Mental Health Information System Implementation in the Rouge Valley

Health System

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Performed at Rouge Valley Health System

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In fulfillment of the practicum requirement of the Master of Health Informatics Program, Dalhousie University

Report of Internship for the period May 16 – August 19, 2003

Date Submitted: August 26, 2011

Acknowledgements

Table of contents

Executive Summary

The adoption of electronic information systems is globally seen as one of the important strategies for improvement of quality of care, preventing medical errors, and reducing costs and delays. In order to improve quality of healthcare for mental health patients, the Rouge Valley Health System (RVHS) planned to implement an electronic information system called Mental Health Information System (MHIS) in its mental health program. The MHIS development was contracted with the HInext, the vendor of another information system which is already in use in the mental health program for collection of consolidated mental health data.

The HInext needed business process maps for all disciplines, and functional and system requirements in order to develop the MHIS. The author was hired by the RVHS for process mapping of all disciplines in the mental health program. Business process maps were created for all disciplines except physicians and crisis teams. Some disciplines such as physicians and outpatient department did not support the project. Physicians were not ready to provide information for process mapping nor did they have interest in the attendance of information and communication technology training, which was intended for the computer- illiterate physicians. The outpatient department manager was also reluctant to cooperate until the former project leader returned from maternity leave and used her influence to encourage her for cooperation.

The MHIS project is facing serious leadership and project management challenges. This internship report will describe the process of business process mapping, information diagrams, leadership and management problems in the MHIS project, challenges of health information system implementation in the literature and recommended solutions for successful development of the MHIS in the RVHS.

1. Introduction

This internship report is focused on the process mapping of the Mental Health (MH) program in the RVHS as part of the defining requirements for designing the electronic MH Information System (MHIS). The current documentation process in the MH program is entirely paper-based except for the RVHS community based MH services called Assertive Community Treatment (ACT), which has been electronic since 2008.   The Residence Assessment Instrument-Mental Health (RAI-MH), an electronic MH consolidated report, submitted to the Canadian Institute for Health Information (CIHI) is also electronic.

Canadian healthcare organizations have continuously been asked to do more for less; therefore, all healthcare provider organizations are striving to achieve this challenging goal, (Fine et al., 2009). The RVHS is also dedicated to continuous improvement of their operations. In order to achieve its strategic goals, the RHVS follows the LEAN philosophy of management for continuous improvement. LEAN is a toolset and a management philosophy that can improve quality of care for patients and reduce errors and wait time. A LEAN approach can support employees to eliminate roadblocks and strengthen hospitals to reduce costs and risks (Graban, 2008).

Research has shown that implementation of electronic information systems in the healthcare organizations could reduce medical errors and healthcare costs, and improve quality of care (Walker et al., 2005). Therefore, Canada Health Infoway is mandated by the government of Canada to accelerate the adoption of electronic health information systems for improvement of quality, access and timeliness of healthcare for Canadians (Canada Health Infoway, 2005). Canada Health Infoway is closely working with the provincial and territorial ministries of health to promote implementation of electronic health systems. In line with the mandate of Canada

Health Infoway and to achieve its strategic goals, the RVHS has implemented several electronic

health systems in various departments in the last few years (e.g. birthing center, community

based mental health program and operating room). Medical Information Technology

(MEDITECH) was implemented as the hospital information system in the Rouge Valley Ajax

Pickering (RVAP) in 1999. The Rouge Valley Centenary (RVC) replaced its old platform

system, the Mckesson, with the MEDITECH in 2006. The MEDITECH includes

communication, patients' demographics, laboratory, imaging, and pharmacy modules. The

laboratory and imaging orders are electronically sent and the results are viewed through the

MEDTECH. The MEDITECH is not fully integrated with other RVHS clinical information

systems. It shares patient demographic data unilaterally with some information systems (e.g. the

birthing center information systems and the operating room information system). The

MEDITECH cannot pull information from any information system in the RVHS. In late 2009,

the RVHS decided to implement an electronic information system in the MH program.

2. About The Rouge Valley Health System

The RVHS has two hospitals, the RVC at East Scarborough and the RVAP in the West

Durham region. Both hospitals have 510 beds where 224 general practitioners, 324 specialists

and nurses, and many allied health workers provide services. The RVAP hospital was established

in February 1954 in a one story wooden building with 38 beds by funds raised through

community fundraising. The new four story hospital was opened in 1964. The RVC hospital was

opened in a 15 story building in 1967. Both hospitals amalgamated in 1998 by the decision of the

Health Services Restructuring Commission.

In 2006, the Ministry Of Health and Long Term Care (MOHLTC) divided Ontario into 14 regions called Local Health Integration Networks (LHINs). RVHS officially became a part of Central East (CE) LHIN. Currently, RVHS plans, operates and gets its funds through CE LHIN. MH is one of the major programs of the RVHS which includes the following departments.

