Needs Assessment and System Design: Implementation of an Electronic Charting and Database System at a Canadian Poison Centre

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I would like to thank all the Specialists in Poison Information, management and support staff at the IWK Regional Poison Centre for graciously working with me throughout this project and Dr. Nancy Murphy, medical toxicologist for continuing to provide space for me to work.

This report has been submitted to Eileen Gillespie for prior approval for submission to the Masters of Health Informatics Program.

Endorsement

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

Executive Summary

The IWK Regional Poison Centre at the time of this paper kept only paper-based patient care records. The growing number of queries regarding statistical data on poisonings in Nova Scotia and Prince Edward Island prompted the plan to implement an electronic charting and database system.

The internship undertaken by the author, was to perform initial tasks related to the implementation of an electronic charting and database system. The author conducted a needs assessment of the IWK Regional Poison Centre with regards to the new computerized system and presented recommendations to the Clinical Leader and Manager of the poison centre along with representatives of the IWK Health Centre Information Technology (IT), Health Records and Quality Resources Departments. Dr. Raza Abidi provided feedback related to the project progress throughout the internship. Through research conducted regarding the current use of electronic charting and database systems in poison centres throughout Canada and the United States the Visual Dotlab system was located and approved for implementation.

In performing her duties at the IWK Regional Poison Centre the author discovered that web technology, which may have best suited the needs of specific healthcare organizations or departments was being under-used based on misconceptions held by both healthcare and IT professionals. This prompted further research into the use of web technology in the healthcare field and advocacy for increased awareness of the benefits of this technology for specified use.

Table of Contents

1. Introduction

This paper discusses the internship undertaken by the author. This includes the author's roles and responsibilities within the IWK Regional Poison Centre and the accomplishments made during the internship period (January 3, 2006 to April 28, 2006).

The task of researching requirements and implementing an electronic charting and database system within a working Poison Centre is not small. As shown by the work performed by the intern it was necessary to carefully examine the existing workflow of the Poison Centre to ensure only limited adjustments would be required.

Although creating a brand new system to meet specifications set out by the IWK Regional Poison Centre would ensure that the new system implemented would be very close to what was envisioned, it is a costly endeavor. With an organization such as a poison centre where each centre collects very similar information in much the same manner it was found to be more appropriate and cost effective to purchase commercial-off-the-shelf (COTS) software. With the limited number of choices available deciding between the options was relatively painless.

At the time this paper was written discussions for augmentation of the system slated for implementation were promising. These augmentations may help the COTS software better meet the needs of the IWK Regional Poison Centre.

The experience had, by working through the process of converting from a paper-based system to an electronic system at the IWK Regional Poison Centre was documented by Sarah Wanderer and Eileen Gillespie as a short paper submission to the 2006 International Symposium for Health Information Management Research [1] (found in appendix C of this document).

Throughout the internship a theme emerged regarding the use of web-based applications in the healthcare field. More specifically, regarding applications that housed patient records (personal patient information). The author found that many healthcare professionals and Information Technology (IT) specialists were somewhat hesitant towards the use of a web-based application that contained patient information. This hesitation may have resulted from misconceptions on the part of the healthcare professionals with respect to secure access of these systems. Misconceptions may have also existed on the part of the IT specialists relating to the actual privacy policies and the requirements of the IWK Regional Poison Centre for this new computerized system with respect to maintaining efficient workflow.

2. IWK Regional Poison Centre

The IWK Regional Poison Centre is a department within the IWK Health Centre. The poison centre is responsible for handling emergency poisoning or toxicology related situations in Nova Scotia and Prince Edward Island along with some incidents occurring in New Brunswick. The poison centre staff members are Specialists in Poison Information (SPI) or Certified Specialists in Poison Information (CSPI). All SPIs/CSPIs have a background of approximately ten to fifteen years in clinical care as registered nurses (RNs) or pharmacists and lengthy training periods to become SPIs/CSPIs. The poison centre receives calls from members of the public and healthcare professionals. The SPIs use their knowledge of toxins and treatments along with information gathered from databases, books and medical consultants to appropriately assess the patients' condition, and give recommendations for care and treatment. The IWK Regional Poison Centre is also involved in public education and awareness with regards to toxins and poisonings and the SPIs answer wide ranges of non-emergency questions as well.

There are approximately ten to twelve SPIs employed at the IWK Regional Poison Centre and approximately 10,000 toxic exposure calls are handled each year. There are six medical consultants associated with the IWK Regional Poison Centre all of whom are emergency medicine specialists, including a medical toxicologist (the medical director of the poison centre).

At the time of this paper the IWK Regional Poison Centre was using computers for research purposes, to retrieve information about specific toxins. The information collected about each patient at the time of the call was recorded on a paper chart. Specific data items were extracted manually for the purpose of statistical analyses. These items were entered on another paper-record in a tally format and later transcribed to a rudimentary Microsoft Excel database.

The need for an electronic charting and database system became apparent as the poison centre was queried on an increasing basis regarding specific toxic exposure statistics. The initial plan for the electronic charting and database system was to create a database based solely off the existing paper chart. A number of adjustments were slated to be made however to limit typing and add more menu selection capabilities. The initial work towards implementation of the system involved the poison centre staff writing descriptions for the data fields to be present, including the type of field and the data options (e.g. drop-down selection with options A, B, C and D).

3. Health Informatics Internship

3.1 Roles and Responsibilities

At the time of this paper the plan for implementation of an electronic charting and database system at the IWK Regional Poison Centre involved two consecutive Health Informatics interns beginning in January of 2006. The author of this paper (and first intern) was responsible for the initial research prior to creating or purchasing any software. The author was tasked with determining the requirements of the electronic charting and database system (specific to the IWK Regional Poison Centre) as well as researching current systems in use within similar organizations across Canada and the USA. This included the examination of the coding/classification schemes in use for toxic substances. Subsequently, the intern was asked to establish which of the available coding schemes (if multiple schemes existed) would best meet the requirements of the database system, and alternatively if a new classification system should be created. The intern was given material related to a cancelled project, a (Canadian) national database for poison exposure information known as Prodtox. This material was to be reviewed to ensure the plans for an electronic charting and database system at the IWK Regional Poison Centre would be compatible with a future national database (a continuation of the previously cancelled Prodtox). In furtherance of this task, the author was asked to contact Mr. Derek Daws of the British Columbia Drug and Poison Information Centre. Mr. Daws is directly involved with the management of the ProdTox program.

