility, either the prescription will be transferred or the pharmacist needs to assess the patient again. If the assessment shows no evidence of the current ongoing therapy or an immediate need, the prescription fails to renew. If there is evidence of the current ongoing therapy, the consent form is mandatory for a patient to submit. Then, the pharmacist will prescribe a minimum amount of medication to the patient. However, if the therapy is not effective or safe, or maybe the patient is not willing to adhere to, the pharmacist needs to re-consider the goals of the therapy and provide potential alternatives, these actions will be recorded in the system. All actions need to be kept no matter what the decisions may occur based on each case. After going through these procedures, the prescription will be reduced to write and a notification will send to regulated health professionals. The pharmacist still needs to work on the adaption, rationale, and follow-up plan. These documents should also be written in the system.

3.2.4 Administration of medication by injection and immunization

When an injection prescription arrives, the pharmacist needs to review the patient health information at first. Then the patient with the therapy needs to be assessed. If the therapy is not effective or safe enough, the goals of the therapy and potential alternatives will be determined and these actions will be kept in the system. If the therapy is effective and safe, the pharmacist needs to identify the need of injection. If the injection is not necessary to the patient, the prescription will not be able to fill. If the injection is needed, a check for the authorization of the vaccination will be performed. If the pharmacist in the specific province is certified to inject, the patient will get injected directly by the pharmacist. If the pharmacist is not certified, the prescription will be transferred to a physician and the patient will get injected from that actor, also a notification will

send to the physician. After injecting the vaccine, the pharmacist needs to observe and educate the

patient. All records for performing the injection need to be stored in the system.

3.2.5 The requirement plan for the project

Here is the requirement plan for this project which refers to the pharmacy practice

management system standard (NAPRA, 2013).

Requirement	Details
Capability to create and access Unique patient identifiers	A unique patient identifier can be given to each patient in the system. The identifier can be supported by the identification functions as well as search tools.
Capability to create, access, and update Unique patient records	Each patient should have a unique record which contains essential personal information and health information.
Ability to identify user by user ID	Each user (such as administrators, pharmacists, physicians) needs to be assigned with a unique user ID.
Support role-based access control	Users can be assigned to different roles. For each role, it has different responsibilities and privileges.
Support to obtain user agreements	A user agreement which states the different obligations and responsibilities for each role can be provided to users. Only after signing the agreement, can users log into the system.
Ability to log out inactive users	In terms of the safety of patient information, user who is inactive for a configurable period of time must be logged out automatically.
Support suspension/termination user accounts	Due to users' employment status, the system must support termination/suspension of user accounts.
Ability to suspend/terminate access privileges of each user	Upon termination or suspension of users' employment, the system must promptly terminate or suspend access privileges of each user.
Ability to not compromise patients' choices	Patients' choices of pharmacy or healthcare providers must not be compromised.

Ability to access patient consents or disclosure directives	The system must access a patient's informational consent or disclosure directives, including the withholding or revocation of consent to disclose information to third parties, where such directives are available to pharmacy professionals from applicable jurisdictional EHR or client repositories.
Enable to record and update patient consents or disclosure directives	An authorized user must be enabled to record a patient's informational consent or disclosure directives and then update jurisdictional EHR or client repositories records where jurisdictional DIS or EHR component allow such updates.
Support patient consents/disclosure directives to comply with legal or policy requirements	Patient consents/disclosure directives must be accomplished in a way that allows each jurisdiction to comply with its own legal or policy requirements.
Support restrict access to patient consents/disclosure directives based on access roles	In addition to the user's access role, restrict access must be assigned to a patient's informational consent or disclosure directives.
Support obtaining emergency access to patient records overriding previously recorded disclosure directives	An authorized user must be enabled to obtain emergency access to patient records overriding previously recorded disclosure directives (where emergency medical care or other special situations permitted by law or policy necessitate).
Support recording emergency access to patient records overriding previously recorded disclosure directives	In the emergency access, an authorized user must be enabled to record in an audit log the invocation of overriding access, along with a user-provided reason as to why the consent directive was overridden.
Capability to create, access and update patient medication profiles	Authorized users must be enabled to create, access, and update a comprehensive patient-specific medication profile, including the dispensing of prescription and non-prescription drugs, medical devices, and other items of clinical significance.
Capability to create, access, and update records of assessment, care planning, interventions and monitoring.	Authorized users must be provided with the capability to create, access, and update records of assessment, care planning, interventions (e.g., dispensing, prescribing, consultations, injections, lifestyle advice, referrals), and monitoring conducted by pharmacy professionals; including observed outcomes, assessment of patient progress and