2.1 Adult Crisis Services

Adult Crisis Services provide MH services to adult patients at the time of crisis. A crisis team response is available 16 hours a day, seven days a week through emergency departments of both campuses. A crisis team includes a mental health nurse and a social worker. Patients are referred by the emergency department physician to the crisis team, and the latter makes the decision to recommend treatment for the patients or admit them in the mental health ward after consultation with a psychiatrist.

2.2 Outpatient Department

Both hospital campuses have outpatient programs where psychiatrists, mental health nurses, social workers, recreation therapists and occupational therapists provide services. The Day Hospital and the Day Treatment programs are also parts of the outpatient department. They are educational and counseling programs to help people overcome their mental health issues. The Day Hospital can be an alternative to the inpatient admission or a follow up support after hospitalization. In the Day Hospital, patients attend the hospital daily and go home at night. The Day Treatment is less intensive and is scheduled two times a week. Services are provided in group sessions and individually in the Day Hospital and the Day Treatment programs. The Clozaril clinic is another outpatient unit, which provides services to chronic MH patients who

need regular monitoring for Clozaril side effects. Furthermore, stress and anxiety clinics are also organized three times a year for people who want to overcome their stress and anxiety. The patients attend these clinics once a week for two months

2.3 Adult Inpatient Department

The Adult MH inpatient department serves patient over 18 years of age who cannot be treated as outpatient clients. A number of different professionals such as psychiatrists, MH nurses, social workers, occupational therapists and recreation therapists provide services to mentally ill patients. The inpatient ward also has a Psychiatric Intensive Care Unit for those patients who are at risk of suicide or homicide. Another inpatient unit is medical psychiatry where MH patients with medical conditions are admitted for treatment.

2.4 Child and Adolescent Department

The child and adolescent MH program provides services to patients less than 19 years of age. It includes Inpatient services, Day Hospital and Crisis services. The outpatient child and adolescent MH services are offered in the Shoniker clinic located at RVC campus where a multi-professional MH care team provides services.

2.5 Assertive Community Treatment

ACT is a community based MH program which provides services to adults with severe and persistent MH problems. The ACT team includes multi-disciplinary professionals such as MH nurses, social workers, occupational therapists, recreation therapists and substance abuse treatment workers. The ACT team provides services to adults who did not respond to office

based services or have had long hospital stays. They help clients to learn important daily

functions, such as attending their appointments, staying hygienic and managing finances.

3. Critical analysis of a problem in the MH program and the health informatics solutions

   One of the significant problems identified in the RVHS MH program was the collection

of redundant information during various patients' assessment events. Patients go through various

intake assessment rounds before receiving psychiatric services in the MH program. For instance,

when a patient is referred by a family physician to the Shoniker Clinic for a psychiatric

consultation, s/he undergoes two rounds of assessments by a social worker/CYC before a

psychiatrist examines him/her. The information collected during assessments by the social

workers/CYC and the psychiatrist is redundant in most parts. The collection of redundant

information is mostly due to paper-based documentation because paper based documents

exchange is problematic; therefore, healthcare professionals and allied healthcare workers

repeatedly collect the information in various departments. The collection of redundant

information brings about inefficiencies, waste of time and money, and it is bothersome for

patients. Health informatics solutions are required in order to minimize the collection of

redundant information.

   Information diagrams are excellent tools to visualize the redundant information collected

during patients' assessment processes. The author went through various intake assessment tools

used by various disciplines in all departments. The information diagrams of assessment tools

used by various disciplines in each department were prepared, and then they were compared with

each other. A combined information diagram of all disciplines assessment tools was created, and

redundant information was highlighted with different colors (Appendix I indicates redundant

information collected during three rounds of assessments performed by Social workers/CYCs

and a psychiatrist).

In order to minimize the collection of redundant information, a broad based multi-

discipline assessment tool is required to be incorporated in the MHIS for use of all disciplines.

The multi-discipline tool has to serve the needs of various disciplines across all departments.

The healthcare workers with assistance of a business analyst should develop users' requirements

definitions for the multi-discipline assessment tool. For instance, if someone does not need to

collect certain information, s/he has to be able to skip that section of the assessment tool. Once a

discipline has performed patients' assessment and has recorded the information, other disciplines

should not collect the same information from those patients again. The collected information

should appear automatically in the multi-discipline assessment tool when another healthcare

professional wants to assess the same patient and record his/her information.

The author did not have a chance to meet with all disciplines' representatives around a

table to discuss the development of the multi-discipline assessment tool. This activity was out of

the scope of this internship project. The healthcare professionals and allied health workers

including physicians from all departments have to gather around a table to discuss the

development of the multi-discipline assessment tool. A review of literature and the assessment

tools used by other organizations, which have similar programs, will provide excellent input for

development of the multi-discipline assessment tool.

4. Mental Health Information System as a Health Informatics Solution in the RVHS MH

program

The RVHS is continuously endeavoring to promote evidence based practices, reduce costs and improve quality of care. The current inefficient business process of various disciplines, collection of redundant information and paper based documentation are serious obstacles for improvement of quality of care; hence, the RVHS determined to implement a CIS named the MHIS.