Based on research conducted, the intern was expected to report on the most appropriate database system and user interface type, either purchased as commercial-off-the-shelf software or a uniquely created system. The intern was required to informally report these recommendations to the direct supervisors Eileen Gillespie, Clinical Leader and Dr. Raza Abidi, Director of MHI at Dalhousie. A more formal report of findings was to be made to the manager of the IWK Regional Poison Centre, and representatives from the IWK Information Technology, Health Records and Quality Resources Departments.

The author was given the responsibility of creating preliminary designs for a database to be used for an electronic charting and database system in accordance with the aforementioned requirements, to prepare for the event of creating a unique system for the IWK Regional Poison Centre. Finally, the intern was asked to complete a preliminary privacy impact form, perform data entry for all Nova Scotia, Prince Edward Island and New Brunswick hospital information as well as create a computerized version of the IWK Regional Poison Centre treatment recommendations as a small extra project.

3.2 Achievements

Initially the author discussed requirements with the poison centre staff (SPIs) and observed general workflow. Based on these discussions and observations along with

information from the ProdTox project initial requirements were created and may be seen in appendix A of this document. The author met with Candace Donovan a database administrator/manager in the IWK Health Centre Information Technology Department. Candace was previously contracted to create an electronic chart for the poison centre. The user interface form was to be directly based off the current paper chart. Information for the data fields was supplied directly from the SPIs in the poison centre.

An initial needs assessment lead the author to make recommendations towards a web-based application. These recommendations however were amended after research of systems in use throughout the USA and Canada was performed and the Visual Dotlab system was discovered. The use of a web-based interface remained the first choice for a backup plan and is discussed further in Appendix B. The recommendations were formally discussed at a meeting on February 8, 2006, involving the manager and the clinical leader of the IWK Regional Poison Centre, the director and manager of the Information Technology department and representatives from the Health Records and Quality Resources departments of the IWK Health Centre. The author of this paper presented the findings discussed in Appendix B during this meeting however the document was not formally submitted.

Although the author made recommendations early in the process for purchase of COTS software it was necessary to begin design of a database system. This would ensure that the list of requirements of the IWK Regional Poison Centre was reasonable and encompassed by the system to be implemented and that the project would move forward in the event that a system was to be developed rather than purchased. The tables of the database were designed along with the relationships between the main tables. The designs may be found in appendix D of this document.

During the course of the internship the author was given the opportunity to meet with representatives from 911 to discuss how the 911 database and calling system works and a possibility of receiving data directly from the 911 dispatcher. At the time of this paper there was no concrete plan to have the incoming electronic charting/database system accept data directly from 911 dispatch, however it was still an option to be considered. The author was also given access to a demonstration version of Computer Automation System's Toxicall (the most widely used poison call tracking system in the USA at the time of this paper). The use of the Toxicall system allowed the author to better assess the way in which a computerized charting system would work in relation to the needs of the IWK Regional Poison Centre and any workflow adjustments that would be required with implementation.

Further into the internship the author was able to gather more information about the Visual Dotlab (VDL) system directly from the creator, Terry Carlson, PharmD. This information was crucial in the decision to move forward with a plan to purchase this software. Terry Carlson is a Certified Specialist in Poison Information and has many years of work experience in a poison centre. This experience gave Terry Carlson unique insight into the workflow of a poison centre while he was creating the VDL system. The

intern arranged multiple conference calls and an online demonstration of the VDL software for members of the IWK Regional Poison Centre and IT department.

Smaller accomplishments also include the completion of a preliminary Privacy Impact Assessment, a list of recommendations for the supervisor to consider when reviewing the VDL system in use at the Ontario Regional Poison Information Centre, data entry into a small database of hospital information and the beginnings of a small side-project to make an electronic version of the IWK Regional Poison Centre's Treatment Recommendation form. The treatment recommendation form project was discontinued however. It was determined that the VDL system would deliver a similar service as the online treatment recommendation form. The privacy impact assessment may be viewed in appendix E of this document.

3.3 How work related to Health Informatics

This internship gave the author an opportunity to work in a non-traditional clinical setting. With a background in Information Technology this experience was invaluable while trying to link health related and IT education. The experience with the IWK Regional Poison Centre linked many of the courses from the Masters of Health Informatics (MHI) Program at Dalhousie together into one project. The course in Health Information Flow and Use gave students a background into the Canadian Health Care system and the skills to properly assess workflow and information flow through a healthcare agency or facility. This knowledge was important to the intern while examining the workflow of the IWK Regional Poison Centre and considering workflow adjustments while determining system requirements for the project. The Fundamentals of Clinical Care course gave MHI students with little or no healthcare background a small sample of healthcare related decision making skills and the ability to understand the terminology more clearly. This training along with some previous experience with emergency response allowed the intern to properly converse with the poison centre staff including nurses, pharmacists and physicians to ensure that their suggestions or concerns were properly met. The education in Information Technology Project Management was also invaluable in this position.

Working in a project-oriented environment is much different than working with ongoing tasks. The Health Informatics field at this point in its lifecycle often involves project-oriented positions. Getting involved in a short-term project involves jumping directly into work with little time to familiarize oneself with the organization and work environment. This along with collaborating with individuals who may be working on a very different timeline may be challenges a Health Informatician must face. The study in data mining was useful for this particular project because a new database was being designed. In order for appropriate knowledge gain from an electronic charting and database system the data collected must meet a specific minimum dataset, and the design must be such that proper data mining techniques may be incorporated for information retrieval. The technical knowledge of data mining taught in the MHI program ensured the intern was effective for

this task. Finally, the Knowledge Management course was particularly informative and helpful for the author while working through this project.

The realization of the need to use the information gathered by the poison centre for learning purposes was crucial to the initiation of this project. Knowledge gained by the data collected in the past was minimal and disjointed, with little to no possibility of knowledge sharing. The significance of knowledge sharing and the best methods to do so were important considerations throughout the IWK Regional Poison Centre project. In medicine, traditional knowledge gain occurs through experience or clinical practice (tacit knowledge) and through personal study of journal and textbook publications (explicit knowledge) [2]. The tacit knowledge held by the SPIs and medical consultants acquired by experience through dealing with toxic exposures may be lost if not transferred in someway to explicit knowledge. Interesting cases are often written up in journals in order to prevent the loss of tacit knowledge and transform that knowledge into a format that can be shared with many colleagues. This is specifically important for medical events that occur infrequently. Creating a database of information about toxic exposures is another way in which one can convert tacit knowledge to explicit. When the data collected is placed in a paper-based database with no effective method of data retrieval the data cannot be processed and transformed into knowledge. Statistical data cannot be analyzed to determine patterns and ineffective methods of treatment may go unnoticed. In order to use this information to create guidelines for medical care and to practice evidence-based medicine it may be necessary to computerize the database. The intern gained valuable experience in knowledge management through this project. Although the electronic charting and database was not implemented during the first internship the author was able to apply previous education in knowledge management fundamentals to the project by maintaining knowledge transfer and dissemination as a significant focus of the end system.