	patient adherence to an established care plan, and all data specified in provincial/territorial pharmacy standards of practice.
Support reporting on clinical records	Users must be able to report on various aspects of clinical records.
Capability to access patient information from jurisdictional DIS and HER repositories	Users must be able to access, for a given patient, all patient information available to pharmacy professionals from jurisdictional DIS and EHR repositories.
Capability to update jurisdictional DIS records and/or EHR records	Users must be able to update jurisdictional DIS records and/or EHR records of assessment, care planning, interventions, and monitoring conducted by pharmacy professionals, where jurisdictional DIS or other EHR component allow such up-dates.
Capability to order lab tests	Users must be able to order lab tests in those jurisdictions where pharmacists can electronically order such tests.
Capability to access lab results	Users must be able to access lab tests results in those jurisdictions where results can be accessed electronically.
Capability to obtain reports of all tests ordered	Users must be able to obtain reports, in those jurisdictions where pharmacists can electronically order lab tests, of all tests ordered by a pharmacist where a result has not received by the pharmacist, and of all test results received by a pharmacist but not yet viewed.
Able to identify patient IDs for e-prescriptions	The system must clearly identify the patient and the patient's ID as found in a jurisdictional client registry, where such a registry exists, for e-prescriptions.
Able to identify prescriber IDs for e-prescriptions	The system must clearly identify the prescriber and the prescriber's ID, as found in a jurisdictional provider registry (where such a provider registry exists in the jurisdiction) for e-prescriptions.
Capable to display information linked to the prescriber	It must be capable of displaying information linked to the prescriber from this jurisdictional provider registry, as users may request.

Able to receive and record evidence on prescribers authorized prescriptions	The system must be able to receive and record evidence that the prescriber has authorized the prescription by electronic means.
Support uniquely identifying e-prescriptions	The system must ensure the e-prescription uniqueness.
Support authentic sources for e-prescriptions	The system must ensure all e-prescriptions are received from a secure and trusted system by technical means.
Support the authoritative version of e-prescription	The system must provide unambiguous direction to pharmacy professionals as to whether an e-prescription constitutes the authoritative record of instructions to dispense or whether it is a copy (e.g., of a paper original) in order to ensure that the prescription is acted upon only once and to thereby prevent a patient from improperly filling it more than once.
Capability to electronically access or input indications or reason for use or therapeutic goal	For each prescription, users must be provided with the capability to electronically access (in the case of e-prescriptions) or input (in the case of paper or verbal prescriptions) an indication or reason for use or therapeutic goal.
Enable to record evidences on signed prescriptions	The system must be able to record evidence, by electronic means, that an identified pharmacist has signed each e-prescription generated in a deliberate and auditable act.
Ability to record the dispensing of each prescription	The dispensing of each prescription which authorized by an identified pharmacist and completed by one or more pharmacy technicians must be recorded in the system.
Enable to generate reports	It must be enabled to generate reports on the data fields stored in the system. These reports include, but are not limited to, patient-specific, prescriber-specific, drug-specific, and drug-class-specific analyses and also include reports that identify individual patients, as well as those that provide aggregate data only.

Enable to de-identify patient records	Enable to provide the aggregate data only, it must be able to de-identify patient data.
Capability to accurately display any patient's pharmacy record	The system must be able to display any patient's pharmacy record(s) exactly as the record(s) existed electronically within the pharmacy at any prior date and time.
Capability to display in French	The system must be able to accurately display French language accented characters in text fields.
Capability to display the origin of any data	The system must be able to display the origin of any data received electronically.
Capability to display the changes	The system must be able to display the date(s) and time(s) of any change(s) made to pharmacy records and the user(s) responsible for the changes.
Able to update records by users	The system must be able to allow a reason for changes made to data to be entered by the user updating the record.
Capability to create, access and update records for patient safety	Users must be capable to create, access, and update records of reported adverse drug events, medication errors, incidents, close-calls and unsafe practices.
Capability to generate reports for patient safety	Users must be capable to generate reports necessary for appropriate management of adverse drug events, medication errors, incidents, close-calls and unsafe practices and continued quality improvement.
Capability to generate reports comply with legislation	Users must be capable to generate reports required to comply with federal/provincial/territorial legislation on adverse drug event re-porting.
Enable to enter into an information management agreement	An information management agreement must be provided with any third party when transmitting for the purpose of managing data to ensure the confidentiality and security of all identifiable personal health information collected.