The CIS opened a new era for improvement of quality of healthcare. The MHIS in the MH program can achieve vast improvement in the documentation, reporting, retrieval and sharing of patient information. In addition, the MHIS can assist physicians in decision making by providing them with reminders, alerts and access to the best evidences. The MHIS could facilitate automatic generation of the MH consolidated data report, the Resident Assessment Instrument –Mental Health (RAI-MH).

A wide range of benefits of electronic information systems such as increased communication among users, reduced paperwork and costs, fewer medical errors, and completeness of patient records and their easy retrieval have been frequently reported in the literature (Johnson et al., 1999); (Tsai & Bond, 2008); (Anderson, 1997). Dudman (2000, P 136) describes six level of sophistication in the CIS:

   i) Level 1 is the most basic level supporting administrative functions of an organization through patient administration with independent departmental systems.

ii) Level 2 is Level 1 plus integration via master patient index.

iii) At Level 3, true clinical support is available with many practical uses, such as electronic clinical orders, results reporting, prescribing and multi-professional integrated care pathways.

iv) Level 4 has Level 3 plus electronic access to knowledge bases, embedded guidelines,

electronic alerts and expert system support.

v) Level 5 has Level 4 plus specific clinical models and document imaging.

vi) The most advanced level is Level 6. It has telemedicine and other multi-media

applications such as picture archiving and communication systems.

5. The MHIS Can Achieve the Following in the MH Program

- Provide access to standardized assessment tools for efficient documentation

- Facilitate interdisciplinary exchange of patient information in a secure and confidential

  way and prevent collection of redundant information.

- Improve patient safety and quality of care

- Prevent medical errors caused by illegibility, dictation and audio recording

- Promote evidence based practices

- Provide support for consolidated data collection such as RAI-MH

6. What Was Done by the Rouge Valley Health System before?

In late 2009, the RVHS decided to use some of its MH program budget for

implementation of MHIS in the MH program. The MHIS was to cover all MH departments. The

MH program is currently using The Roster of Electronic Assessment Tool (TREAT) system for

electronic reporting of patients' consolidated data (RAI-MH) to the CIHI. The RVHS made a

decision to explore the possibility of appending the MHIS to the TREAT system. The vendor of

the TREAT (HInext) was requested to provide information about the possibility. The HInext

provided a positive answer and organized a demonstration to show RVHS the possibility of

having MHIS alongside TREAT. A large group of healthcare professionals, allied health workers

and managers attended the demonstration, and according to a manager, everyone was impressed by the demonstration. Subsequently, the RVHS determined to develop the MHIS by the HInext, and signed a contract with them. It is unknown that whether the decision of selection of vendor was made by consensus among healthcare professionals and mid level managers or just by the top managers only. Some mangers did not support the development of MHIS by HInext.

After the deal was signed by both parties, the vendor requested various requirements for system development including business process maps of all disciplines in the MH program, but RHVS did not have such documents. At this point, the leader of the project, the director of MH program, was promoted to a higher position; subsequently she went on maternity leave for a year. Another manger was selected as the MH program director and the leader of the MHIS project. Some other key managers were also replaced. These changes in the key positions brought the project to halt.

Early in 2010, a steering committee with four working groups was formed from different departments to move the MH health project forward. The steering committee has met once a month to discuss project activities and progress. Process mapping was the integral part of the requirements the vendor has asked for. The RVHS assigned the author as a clinical informatics intern to assist with the business process mapping of all healthcare professionals and allied health workers.

7. The Work Performed by the Author as Health Informatics Solutions

On the first day on the job, the author was introduced to the clinical informatics department staff by his supervisor, the RVHS Clinical Informatics Manager. The author was briefed on the background of the MH project, the MH program details and his responsibilities.

He was provided with a project folder that included some project activities documents e.g. project charter, meeting notes, and progress reports. The author's major responsibilities were business process mapping for all disciplines in the MH program, acquisition of information for process mapping, creation of information diagrams, and facilitating the Information and Communication Technology (ICT) training for computer illiterate physicians.

The MH program Clinical Practice Leader (CPL) was the key person to assist the author in the information acquisition. The author arranged a meeting with the CPL to draw a plan for process mapping. The structure of the MH program was discussed with the CPL and all the discipline/departments were identified, which required process mapping. There were a number of important processes which required process mapping; however, the plan was limited to the healthcare professionals and allied health workers business process mapping. Other processes were not the focus of this project. The following disciplines/departments were identified for process mapping:

Rouge Valley Centenary

 Adult Inpatient:

  Social Worker

  MH Nurse

  Recreation Therapist

  Occupation Therapist

  Psychiatrist

  Crisis Team

 Child and Adolescent Inpatient

Child and Youth Counselor /MH Nurse

Psychiatrist

Outpatient

Day Hospital

Day Treatment

Housing worker

Pathway worker

Clozaril clinic

Psychiatrist

Geriatric Mental Health Outreach Team

Crisis Team

Shoniker Clinic

Social Worker

Child Youth Counselor

MH Nurse

Occupational Therapist

Psychiatrist

Crisis Team

RVAP   Day Hospital

Day Treatment

Crisis Team

Psychiatrist

Depot Clinic

Clozaril Clinic

The author went through a period of learning process to learn the ADONIS, the RVHS standard software, which was recommended by the RVHS for process mapping. ADONIS is a robust open-source software which provides a dynamic environment to draw process maps, and link processes and tasks to sub-processes and documents in other formats. Moreover, business process mapping literature was reviewed in order to get a conceptual understanding of process mapping, its tools and methodologies. Literature regarding clinical information system implementation strategies and challenges was also reviewed.