The experience gave the intern the opportunity to work with representatives of multiple disciplines within the IWK Health Centre and the healthcare field in general. This experience allowed the author to gain new perspectives with regards to the IWK Regional Poison Centre project and the practice of Health Informatics in general. The insight acquired will allow the intern to work more effectively as a Health Informatician in the future.

4. Web-based Applications in Health Care

Web-based applications are those, which are viewed in a web browser. This may be as simple as a webpage displaying textual information only. A web-application may be a more complex interface for a back-end system such as a database as well.

4.1 Misconceptions and Hesitations

Based on the information gathered the author determined that a web-based interface for the electronic charting and database system would nicely suit the needs of the IWK Regional Poison Centre. The suggestion was made to members of the Information Technology, Health Records, and Quality Resources departments at the IWK Health Centre and was met with some hesitation. The concern surrounded privacy and security issues and the dissemination of information over the Internet. On the part of healthcare professionals with little Information Technology (IT) background the concerns related to the technology and the imagined or exaggerated lack of security. On the part of the IT specialists the security features of the technology may have been better understood but there may have been a lack of understanding with regards to the specific needs of the IWK Regional Poison Centre and the related workflow.

The problem identified is the under-use of such tools as web-applications in healthcare due to misconceptions and overstated concerns. Although it is necessary to ensure that any application containing sensitive data, maintain a high level of security, it should not prohibit the use of web-based interfaces within healthcare. One misconception discovered was that many healthcare professionals with limited technological expertise believe that a web-based application is always available on the Internet. After explaining that web-based applications can sit on an intranet rather than the Internet many people became much less concerned and even considered web-based applications as a possibility for use within healthcare.

4.2 Current Use of Web-based Applications in Health Care

In healthcare web interfaces are used to deliver information to patients and healthcare professionals alike. Web-based interfaces enable information to be easily distributed to many users across distance and different platforms. It eliminates the necessity to install complicated software and thus reduces demands for technical support. Web-interfaces may be used to collect information as well, by having a form-based input system with the data parsed and stored in the backend of the system.

Many organizations use websites to deliver information to patients and healthcare professionals. Databases of online journals such as PubMed [3] are available to provide healthcare professionals with published information to increase their knowledge base and aid in patient care and research. One study showed that a continuous internet-based education program for asthma patients as an augmentation to a standardized patient management program to be an effective approach to reduce the utilization of healthcare services [4]. Thomson Micromedex [5] is an online collection of databases used to help both healthcare providers and consumers find pertinent health related information. Micromedex is generally used by healthcare professionals and is available through a license agreement purchased by the Nova Scotia Department of Health to healthcare facilities across Nova Scotia. The IWK Regional Poison Centre uses several of the

databases contained within Micromedex on a regular basis to provide accurate toxicological and treatment information to healthcare professionals and patients. Some portions of Micromedex are available through the websites of healthcare facilities (such as the IWK Health Centre [6]) for use by the public. More in-depth databases within Micromedex are reserved for use by healthcare professionals to aid in the practice of evidence-based medicine [5].

The use of the Internet and web technology to disperse health and medical information has prompted much research in the area of web-design for these purposes as well as the use of web applications for other health related tasks. In the earlier years of web applications in medicine researchers at the Stanford University School of Medicine created the MedWorld project to examine the design process for medical education-specific web applications [7]. MedISeek [8] is a framework for the storage, description and finally retrieval of medical images on the web. With the increasing number of web sites containing medical information (and more and more containing non-peer reviewed information) the MedISeek researchers set out to solve the problem of retrieving relevant images and their associated textual description and related information [8]. The prototype allows for peer-review [8]. Case-based reasoning (CBR) systems are also making their way onto the web scene [9]. A web-interface for the Image and Diagnosis from Example in Medicine (IDEM) CBR System was created [9]. This project brought together the tacit to explicit knowledge transfer of a case-based reasoning system with the accessibility that the Internet provides [9].

More recently, electronic health record (EHR) systems have been moving into the web-based forum. The Internet may provide an easy way for secure access to EHRs outside the healthcare facilities [10]. With the greater distribution of related healthcare facilities and the need for inter-facility connectivity remote access to EHRs are becoming a necessity [10]. An example system using the web for an EHR system is the He@lthCo-op system [10].

4.3 Problem Solution

Electronic health records may be used to monitor patient care and to retrieve statistical trends and valuable evidence for or against specific treatment strategies. With the new way in which healthcare professionals work and share information it is difficult to use these valuable repositories of information effectively and efficiently if they are restricted to use within the confines of each individual healthcare facility. The IWK Regional Poison Centre is a good example of a healthcare organization that would benefit from the ability to access their electronic records remotely. In the IWK Regional Poison Centre currently, the Specialists in Poison Information (SPIs) work exclusively from within the poison centre however there are a number of medical consultants working with the poison centre on a strictly remote basis. Information transfer would become more efficient and effective if these consultants could have access to the poison centre’s repository of data from outside the IWK Regional Poison Centre facility.

The problem identified in this paper relates more to changing the mind-set of stakeholders involved in implementing such systems as electronic health records rather than creating a specific technological solution.

Although web-based medical applications are becoming more widely used the fear of security breeches and lack of privacy remains. It is important to have Health Informatics professionals working with the Information Technology and Medical specialists involved in health information system design and implementation to ensure that the requirements of the specific health organizations are fully met using all available technology to its potential including web-based technology. The professionals involved must be educated on the technology, the need for security precautions and the ability to provide safe and easy remote access once these precautions have been taken. The disconnect between Information Technology and Medical specialists must be bridged to effectively assess the needs of the organization in relation to the health information system being implemented and the technology available to meet these needs.

As web technology is used in the implementation of electronic health/patient records and for other health related purposes the experience and results should be documented and distributed to organizations in a position to follow suit by implementing similar technology.