Enable to enter into a confidentiality agreement	A confidentiality agreement must be provided with any third party when transmitting for the purpose of managing data to ensure the confidentiality and security of all identifiable personal health information collected, used or retained.
Ensure secure transmitting person health information	The system must ensure a securely encrypted transmission for personal health information.
Ensure secure messaging to other healthcare providers	The system must ensure the messages to other healthcare providers are securely encrypted.
Ensure secure storing and managing patient health records	All electronic pharmacy records and audit log records must be stored and managed securely.
Restrict storage to patient records outside of Canada	Any unencrypted electronic pharmacy records or audit log records outside of a Canadian jurisdiction must not be stored in the system.
Ensure remote access to electronic pharmacy records with conditions	Remote access to electronic pharmacy records or other services must be provided to pharmacy professionals only if when it meets such conditions: (1) uses secure transmission (2) incorporates access control (3) does not store unencrypted personal health information on remote computers.
Capability to record events	The system must be able to record events related to system use (i.e., user login and logout, session timeout, data backup and restoration), processing of electronic pharmacy records (i.e., record creation, transmission, access, modification, and deletion), disclosure of electronic pharmacy records (i.e., import, export, transfer, printing, or other disclosure), overriding of consent directives (where permitted), and electronic signing of e-prescriptions or dispensing records by a pharmacy professional.
Capability to keep an audit record	The system must be able to keep an audit record of the time and date of the event, the identity of the user, the identity of the patient, the type of event, and (where supplied by a

	user), the reason given for the modification of a data field.
Capability to protect audit log files	The system must be able to protect the audit log files to prevent any alteration or unauthorized access.
Capability to restrict access to the audit log	It must be able to restrict access to the audit log.
Capability to extract audit information and interrogate the audit log	The system must be able to provide the tools to extract audit information from audit records and interrogate the audit log to: i)identify all users who have accessed or modified a given patient's records over a given period of time, or ii)identify the actions of a given user (including all access to any patient records) over a given period of time.
Capability to retain audit log information	The system must be able to retain audit log information for as long the underlying e-prescription and dispensing records are retained.
Capability of reporting	The system must be able to provide reporting capabilities that allow the audit trail to be displayed.
Enable to support the generation of offsite backup copies of all data, security credentials, audit log files, and other data or files	The system must be able to support the generation of offsite backup copies of all data, security credentials, audit log files, and other data and files needed to return the system to a fully operational and secure state.
Ability to run a backup	When the system is available continuously, the system must have the ability to run a backup concurrently with the operation of the system.
Ability to identify and mitigate privacy risks	The system must undergo a privacy impact assessment (PIA) that includes a data flow analysis and a legislative analysis pertinent to the province or territory where the system is being used.

Ability to define the risk profile for the system	A threat and risk assessment (TRA) must be conducted in order to understand various treats to the system, to determine the level of risk the system is exposed to, and to recommend the appropriate level of protection.
Ability to reassess the risk profile	A TRA should be conducted after significant changes/upgrades to structure or functionality.
Availability to update documentations	The system must have available to up-to-date documentation that addresses system requirements and capacities, installation and testing, management and ongoing operation, known security issues, user identification, authentication, privilege management and access control, secure communications, audit, software change management, and data backup and restoration.

4. Relevance of projects to health informatics

During the internship, the knowledge gained from health informatics program helps to get the project going and be done well.

- HINF 6101 Health Information: Flow and Use

This is a core course for Master of Health Informatics. As illustrated above, the goals of these projects are ideally to capture all workflows within healthcare facilities. It is significantly important to apply the skill to understand how the information flows from an actor to another. Especially, workflow diagrams are required as the most part of project deliverables.

- HINF 6220 Networks and Web for Health Informatics

This is a core course for students with a medicine-related background to prepare them some fundamental skills for networking. Knowledge on the class diagram is extremely valuable to

perform the work in these projects. Sometimes, it is also very beneficial when communicating with other colleagues.

- HINF 6110 Health Information: systems and Issues

This is a core course for Master of Health Informatics. It is necessary to keep the principles in mind such like what the scope is, where the boundary of the system would be, while performing the project. Applying that knowledge to the project helps to keep focusing on the project itself.

- HINF 6300 Project Management

This course is most beneficial one to this internship. Techniques on project management are important while working with other team members. Because it can be utilized frequently when it comes to organize and manage projects.