7.1. Business Process Mapping

Process mapping is an integral part of the requirement gathering for developing health information systems. Information acquisition for process mapping is as crucial as process mapping per se. There are different sources of information which could be used to extract information e.g. healthcare professionals, allied health workers, process performers, assessment tools used during the process of care. Information could be extracted by reading documents, focus group discussions, observation of process performers while they perform the tasks, and individual interviews with the process performers, healthcare workers and managers.

The intern had a comprehensive discussion with the CPL to identify the sources of information and method of collection in the MH program. A mutual agreement was made to

collect information by interviewing a representative of each discipline and reviewing assessment tools and forms which are used during the process of patient care.

One important challenge in the process mapping is to differentiate an activity from a process. Public Health Informatics Institute (2006) defines a business process as a set of activities and tasks that logically group together to accomplish a goal or produce something of value for the benefit of the organization, stakeholder, or customer. It further elaborates that the following components have to exist in an activity to be characterized as a process:

Entity

Transactions

Goal

Objective

Business Rules

Trigger

Task set

Input(s)

Output(s)

Outcome

See Appendix II for definition of each component.

The intern used above criteria to differentiate between an activity and a process. The first information acquisition meeting took place with the representative of social workers in the inpatient department, which lasted one and a half hour. The author used a semi structured questionnaire (Appendix III) to elicit information and went through all tasks and decision steps in the process with the representative of the social workers. Assessment tools and forms used in

the process were also discussed in detail. At the beginning the author was not clear that to what granularity tasks have to be captured in the process mapping. This question was resolved when the author was provided with a few sample process maps, which were developed in the RVHS for another CIS implementation. The process map was created using the ADONIS software. (See Appendix IV for a sample map). The process map was shared with the inpatient social workers for feedback. The map was amended and shared again with the social workers for further suggestions. The process map was amended several times based on the social workers' suggestions until no further amendments were required. Communication was done by telephone, email and sometimes by repeated meetings. The process of process mapping was similar for all disciplines in all departments.

7.2 Process Mapping Tools

There are several process mapping methods and notations to map clinical business processes. The important ones are as follow: (National Training)

- ISO 5807 information processing diagrams, the same symbols used for Flow Charting,

- Yourdon notation for data flow diagrams,

- Gane-Sarson notation for data flow diagrams,

- Unified Modeling Language (UML) that represents several different aspects of processes, and

- Entity relationship (E-R) diagrams that concentrate solely on information content.

The intern used the ADONIS software which creates process maps in the ISO 5807 flowcharting method.

7.3 Information Diagrams and Standardization of Assessment Tools

One important aspect of the process mapping is the information that is generated or used during a business process. Information diagrams are created to highlight the redundancies and facilitate the development of a multi-discipline assessment tool. For more details refer to section 3.

7.4 Business Process Analysis and Redesign:

The purpose of process redesign in a healthcare program is to increase efficiency, save time and reduce costs and delays. Historically, process redesign for quality improvement has been done without application of information technology; however, recent advances in the information technology made the latter an integral part of business process redesign. In process analysis and redesign, the business analyst and the healthcare professionals go through all tasks in the process step by step to identify that which tasks add value to the process, and which ones have little or no value. The tasks with little or no value could be removed or modified. New tasks may be added to increase efficiency in a process. It is not necessary to amend all processes. Some processes may need substantial amendments to become efficient; others may require little or no amendments.

A preliminary process map analysis was performed for some processes. It was out of the scope of this internship project to meet with healthcare professionals again to do a comprehensive analysis and redesign of the processes. This will be a future task for RVHS to analyze and redesign the processes, and define business rules, functional and system requirements. In the preliminary analysis, it was observed that in some processes the majority of tasks were similar. For instance, majority of the tasks were similar in the following processes:

- RVC Mood Clinic

- RVC Day Treatment

- RVC Day Hospital

- RVAP Day Hospital/Treatment

These processes could be merged, and a unified more efficient process could be developed to be used by all these disciplines/departments. Process mapping for all disciplines/departments have been completed successfully except psychiatrists' and crisis teams.