5. Conclusions

The internship experience was both challenging and rewarding. The work accomplished was important to the completion of the final project objective, which is the implementation of an electronic charting and database system. As discovered (prior to a great amount of work in the wrong direction) by the IWK Regional Poison Centre it is important to plan and research a project before jumping into design, creation and implementation. Although planning continues through to the end of any project the first intern and author of this paper completed the official planning and research stage of this project.

The project is now at a stage where work is being done directly leading to implementation. This work involves data entry to allow for a smooth transition and the intern can hand over the project to the IWK Regional Poison Centre and the incoming second intern.

Along with the completion of designated tasks, such as a needs assessment and detailed research into available software and the use of electronic charting and database systems by other poison centres, the intern has given suggestions for augmentation of the incoming software. These augmentations include a web-interface for medical consultants, which may help healthcare professionals within the IWK Health Centre better understand the web technology available.

6. Recommendations

The IWK Regional Poison Centre has moved into a new forum for evidence-based patient care. The incoming electronic charting and database system must be used not only as originally intended but also beyond. The system when fully functional will allow for increased efficiency and better patient care if the data collected is compiled and transformed into explicit knowledge.

The project will not end after the departure of the second intern. The system must be kept up-to-date to meet the changing needs of the IWK Regional Poison Centre. Allowing access to the medical consultants at the Queen Elizabeth II Health Sciences Centre and eventually from their homes will create a better workflow, increased efficiency and knowledge gain. The medical consultants will be able to review cases much sooner than at present and provide valuable feedback to the Specialists in Poison Information.

It will be invaluable for the incoming intern and the exiting intern to discuss the project and share the information collected and further recommendations. The author would also benefit from discussing the project with the incoming intern to further her own knowledge. The author would also personally gain from the experience of viewing the final system at work in the IWK Regional Poison Centre although not directly involved in this portion of the project.

7. References

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8. Appendices

8.1 APPENDIX A

List of features required for the IWK Regional Poison Centre electronic charting and database system (Not previously submitted)

Created by: Sarah Wanderer
January 5, 2006

The database will be a back-end system with a front-end form. The form is designed to contain all **necessary** information contained within the present patient care/phone call paper-based record form.

The form must have an appropriate layout to facilitate minimal workflow changes. The form may be contained on multiple pages however, the information must be readily accessible throughout the entire process; otherwise a one-page format may be more acceptable.

The information must be searchable and easily retrievable once stored. The statistical data collected/reported should encompass the minimum data set as determined through the ProdTox process.

The database should be secured through password access and other means, however the system must be useable over the Internet or an intranet. Different user types may be necessary for users gaining access for statistical reporting only and those users that have access to enter or edit patient information.

The ability to delete records may be an issue to consider if the ability exists how many warnings and checks should appear before deleting a record or there is possibility of disabling delete for the database or not putting a delete function in the user-interface.

The purpose of this database is not to house information about specific products rather patient information and may connect to one or more databases about product information. The database may have the ability to have a product information section added in the future that could be update from the patient care information.

The follow-ups must be easily retrievable for the day, week, etc. The physicians must be flagged either upon login to the system, by email or both when they have patient records to review and make notes. If the notes must then be reviewed by the poison centre nursing staff there must also be a flag within the system set to ensure the nurses are aware

of notes to be reviewed, the system must be able to keep track of all SPIs who have reviewed the notes in order to remove the flag.

Time stamp must be a feature of the system for the call only, if time stamps for other areas such as physician or nurse review are desired that should not affect the time stamp designated for the initial call.

The database must also have options to review, create new chart, create reports, etc.

Coding system to be used may be similar to the TESS system, the AAPCC system or perhaps another coding scheme.

Abbreviations allowed must be from an approved list.

A search cannot be done on the long text based data currently other than the coded data. However, the textual data may be easily retrieved through searches on other data fields, such as coded data fields, names, case number, date, time, place of caller, etc.

Storage must be considered, the type of database may be dependent on the storage availability.

Animal exposure cases may be kept in the same repository or a different repository for purposes of separation.

Information should be sent directly via email, or faxed to a hospital requiring information for a current or incoming patient.

The particular statistical reports to be generated must be specified. New reports may be added or ad hoc style reporting should be possible however for simplicity annual reports that are required will be specified up-front.

Nine different types of reports were specified for ProdTox:

- Age and Gender Distribution of Human Poison Exposure Cases;
- Reason for Human Poison Exposure Cases;
- Distribution of reason for Exposure by Age;
- Therapy Provided in Human Exposure Cases;
- Substances Most frequently Involved in Human Exposures;
- Substances Most Frequently Involved In Pediatric Exposures (Children under 6 Years);
- Substances Most Frequently Involved in Adult Exposures (>19 Years);
- Demographic Profile Exposure Cases by Generic Category of Substances and Products: Non-pharmaceutical Products; and
- Demographic Profile Exposure Cases by Generic Category of Substances and Products: Pharmaceutical Products.

Reports above are selected for the specific report date and areas.

ProdTox had the intention of a notification system regarding X number of cases dealing with Y classification of products within a predetermined period of time. If such a situation exists an email notification would be sent to a specified person, this might be something to consider for tracking outbreaks.

A Help page would be important for any minor trouble shooting, or questions regarding system use. Any major problems would need to be referred to the Help Desk.

Audit logs were to be a security feature of the ProdTox system and would be a useful feature of this database to view who is using the system, how, when, etc. Events logged:

- Job or process status (entry, initiation, completion, deletion, restart, and abort);
- File, volume, and database accesses (open, close, create, delete, rename);
- Communications device connect, disconnect and re-configuration;
- Network status messages;
- User sign-on and sign-off;
- System operator commands and responses;
- System and subsystem status messages (start-up, shutdown, abort);
- System-generated messages or requests regarding configuration changes;
- Changes to system logging facility status (start, stop, alter, print, dump, delete, rename and overflow);
- Changes to access control information;
- Changes to lists of authorized users;
- Detected security incidents; and
- Use of privileged or powerful software.

An incident or error report form sent directly to the IT department member in charge of maintenance of the system may be a good way to acknowledge and repair any bugs or problems within the system.

It would be useful to use an expansion operator to locate items even with misspelled queries.

8.2 APPENDIX B

Initial Recommendations for the Electronic Charting/ Database System: IWK Regional Poison Information Centre

Prepared by:
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Initial Recommendations

The requirements of the database/electronic charting system have been thoroughly discussed with several members of the Poison Centre team. Based on these discussions, several observation sessions (in the Poison Centre) and research conducted, a system has come to light that looks like it would be the best product to suit the purposes of this centre.