- HESA 5335 Information systems in Health Administration

This course is taken from School of Health Administration. As trying to document the Canadian standard for multiple projects, this course provides some insights for the legislation and regulation into building up the requirements.

- HESA 5315 Managing change in Health Systems: Sustainability and Adaptation

This is also a course taken from School of Health Administration. It brings a lot of knowledge on the organizational culture, and helps to understand the culture within the company and to communicate efficiently with other colleagues.

5. Challenges on these projects

To complete the projects, two challenges were experienced during the internship. One of them has a direct impact on the deliverables. And the other challenge is highly related to the project management issue.

1. Information Incompleteness

Generally speaking, in the project "Canadian Pharmacy Services", the information on pharmacy workflows is quite challenging to gather. In the practice, several documents were used to support the requirements for projects, but few of them mentioned about how the information flow in the clinical settings. In order to capture the workflow, the supervisor connected the author with former pharmacy professionals. After some discussions and investigations, the workflow can eventually be proposed.

2. Communication problems

The supervisor primarily locates in Toronto for most of the time, whereas the author worked in the Richmond office. Therefore, at the beginning of the internship, weekly discussions have been scheduled two times per week. However, due to time conflicts, it is not always easy to make communications with the supervisor for reporting or discussing. Strictly following the timeline for the project can also be tough for this reason. Therefore, planning in advance and keeping notes for projects are good strategies which have been applied in the reality.

6. Conclusion

In conclusion, Allscripts is a great place for interns who study Health Informatics to grow. The projects performed at Allscripts are highly related to the courses as the students take at school. The internship at Allscripts is a wonderful experience to the author, where she can apply the knowledge into practice and learn about the industry at the same time. From the author's own perspective, it should be encouraged to keep a partnership with Allscripts for the summer internship program, so that students can benefit from it and bring the expertise and insights into the real industry.

7. Recommendations

Recommendations are proposed to other students from Health Informatics who would like to work with Allscripts in the future.

First of all, interns work in the Richmond office, whereas the supervisor locates in Toronto. Since working on projects individually, it can be tough for managing the time after work, therefore it is important to have connections with other interns and colleagues.

Secondly, it is always good to track tasks by taking notes. Sometimes, interns need to take multi-tasks and the schedule in a workday can be complicated. To make sure, getting the details correctly, taking notes is a strategy to make the internship successfully.

Additionally, there are gaps between school and work. Learning to take responsibilities and behave properly can help to make a good impression.

8. References

About us. (2016, 07 13). Retrieved from Allscripts: http://www.allscripts.com/company/about-us

Canadian pharmacy services framework. (2011, October). Retrieved July 7, 2016, from https://www.pharmacists.ca/cpha-ca/assets/File/cpha-on-the-issues/CanadianPharmacyServicesFramework.pdf

Dalhousie University. (2016, July 17). Master of Health Informatics, Program Details. Retrieved from Dalhousie University: http://www.dal.ca/academics/programs/graduate/healthinformatics/program-details/what-is-health-informatics-.html

Personal Health Information Protection Act. (2016, May 21). (n.d.). Retrieved July 18, 2016, from Wikipedia, The Free Encyclopedia.: https://en.wikipedia.org/w/index.php?title=Personal_Health_Information_Protection_Act&oldid=721418350

Pharmacy practice management systems: Requirements to Support NAPRA's "Model Standards of Practice for Canadian Pharmacists" (n.d.). Retrieved July 27, 2016, from http://napra.ca/Content_Files/Files/NAPRA_Pharmacy_Practice_Management_Systems_November2013_b.pdf
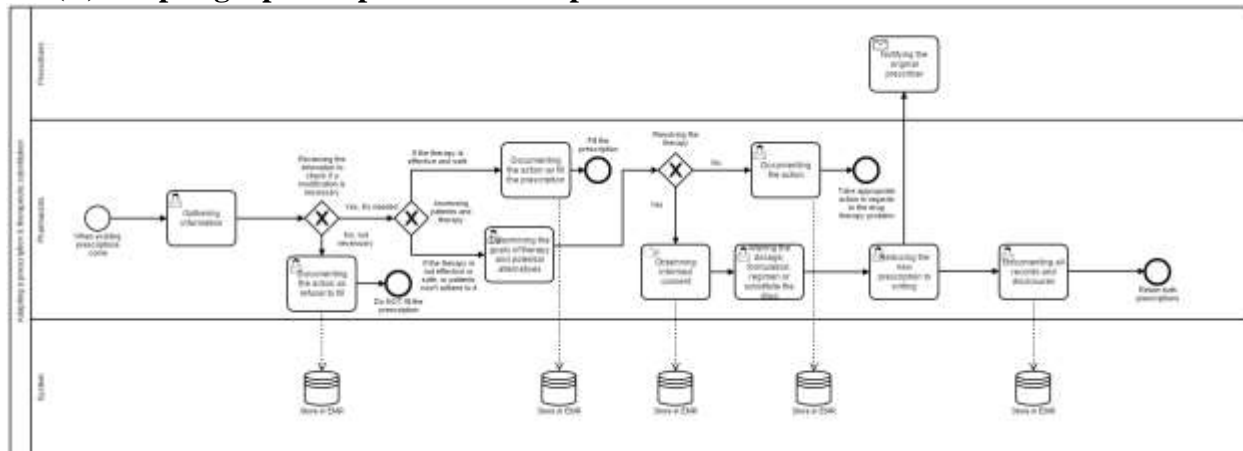
9. Appendix