8. Relevance of Work Performed with Master of with the Health Informatics Program

The current business processes in the MH program are inefficient which bring about poor quality of care and waste of time and money. The healthcare professionals and allied health workers perform multiple assessments of patients before provision of healthcare services. The patient information collected during these assessments is redundant in most parts. In order to tackle these problems health informatics solutions are required. Health informatics is application of information technology in the healthcare system to improve delivery of healthcare services and quality of care

One of the major works performed by the author in the RVHS was the business process mapping for all disciplines in the MH program, which was required for designing the MHIS. In order to develop the MHIS for MH program, the RVHS had to re-design the business processes of all disciplines for more efficiency before their incorporation in the MHIS.

The business process maps are excellent tools to visualize how the tasks are done in a process, who are the performers of the tasks, where the tasks are performed, and at what point and time the data is exchanged in the process. The current process map provides excellent

opportunity to analyze all tasks in the process and identify ways to redesign the process for more efficiency. According to the Public Health Informatics Institute (2006), the current process maps have two important goals:

i)   To understand problems with the current processes and avoid repetition in the new redesigned process.

ii)   To measure the existing processes to have a baseline to compare with the future redesigned process.

 According to the Canada's Health Informatics Association (COACH Canada, 2011), the health informatics applications include design, development, implementation, maintenance and evaluation of clinical information systems. The business process mapping is an essential part of requirement gathering for developing and designing clinical information systems; hence, the authors performed a health informatics relevant work in the RVHS.

Another major work the author performed was creation of information diagrams to shed light on the redundant information collected during various assessments performed by healthcare professionals and allied health workers in each department. The creation of information diagrams is an important step in the process of developing a multi-discipline standardized assessment tool which could be incorporated in the MHIS. The incorporated multi-discipline assessment tool in the MHIS could minimize collection of redundant information and improve efficiency, exchange of information and quality of care. Creation of information diagrams to visualize redundancies and facilitate development of a multi-discipline assessment tool to be incorporated in the MHIS is a health informatics relevant work. The COACH Canada (2011) describes that the health informatics solutions involve facilitation and exchange of health related information and knowledge, and improvement of efficiency, patient safety and effectiveness.

The author gained most of the health informatics knowledge, which has been applied in the completion of this internship project, in the Health Information Flow and Standard, Health Information System and Issues, and the IT Project Management courses in Dalhousie University.

9. Physicians' Reaction about Mental Health Information System

Physicians are not employees of RVHS. They provide healthcare services on a pay per service basis. Physician business process mapping is an integral part of the MHIS design process. The author was not able to visit any physician in the mental health program to elicit information for business process mapping. In Shoniker, clinic the manager provided some input for physicians' business process mapping of that department, which may include some errors.

A physicians' representative was a member of MHIS steering committee, and had the responsibility to facilitate meetings between the author and physicians in different departments. According to the author's observation, the physicians' representative did not show any obvious resistance against MHIS implementation in the steering committee meetings. On the contrary he agreed to facilitate the author's meeting with physicians; however, he has never arranged any meetings. Moreover, he was responsible for preparing a schedule for ICT training for those physicians who were computer illiterate. No schedule was prepared for ICT training. According to some RVHS staff members, physicians do not support the implementation of MHIS.

The resistance of physicians against MHIS is not uncommon. There are studies in the literature reporting physicians' resistance against CIS implementation. One study documented failed projects due to resistance of physicians (Gorddard, 2000).

The Implementation of a CIS is not just installation of some hardware and software; it brings about substantial changes in an organization. It affects workers' lives in the work place,

their interaction between each other and with the patients. A literature review of challenges of

electronic medical records implementation conducted by Ludwick and Docette (2008) observed

that physicians' often had concerns about changes in the long time established processes,

increase in the accountability (e.g. physicians have to do the order entry), privacy, patient safety,

provider-patient relationship and liability. They also reported that physicians' resistance could

be more powerful in the organizations that have pay-per-service policy because CIS may

negatively affect the revenue generation and patient throughput especially at the beginning.

Berg (1999) believe that installing information systems in established practices seems to

be a politically textured process of organizational change, therefore, users have to be at the

center stage of this kind of change in order to achieve success.

10. Why the Mental Health Information System project is Facing Challenges

The implementation of CISs requires strong leadership, broad involvement of users and

managers in key departments, and sound change management strategies. Ignoring any of these

elements can lead to resistance, and as a result project failure. Berg (2001) reported in his study

that there are more failure stories of information systems than there are success stories.

According to the author's observation, the MHIS project is facing serious problems due to the

physicians' and other key staff's resistance. Furthermore, the scope of the project has not been

defined well with the vendor. The project has been suspended once again just before completion

of this internship project because of some unresolved issues between RVHS and the vendor

regarding user interface and functionality of the MHIS. Various factors could be the cause of

staff resistance including the followings:

- Lack of consideration of a request for proposal to investigate various products in the market

- The leader of the project was promoted to a higher position, and subsequently went on maternity leave for one year. The new leader has less experience and influence in the MH program.

- Long delay between the vendor demonstration and project initiation process; therefore, the sense of urgency for implementation has died out.

- Replacement of some key managers with inexperienced staff who were not or poorly involved in the project planning stage.