A number of considerations are involved in this initial recommendation. The IWK Regional Poison Information Centre is interested in remaining mainstream with regards to data collection, system design and configuration. This interest is sparked by the possibility of a national database and a need to provide information to multiple sources in the future. After speaking with Derek Daws from the British Columbia Poison Centre it is clear that the individual poison centres will be required to submit information to the ProdTox database via textual data delimited into specific fields in a specific order. This allows the individual poison centres to use different database systems while still being able to contribute to the national database. The ProdTox database will however be built on an Oracle platform.

Information From Other Canadian Poison Centres

The four main poison centres in Canada aside from the IWK centre were polled for information regarding current database systems. The information is charted below in table 1.

Based on the information provided from the poison centre in Toronto the Visual Dotlab system was found and the available information was reviewed. Unlike the other systems in use around Canada this system is comprehensive and has almost all the features that are present in the IWK Poison Centre's list of requirements.

The system in use in Quebec is antiquated and therefore would not be considered for a project of this sort. The Quebec Poison Centre has expressed interest in upgrading their system, however as of late have not moved forward with any plans to do so. The Quebec Poison Centre was also very involved with the original ProdTox plan for a national database and would be interested in taking part if such a system were to be put in place in the future.

The system in use in British Columbia is based in Sybase, which is a very good/mature database system. The system does not connect with any other systems, unlike the Visual Dotlab system, which takes information directly from Micromedex reducing manual work from the Specialists in Poison Information (SPIs). The BC system however, it is not used by the SPIs but rather by a data entry person and a report writer only. The interface is not conducive to good workflow while used by the SPIs during a call. The current routine is to hand-write the call information and twice daily review the calls for quality

assurance. Finally, a data entry person enters the verified calls into the database. Currently, the BC poison centre is working on a plan to alter the system to allow SPIs to search the system for information. They are also planning to rebuild the interface to allow the SPIs to enter the information at the time of the call. This interface re-work does not have a specific timeline in place. It is unknown whether remote access will be possible. There is no information from the Calgary Poison Centre regarding a database system at this time. This information is pending and must be thoroughly reviewed and considered prior to any final recommendations/decisions.

The satisfaction of the members at the Toronto Poison Centre regarding the Visual Dotlab system is also under consideration. A response to this question is pending. It is most likely true that Dr. Nancy Murphy has been exposed to the Visual Dotlab system during her fellowship in San Francisco, California, her opinion of the system would also be appreciated and highly regarded.

A partial list of features of the VDL system is found in appendix 1. This document shows a number items some of which were requested specifically from the IWK Poison Information Centre and others that are either, interesting extras or most likely not necessary for this centre. There are questions to be considered along with the list of features, which are integrated into the document.

One major consideration for the VDL system is its use of Terminal Server for remote access. This is an important item to discuss with the Information Technology Department to determine if this would be feasible. It will be necessary to receive more information on remote access for this system and if Terminal Server is the only method or if there may be other options to be considered for use with this system.

Other Options

Other options for the database were considered and may possibly be under review again if the option to purchase VDL fails, or is determined to be inappropriate. The first option considered was a SQL server database with a Microsoft Access front-end. This set-up although currently in use by a number of systems in the IWK Health Centre is not ideal for the needs of the poison centre. While SQL Server is a powerful database management system (DBMS), Microsoft Access was not designed for use in a professional setting. It has become widely used as a front-end for the client-server based SQL server in a number of settings because of the available update-wizard in MS Access. Unfortunately, MS Access remains slow and limited for these purposes. It is not easily accessible through remote connections such as VPN (virtual private network), as the system attempts to send the entire database through the network; this is inefficient for small databases and unusable for larger databases.

Table 1: Systems in use at Canadian Poison Information Centres

Questions	IWK	Sick Kids	Quebec
Poison Centre uses Electronic charting/ database	NO	YES	YES/With paper as well
What kind of database is being used? (OTS or Not)	N/A	OTS Created by VDL Enterprise: developed by Terry Carlson in California SQL Server backend/Visual Foxpro Frontend, data-centric environment, also uses Omni-Audit to create audit logs of edits to records, uses optimistic table buffering to ensure limited to no errors in update tables with mutliple users, tested for upto 5 people entering data on the same case simultaneously: Cost: $12000-$15000 USD for initial installation and training, and $3000 USD per year for support and upgrades	DOS based system: With an optical reader for bubble sheets, textual notes can be inserted manual but cannot be searched upon. Product information, patient information and treatment protocols are found within one system
Web-based or Not?	N/A	Not: uses Term Serv for remote access	NOT
Does the system interact with other systems?	N/A	Interacts with Micromedex	Unknown
Intend to put in an electronic system?	YES	N/A	Would be interested in upgraded
Coding system	Unknown at this time	AAPCC/TESS	Use Registration numbers (e.g. DIN for drugs, and pesticides) Also use CAS (Chemical Abstract System)
What stats?	See Report	AAPCC/TESS Reports Plus: calls per hour, calls per hour per SPI, annual calls per SPI, calls managed in an HCF in 6 hour time blocks; AND ACD telephone system generates: list of telephone calls per hour, wait times, average length of calls, calls abandonned, etc. Has 50-60 pre-generated reports that come with the software, and the ability to generate and save any report you require.	Can search on phonetics or by any word in name of prodcut, on date/time (truncated capabilities), etc. Reports all done manually, can be done on an adhoc basis. Small reports created
Ad-hoc capabilities?	NO	YES: Report writer in the IS department generates ad-hoc reports	YES

Table 2: Systems in use at Canadian Poison Information Centres Continued

Questions	Calgary	BC
Poison Centre uses Electronic charting/ database	YES/With paper as well	YES
What kind of database is being used? (OTS or Not)	Built in-house created in Foxpro (mostly likely DBMS contained within Foxpro as well, will check into SQL back-end possibility) In-house IT person involved with maintaining and updating the system on a regular basis. Considered by staff to be clunky/ very old (GUI not entirely intuitive)	Sybase Engine, built specifically for the BC poison centre
Web-based or Not?	Not web-based no remote access available	Not web-based, SPIs do not have access to ad-hoc or other searches, specific person in charge of creating reports Data is entered by a data entry person from paper-based records twice daily, after quality monitoring
Does the system interact with other systems?	Unknown (unlikely)	NO
Intend to put in an electronic system?	N/A	Intention to allow SPIs to perform searches on the database in the near future Intention to have SPIs input the data directly into the system when an interface can be built allowing for limited alteration to workflow
Coding system	Unknown	Based on the AAPCC coding scheme: are using the 6-digit numbers
What stats?	Has pre-created reports unknown what statistics are being measured	See Report
Ad-hoc capabilities?	YES: The IT person is involved in creating reports.	Minimal, no access for SPIs