9.1 BPMN- "Canadian Privacy and Security Standard for EMR" Project
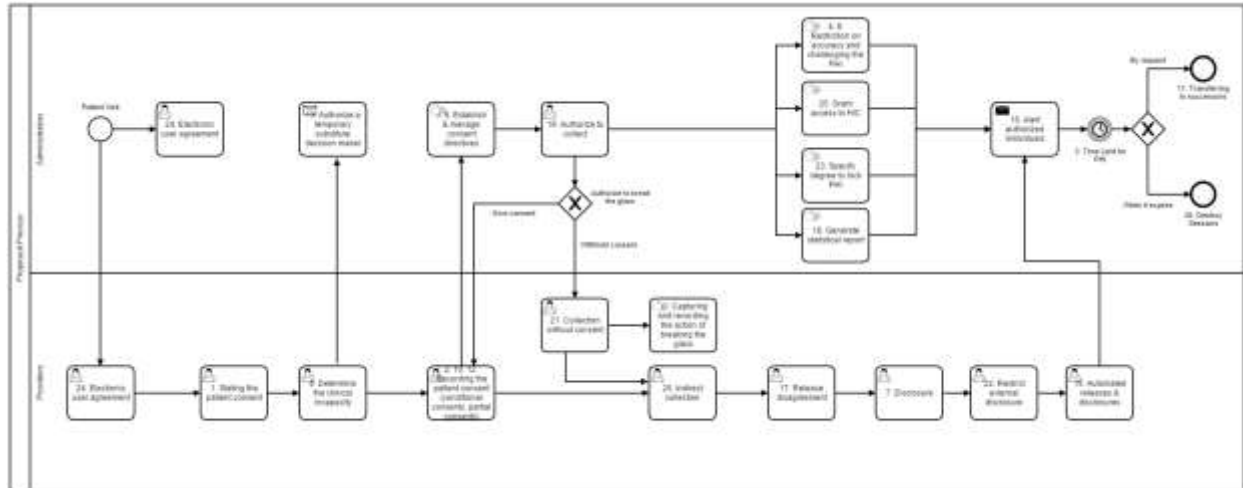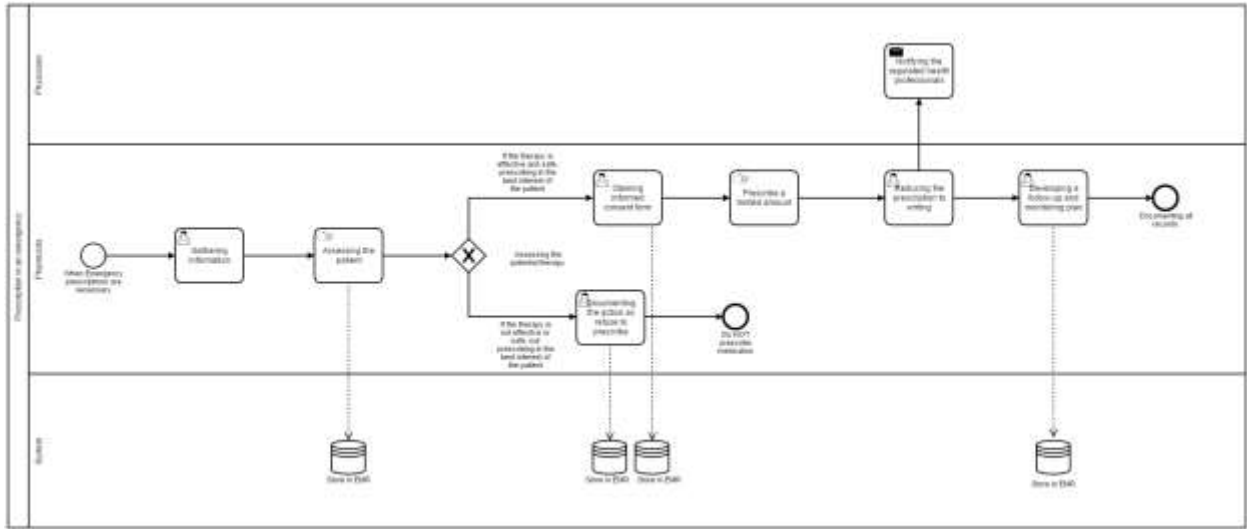