- Departmental silos and poor interdepartmental communications.

- Poor project scope definition. The project does not have enough funds to develop a fully electronic system. The system will be partially electronic. It is not decided yet that which part of the system will be electronic

11. Conclusion

The RVHS is continuously striving to improve its operations and quality of health care and reduce costs and delays. In order to achieve these strategic goals, the RVHS decided to implement MHIS in the MH program. The RVHS contracted the development of the MHIS with the HInext, the vendor of the TREAT system which has already been in use in the MH program for consolidated data reporting to the CIHI.

The project leader was promoted to a higher position and subsequently went on maternity leave after signing the contract with the HInext. The new project leader had little experience and influence in the MH program. A few other mangers were also replaced with inexperienced ones

in the program. The project came to halt due to poor leadership and project management strategies, and lack of interdepartmental cooperation.

A steering committee was created later on to move the MHIS project forward. At this point the author was hired as an intern for developing the business process maps for all disciplines of the MH program. The process mapping information was collected from all disciplines except physicians and the crisis teams, and the process maps were created. The information diagrams were also created to highlight the redundant information collection in various departments. There was significant resistance from some disciplines during information acquisition such as physicians and the outpatient department. The author was not able to meet with the representatives of physicians; however, outpatient department was influenced by the former project leader after she returned from maternity leave in the last few weeks of author's internship program, and subsequently, outpatient manager started cooperation reluctantly.

It was unknown that to what extend users and other key personnel were involved in the selection of vendor and other important project decisions. The outpatient manager had concerns about the vendor and physicians also had some concerns. Some users had questions about the MHIS (e.g. what would be electronic and what would not be? Would they be able to add narrative text if required?). The physicians' resistance is a major issue for success of the project; therefore, bringing physicians on board to support the MHIS implementation is crucial. A successful implementation is not just to enable the system to go live. A successful implementation is the use of the system with full functionalities by all intended users. Lack of cooperation of physicians can fail the MHIS even after it goes live.

12. Recommendations

Adopting a health information system in a healthcare organization is not just buying and installing software and hardware. It is a major change in the social, technical and organizational aspect of the organization. A small change in an organization can bring about staff anxiety; adoption of a health information system is a major change. Addressing socio-technical factors and staff anxiety and emotions are crucial issues. Strong leadership and change management strategies can lead MHIS implementation to success. Kotter et al. (1995) suggests eight steps for leading change in an organization (See Appendix V). Socio technical factors directly affect success of clinical information systems implementation; they could be controlled by leadership, project management, training and standardization (Ludwick & Docette, 2008). The author recommends the following for successful implementation of the MHIS.

12.1 Recommendations for Business Process Mapping

- Physicians' and crisis teams' business process mapping are integral parts of the MHIS project. They have to be completed with cooperation of physicians and crisis team workers.

- ADONIS is a robust dynamic open-source software which can be used for business process mapping.

- Physicians have to be trained in ICT well in advance before the system goes live

- Representatives of all disciplines including physicians have to come together around a table to develop standardized assessment tools.

- A business analyst has to sit with each discipline personnel to review all tasks in the related discipline current process, and redesign the process for more efficiency.

- The business analyst with cooperation of each discipline should develop business rules, functional and system requirements definitions.

12.2 Project Management Recommendations

- The RVHS should assign a strong influential leader with excellent communication skills to revive the spirit of moving the project forward in all key departments.

- All users including physicians have to be involved in the entire implementation process, and their concerns should be heard and solutions have to be sought.

- All decisions have to be made through consensus among users' representatives and key managers.

- Controversial issues have to be clarified at the time of occurrence; ignoring them can bring about strong resistance.

- Communication has to be improved across key departments, and users have to know in detail that what they are getting out of the MHIS project, and what are the strong and weak points of the system

- The scope of the project has to be clarified with the vendor in fine granularities and a written document of the scope and other commitments has to be produced and signed by both parties.

- A physician could be assigned if possible to champion the project. Study has shown that assigning a physician to champion such a project can lead to success.(Poon et al., 2004)

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Appendix I

Information diagram indicating the redundant information collected during three rounds of patient assessment by social worker/CYC and psychiatrist