Tailor-made Front-end Options

A more appropriate approach would be to use a standard client-server based DBMS such as SQL server, Sybase (used in BC) or Oracle, with the use of a tailor-made front-end system. The tailor-made system may be made as a web-based system to be used through a web-browser or a stand-alone desktop system. Initial recommendations would be towards a web-based designed for several reasons:

- Remote access is much easier, whether allowed currently or to be used in the future;
- Installation of the system is not required on individual systems;
    - This makes for easier access to the system from an alternate computer as well as fewer problems than may occur with the system installation;
- Web-based systems can be very comprehensive, easily integrated with other database systems, as well as requiring fewer resources to create;

- Web-based systems are also advantageous when multiple platforms are present, such as Windows, Unix, Macintosh, etc. Although this might not be a necessity for the poison centre currently it is much easier to allow the use of different types of platforms with the system if there is a web-based option;
- One issue often discussed when considering web-based versus desktop based systems is security,
    - Although there may be more options available to secure a desktop-based system, there are many options available to secure web-based systems,
    - When secured properly the web-based system will have a more than adequate level of security for the poison centre's purposes
- One misconception with web-based systems is: the database would be available on the Internet; this is not necessarily the case however. The system can be an intranet site viewed only from within the Health Centre.

Based on the nature of the poison centre, new hardware is not necessary for the purchase or creation of a database system. The desktop computers currently in use within the poison centre are fairly new and meet any requirements at this time. It is not necessary to implement the use of laptops or tablet PCs. The SPIs do not travel to different areas for work other than occasional visits to patients in the Emergency Department.

Appendix 1

WBM Software
Visual Dotlab©
Features and Functionalities

Visual Dotlab© (VDL) is a comprehensive on-line patient management tool for Poison Control Centers. Visual Dotlab© is the 32-bit, Y2K compliant, GUI replacement for the 16-bit DOS DOTLAB© software package that has been in use since 1989. Visual Dotlab© is a client-server, transaction-based application that uses Microsoft SQL Server® as the data 'back-end'. The user 'front-end' was created using object-oriented, data-centric, Microsoft Visual Foxpro® and a powerful and well-tested system framework package called Visual Promatrix©.

The developer of Visual Dotlab©, Terry Carlson. Pharm.D., has 15+ years of 'on-the-phones' Poison Center experience. Since 1989 he has been writing and enhancing the DOTLAB© system for Poison Control Centers. Since 1997 he has been the data systems analyst for the California Poison Control System. Visual Dotlab© is specifically designed to allow the poison specialist (CSPI) maximum flexibility in initiating, managing and documenting Poison Center exposure and information calls. The following are just some of the features that maximize the use of the CSPI's time and give Poison Center managers total control over their case data:

- **Integrated zip code tables** bring across area codes and county information upon the entry of caller zip code. City name can also be incrementally searched to deliver zip and county information.
  - ➢ **Can this be altered for Canada?**
  - ➢ **Can we use area code and exchanges instead?**
- **Service area hospital information is integrated into case entry** and incremental search capabilities provide more flexible access to this information. The scope of hospital information has been greatly expanded in VDL. There is now no limit to the number of hospital phone numbers, addresses or personnel that can be stored. A powerful new feature**, unlimited entry of specific hospital laboratory capabilities**, has also been added.
  - ❖ **The Education Interface** has also been greatly enhanced. Order processing, billing and payment tracking can all be managed from within the enhanced interface. Materials requests as well as media, lecture and any user-defined requests are supported.
  - ❖ **The 'staff' information** database has been expanded to accept any and all addresses and phone numbers that may apply to any given staff person as well as any other additional information such as hire dates, evaluation due dates, etc.
- **VDL supports multiple open case entry forms**. Each form can contain different sets of data with a single toolbar controlling the form that is active ('has focus').
- **Case follow-up tracking** has been improved and enhanced. Case follow-ups are tracked via a separate follow up form with multiple sorting and reporting options. The

follow up form and the case entry form(s) are linked. If a user selects a case needing follow up on the follow up form, then moves to a case entry form, the case entry form record pointer will move to the appropriate 'follow up' case.

- **We require more information!!**
- **Are the old inputs viewable, other than in audit logs?**
- **Are you allowed to change whatever you want?**

- **No limitations** on the number of substances that can be captured! If a patient ingests 12 substances, you can fully document (including mg/kg calculations) all 12 substances (including subcomponents of mixed products). Substances involved in an exposure are rated (tox. hierarchy) by the user from most toxic to least toxic.

- **Are mg/kg calculations available for all subcomponents/ingredients?**

- **Poisindex© specific substance codes, generic codes and product descriptors are seamlessly pulled into VDL records.**

- **What about other Micromedex databases/datasets?**

- **Quick pick lists** for AAPCC 7-digit codes. A user-definable quick pick list of common exposure substances alleviates time spent having to search Poisindex©. This has been greatly enhanced with incremental searching.

- Visual Dotlab provides **hyperlinks to useful toxicology-related internet and intranet sites** right from within Visual Dotlab©.

- **Are these also user-definable?**

- **An on-line calculator** is available at the users fingertips. Calculation results are automatically dumped into the appropriate fields. Mg/kg calculations are automatically calculated once mg and weight values are entered.

- **In what format is this calculator?**
- **Is it easy to use and easy to determine which calculations must be done?**
- **Are there many manual calculations required?**

- **Date and time of exposure as well as date and time of call are stored**. The date and time of exposure is very useful for calculating time since exposure for lab values etc. Date and time of exposure is automatically calculated based upon the call time and the entered 'Time Since Exposure'. This value can also be manually entered, overriding the automatic calculation.

- **Time since exposure is calculated & displayed.** Every time you access a VDL record the system calculates the current time-since-exposure. This dynamic data point is not stored but is continuously calculated and updated. This is very useful information when evaluating current follow-up cases.

- **Last edit time:** When a case is 'refreshed' from the server the system automatically displays how long ago the case was last edited.