9.2 BPMN- "Canadian Pharmacy Services" Project
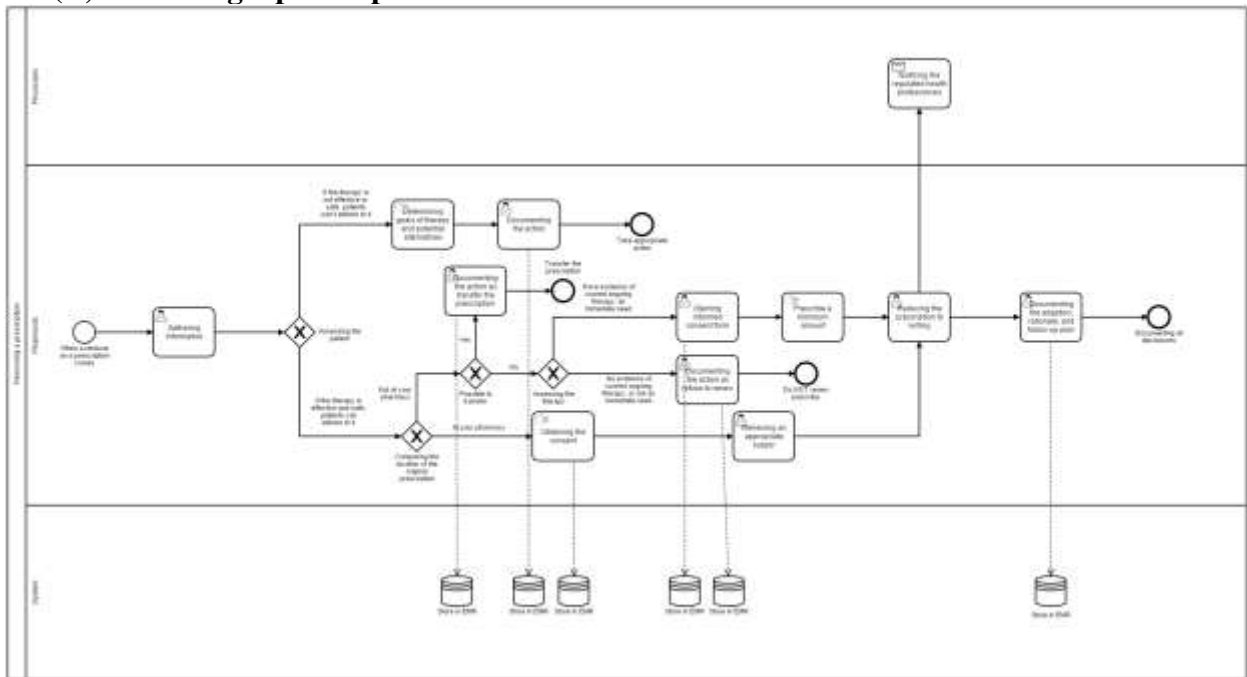
(A) Adapting a prescription and therapeutic substitution

(B) Prescribing in Emergency

(C) Renewing a prescription

(D) Administration of medication by injection and immunization

Administration of a medication by injection and immunization

Physicians

Notify physicians to inject the medication

Pharmacists

When injection prescriptions come → Gathering information

If the therapy is not effective or safe → Determining goals of therapy and potential alternatives → Documenting the action → Take appropriate action

Assessing the patient

If the injection is not necessary → Documenting the action as refuse to prescribe → Do NOT prescribe

Identifying the need

If the therapy is effective or safe

If the injection is necessary → Check the authorization of vaccination

If the pharmacist is certified to inject → Injecting Medication

If the pharmacist is not certified to inject → Transfer to physicians

Injecting Medication → Observing patients and Educating → Documenting all records → Follow-up

System

Store in AMR / Store in EMR

Store in EMR