Intake Assessment by SW/CYC on Phone

A-Contact

B-Presenting Problem

C-Family History: Family members, custody, family support &stresses

C-Family psychiatric history, suicide etc

D-Relevant Medical & Developmental History

D-Current Medical problem, its impact on daily living

D-Pregnancy, Birth, Delivery

D-Milestones, early personality /development delay

D-school attendance, class placement, grade

D-Previous tests result Schools, neuro, psycho

D-relevant social, behavioral functioning

E- Psychosocial history Abuses, neglect

F-Alcohol and substance abuse

G-Current service involve Police, school, welfare

H-Legal History

I-Psychiatric/medical services: Current/previous medication

I-Currently awaiting services elsewhere

J-History of Harm to self or others

K-Consultation/education given by intake worker

Toronto Regional child and Adolescent Crisis Assessment by SW/CYC

Form 1 ☐ Form 2 ☐

A-Background &contact info

B-Other current/ precious service involvement

B-Legal History

C-Chief complaints /Presenting Problem

D- Psychosocial history Abuses, neglect

F-Alcohol and substance abuse

F-Psychiatric/mental health services:pshych & non-psych medications

J-History of Harm to self or others

H-Relevant Medical & Developmental History

H-Milestones, early personality /development delay

H-Childhood injuries, illnesses, surgeries

H-Previous tests result Schools, neuro, psycho

H-Previous tests result Schools, neuro, psycho

H-relevant social, behavioral functioning

I-Family History: Family support &stresses

I-Family psychiatric history, suicide etc

J- Review of past symptoms, Developmental disorder, mania ADHD, ODD,OCD, depression

K- Mental status Exam

K- Clinician Formulation &impression

Initial Psychiatric Assessment by psychiatrist

Patient Id info and Assessment date

Informants

History of Present problem/illness

Previous Psych history

Hospitalization History

Suicidal/homicidal behavior history

Prev/current Psychiat medication history

Family Psychiatric

Medical/surgical Hist

Allergies

History of Seizure

Hist. of head trauma

Last physical check up Lab work up

Developmental Hist Pre/post-natal/Natal

Milestone develop Language/Motor/ temper

History of Physical/sex abuse or

Substance abuse hist

Social Hist/Parental Relationship

Educational History

Quality & quantity of current Peer Relation

Sexually active ?

Outside activities/interests

Legal history/involve

3 Wishes/values/goals

Care taker behavior/ attitude

Mental status exam

Impression/Diagnosis: AXIS I, AXIS II, AXIS III, AXIS IV,

Recommendation/

Psycho-Education

Safety contract

☐ Redundant   ☐ Not Redundant   ☐ Redundant in Two Assessments

Appendix II

Definition of Business Process Components

Entity: A person or a group of people who performs one or more tasks involved in a process. The entities are the participants in the process. Entities are represented by circles in context diagrams.

Transactions: Information exchanges between entities. May also be the exchange of goods (e.g., a vaccine or payment) or services (e.g., an inspection) between two entities. Transactions are represented by arrows in context diagrams.

Goal: The major health goal that the business process supports. The goal is the end state to be achieved by the work of the health agency and should be defined in terms of the benefits provided to the community/population or individual/client.

Objective: A concrete statement describing what the business process seeks to achieve. The objective should be specific to the process such that one can evaluate the process or reengineer the process and understand how the process is performing towards achieving the specific objective. A well-worded objective will be SMART (Specific, Measurable, Attainable/Achievable, Realistic and Time-bound).

Business Rules: A set of statements that define or constrain some aspect of the business process. Business rules are intended to assert business structure or to control or influence the behaviour of the health agency (business).

Trigger: Event, action, or state that initiates the first course of action in a business process. A trigger may also be an input, but not necessarily so.

Task Set: The set of tasks required to fully define the business process.

Input(s): Information received by the business process from external sources. Inputs are not generated within the process.

Output(s): Information transferred out from a process. The information may have been the resulting transformation of an input, or it may have been information created within the business process.