- **Is this the case for follow-ups?**
- **Is this the case for edits other than follow-ups?**
- **Does it keep track of the number of follow-ups?**

- **Defaulted fields based upon call type**. Upon initiating a case approximately 50-60% of necessary field coding is already accomplished by defaulted values. The system automatically adjusts the defaults based upon human exposures vs. animal exposures vs. information calls.

- **Which fields are these?**
- **Are they visible fields?**

- **Unlimited text entry** into a 'read-only' text memo file. The stored free text memo field is 'read-only'. This prevents previously entered case data from being modified. A temporary work area is opened for text information entry and this data is then 'appended' to the read-only area. The read-only file can now be read at any time, even while writing a new note. An enhanced editing session is available that lets users make the editing screen 'full screen' as well as select a favored font configuration. This configuration is 'remembered' by user by workstation.

➢ **Are these in certain sections with designated titles, e.g. medical history or just notes?**

- **The free text editing session is automatically spell checked**. Misspelled words display with a RED tilde underscore. Right clicking on a misspelled words prompts with correct spellings or alternatives.

➢ **Can this be changed to Canadian English instead of USA English if desired**?

❖ **Restore last note function:** The last note entered on a given case on a given workstation can be retrieved instantly and reinserted into the read-only memo.

➢ **What purpose does this serve?**

- **Data verification for internal data consistency** - VDL provides and extensive data verification scheme that evaluates each exposure by over 250 different criteria for internal data consistency. The routine can be run by the CSPI at any time and generates a detailed list of any logical errors detected. The verification routine can be run under multiple filtered conditions giving the CSPI and PCC manager a detailed analysis of case coding and data quality. Coded unknowns are also evaluated and this gives the PCC director a solid look at the data 'coding' habits of staff.

➢ **Can staff override verified data entries?**

➢ **If so, is this easily done (i.e. accidentally, or are there warnings)?**

❖ **Data Triggers –** Data triggers can be established that automatically fire additional data collection notifications or collection tools. For instance, symptomatic pesticide exposures seen in health care facilities are 'reportable diseases' in many states. Visual Dotlab already has a Pesticide Incident Reporting (PIR) interface that can be activated. As soon as VDL detects the substance involved is a pesticide related substance (determined by user-determined flags set on generic substance lookup tables) and the patient is in or en route to a health care facility, a prompting form fires to remind staff to collect additional needed PIR information. This information is then collected. A special report form is linked into VDL and this report can be faxed directly to appropriate State and County agencies through a Networked Fax device. This same 'data' trigger' mechanism can be modified and utilized for prospective studies, etc.

• **Do we use these types of reporting as well?**

- **User definable protocols** are supported. An extensive management protocol system allows for center-specific protocols to be available for appending into case records. The management standardization potential and obvious time savings with this feature are significant

➢ **What is meant by this?**

➢ **What types of protocols?**

❖ **Case Templates –** Standard case templates can be created by management to facilitate entry of cases involving common substances and toxins. Selection of a

template changes the case coding defaults to reflect the template values. Standard free text is also incorporated into the templates but use of template history is optional and is determined by the user at runtime. These templates can be created from live VDL cases facilitating ease of creation. Regular staff DO NOT have template creation rights. This allows greater control and standardization of template content by managing directors and medical directors. The ability to create templates is a security feature that can be set at a user or security group level.

- **Does this work well?**
- **Is it used often?**
- **Case copying with advancing sequential case numbers** allow for rapid entry of multiple exposure cases. An exposure with twenty victims can be rapidly captured with very little extra effort beyond the thorough documentation of the primary exposure case. This has also been enhanced in VDL. Memo field information is now also copied and the user is prompted as to whether the wish to copy laboratory and vital signs data. A multi-case number field is available to enter the case number of the first of a series of multiple person exposures. Each copied case retains that 'parent' number making retrieval of all cases related to a multiple exposure easier.
- **VDL has extensive context sensitive help for each field**. By right clicking on a field the help for that fields entry is displayed. The data criteria for AAPCC data collection is online and provided in the context of the entry field. This is a great training tool for new staff and a great instant resource for seasoned staff.

- **Laboratory and vital sign data collection has been moved from free text to reportable field entry!** This provides an incredible new tool for evaluating the poisoned patient. An incremental search grid with 'sortable' columns provides instantaneous, on-the-fly reorganization of this data! This is a very powerful addition! To facilitate entry of this data a 'lab panel' interface prompts the user to select a 'panel'. A single date/time stamp is then added. Users can then deselect any lab in the panel for which they have no value. The interface then creates the 'panel entries' in the case record and the values can then be entered. These panels are user definable and simple to construct. The same 'panel' functionality is available for symptoms entry.
- **Printed Case output can be directed to E-mail, fax devices, Acrobat files or Word Documents!** Visual Dotlab© allows for easy redirection of printed case output. This is an extremely powerful addition. On cases requiring medical consultation a staff person can e-mail the entire case (either as direct e-mail output or attached Acrobat or Word Document) to a consultant/medical director. If a consultant then contacts the hospital, they can forward their note back to the staff person who can then cut-and-paste that information into the VDL record.

- **Is there a place for the consultant to have access to the database?**
- **This would require limiting accessibility (i.e. not able to edit fields other than comments specifically from the consultant)!!**
- **Is there then a way to have all CSPIs and SPIs flagged/emailed to review the physicians' notes before complete case closure?**
- **If these capabilities are not present could they be added prior to purchase?**
- **What would this addition cost?**

❖ **Multiple preset and user definable query parameters for retrieving records from the 'server'.** Client-server applications can be very difficult for end-users to understand. VDL has easy to understand and simple to use defaults for case retrieval that make client-server seamless and less intimidating.

- **Data auditing is extensive in Visual Dotlab©.** User activity, field changes and memo field changes are extensively audited. A manager can look at auditing files and tell when a user logged in, what menus they accessed and what data they added or changed (including previous and new values). This is an important feature in on-line medical records systems!

➢ **Are the old data entries stored only in these audit logs?**

➢ **For how long?**

- **Visual Dotlab supports 3 levels of security based access to records.**

  1.) Menu level - With menu level security you can limit a given users access to all system menus. This access can be granted or denied by membership in security groups or individually by user.

  2.) Control level – With control level security you can limit a users ability to use data controls. For example, a manger can allow one user access to the 'delete' function or the 'add new' function and deny another, either individually or by group. Users can granted or denied the ability to run routines, access forms, etc..