Outcome: The resulting transaction of a business process that indicates the objective has been met. Producing or delivering the outcome satisfies the stakeholder of the first event that triggered the business process. Often, measures can be associated with the outcome (e.g., how much, how often, decrease in incidents, etc.). Please note that an outcome can be, but is not necessarily, an output of the process.
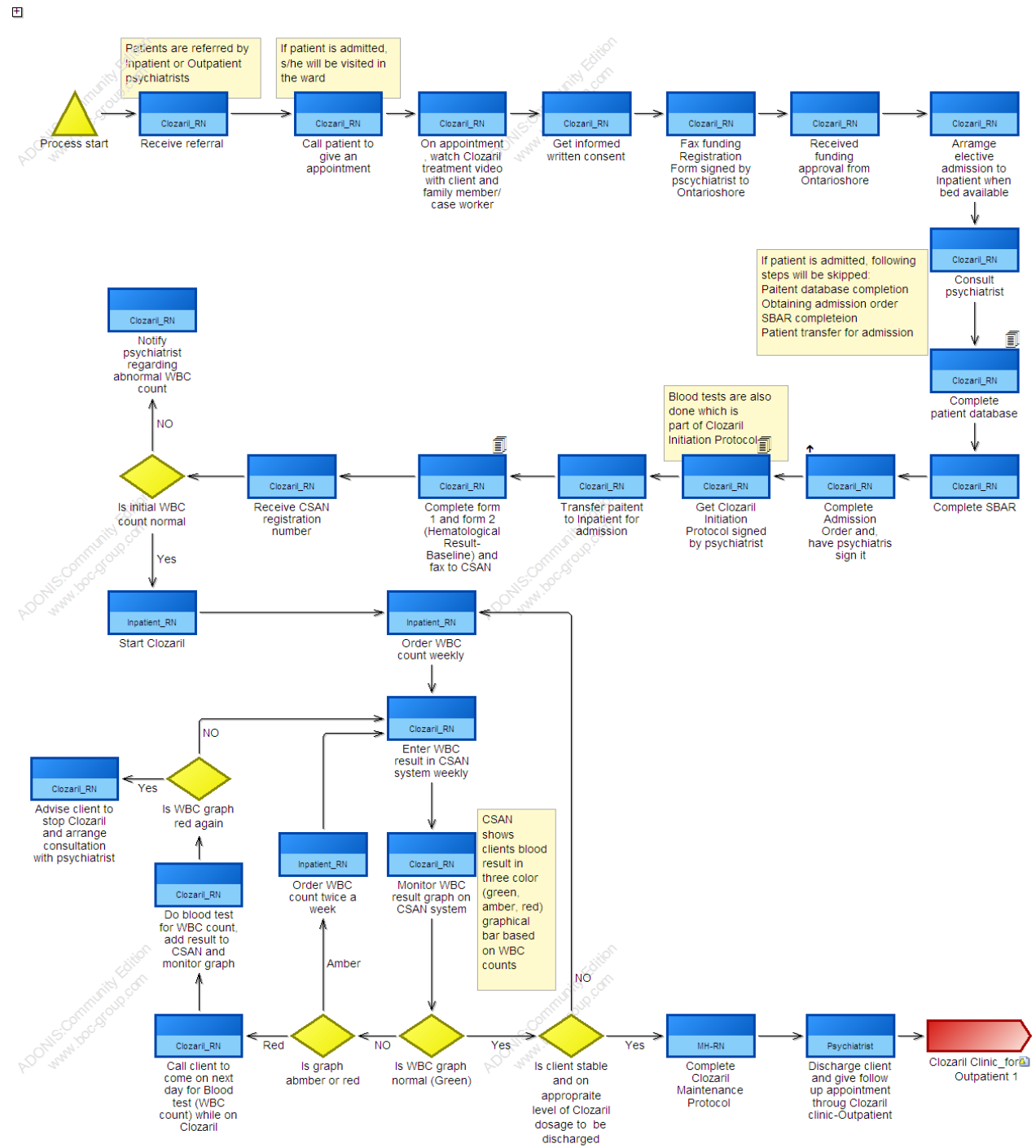
(Public Health Informatics, 2006)

Appendix III

Questionnaire used for process mapping information elicitation

1. How many processes are involved in the discipline workflow?

2. What participants take part in the process?

3. What the steps of the process are?

4. When and where the process start?

5. How each step of the process is performed

6. Who perform a specific task?

7. How many decision points are there in the process?

8. Are there variations/exceptions in the process?

9. Is client referral required for the start of the process?

10. Is any specific assessment tool/documentation form used in the process?

11. What assessment tool/documentation form is used for a task?

12. How the data/information being exchanged?

Appendix IV

The Clozaril Clinic Process Map for Inpatient Clients

Appendix V

Eight Steps to Transforming Your Organization

1. Establishing A Sense of Urgency
Examining market and competitiveness realities
Identifying and discussing crisis, potential crises or major opportunities

2. Forming a Powerful Guiding Coalition
Assembling a group with enough power to lead the change effort
Encouraging the group to work together as a team

3. Creating a Vision
Creating a vision to help direct the change effort
Developing Strategies for achieving that vision

4. Communicating the Vision
Using every vehicle possible to communicate the new vision and strategies
Teaching new behaviours by the example of the guiding coalition

5. Empowering others to Act on the Vision
Getting rid of obstacles to change
Changing systems or structures that seriously undermine the vision
Encouraging risk taking and non-traditional ideas, activities and actions

6. Planning for and Creating Short-Term Wins
Planning for visible performance improvements
Creating those improvements
Recognizing and rewarding employees involved in the improvements

7. Consolidating Improvements and Producing still more Change
Using increased credibility to change systems, structures, and policies that don't fit the vision
Hiring, promoting, and developing employees who can implement the vision
Reinvigorating the process with new projects, themes, and change agents

8. Introducing New Approaches
Articulating the connections between the new behaviour and corporate success
Developing the means to ensure leadership development and succession

By John Kotter, Harvard University, 1995

Acronyms

ACT	Assertive Community Treatment
CE LHIN	Central East Local Health Integration Network
CIHI	Canadian Institute for Health Information
CIS	Clinical Information System
CPL	Clinical Practice Leader
CYC	Childe and Youth Counsellor
ICT	Information and Communication Technology
LHIN	Local Health Integration Network
MEDITECH	Medical Information Technology
MH	Mental Health
MHIS	Mental Health Information System
MOHLTC	Ministry of Health and Long Term Care
RAI-MH	Resident Assessment Instrument-Mental Health
RVAP	Rouge Valley Ajax Pickering
RVC	Rouge Valley Centenary
RVHS	Rouge Valley Health System
TREAT	The Roster of Electronic Assessment Tool
UML	Unified Modeling Language