  3.) Field level – A manager can determine right down to a field on a form what users can change a given value. For instance, some poison centers user poison information providers (PIPS). A CSPI can be allowed access to change the 'peer review' field and a PIP can be denied that right. This makes it impossible for a PIP to sign off his/her own cases.

- **Login passwords are encrypted for increased login security**. Users can also be granted hierarchical security clearance such that user level 'H' can edit login account information for users 'H'->'Z' but can not edit users 'A'->'I'. This can be useful for allowing certain staff the ability to reset the passwords of others who may have forgotten their passwords. Password expiration is also supported as well as 'grace' logins'

➢ **Can this hierarchical access be prevented as well?**

- **Maintaining user-defined lookup table values is a snap**. If a user if given 'F3 Edit' capabilities in his/her user account, he/she can add new lookup values directly from the popup screen. Editing buttons are available to 'F3 Edit' users and are hidden from 'non-F3 Edit' users. This makes the entry of these values essentially 'context sensitive' and does not require exiting to an 'administrative' interface.

❖ Enhanced 'free area' support: The 'F3 Edit' capabilities discussed above make use of the free areas much easier. User defined data in these free areas is simple to create and manage.

➢ **More Information Required?**

❖ **Visual Dotlab© has a powerful active data dictionary** that gives managers total control over their data and forms. Screen prompts can be changed in the data dictionary without accessing system source code. Default values can be set and much, much more!

- **The Visual Dotlab© Data 'Backend' has been optimized for Seagate Crystal Reports**. The standard VDL case report and other data locator utility reports are built

in Seagate Crystal Reports and are linked into Visual Dotlab using Active-X. The data dictionary provides all the information necessary to create ad-hoc reports using Crystal Reports® or other SQL-based report writers.

- **Visual Dotlab Report Bank** –The Visual Dotlab Report Bank is a collection of standard statistical, utility, productivity and Continued Quality Improvement (CQI) reports written in Seagate Reports by WBM Software. These reports are useful both for running standard reports against VDL data and as templates for other required 'ad-hoc' reporting needs that arise.

❖ **Powerful data filtering capabilities** exist in VDL. Filtering criteria can be saved 'by user' 'by workstation'. A default set of useful data filters can be imported to provide a framework for a personal set of reusable data filters.

➢ **More information required!!**

- Incremental searching of patient names, caller names, substances, and other fields makes locating cases much quicker in VDL.
- **Extensive documentation** is provided with Visual Dotlab. A 550+ page full system manual is provided that fully documents system issues like security and data control, etc. A 100+ page users manual is also provided that is geared towards staff case entry.

❖ **Multiple center system support**: Visual Dotlab was written specifically to manage a Poison Control System operating multiple 'division' locations utilizing a Wide Area Network (WAN) computer network and an Automated Call Distribution (ACD) telephone system. Instantaneous access to system wide case data gives multi-division systems the power to take advantage of the economies of scale inherent in multi-division organizations. Visual Dotlab© seamlessly handles the transition of one division closing at night and another division taking their night calls. Each 'division' is assigned 'ownership' of regional hospitals. If one 'division' handles an initial hospital call 'owned' by another 'division', Visual Dotlab© assigns the case to the proper division and assures that case appears in the ongoing follow ups of the division who 'owns' that hospital. A staff person from one division cannot 'close' a hospital case that is 'owned' by another division. This helps assures a consistent interaction level between all service area Hospitals and the ' 'Virtual Poison System'.

- **On Line Analytical Processing (OLAP)/Data Analysis Services** – WBM software now offers OLAP / Data Analysis Services setup and optimization. This extremely powerful DATA REPOSITORY feature allows real-time 'drill down' into a Poison Center's case data for administrative and clinical purposes. This user determined, multi-dimensional analysis of case data gives Poison Center administrators, managers and medical directors a powerful tool to examine Poison Center data in ways never before possible. This 'Meta Data' or 'data on you data' is an **extremely** powerful tool. Although difficult to describe, once seen, it will become a tool that Poison Center management will not want to do without.

➢ **Can the system take in delineated text input and dump it directly into the required fields (i.e. from 911)**

➢ **Does this only work on a Windows Platform?**

➢ **Is there possibility for it to work on other platforms in the future?**

To ensure a successful go-live with Visual Dotlab©, WBM Software provides on-site installation and training. In Canada as well? To unleash the power of Visual Dotlab©,

CSPI training is essential. Extensive training is also provided to the database manager(s) to ensure proper file maintenance and data base administration. Training on the use of Seagate Crystal Reports© is also essential to understand the power it provides the end-user for ad hoc report writing needs. The report writer training provides detailed information on VDL database design and how the VDL backend has been optimized for Seagate Crystal Reports.

Visual Dotlab continues the legacy established by Dotlab©. Visual Dotlab© is a robust and powerful tool for Regional Poison Control Centers interested in becoming more efficient in the management and documentation of their call volume. It is being used in higher call volume centers as well as lower call volume centers. Visual Dotlab© is powerful because it has been developed in a Poison Control System using 4 busy centers as a software laboratory.

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May 19, 2001

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References

Information provided in Apendix 1 taken directly from the WBM Software website: http://www.wbmsoft.com/VDL%20features%20List.htm

- ➢ Questions to ask the WBM Software company regarding the Visual Dotlab application (not found on the original document created by WBM Software)
- Questions to ask the members of the IWK Regional Poison Information Centre (not found on the original document created by WBM Software)
- ❖ Interesting features of Visual Dotlab not original required by the IWK Poison Centre

8.3 APPENDIX C

Implementing an Electronic Charting and Database System as Experienced by the Izaak Walton Killam Regional Poison Centre

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The decision to implement an electronic charting and database system was made by the Izaak Walton Killam (IWK) Regional Poison Centre. The possibility of workflow and patient care improvements influenced this decision along with the potential for research and decision support. The ability to identify trends and best-practice treatment strategies along with preventing future instances of toxic exposures were all strong arguments in favour of an electronic charting and database system. After considerable planning the IWK Regional Poison Centre made the decision to purchase and implement commercially available software. The software was chosen based on the evaluation of usability, accessibility, stability/reliability, security, feature richness and a more than competitive price. The timeline for implementation was greatly lessened by purchasing commercially available software rather than creating a new system. A more mature system was expected to have fewer bugs and problems as well. The IWK Regional Poison Centre has future plans for additional web-based user interfaces to increase remote accessibility and the added functionality to submit to a Canadian National Database for poison information.

Keywords

Poison Centre, Electronic Charting, Electronic Health Records, Statistical Database

1. Introduction

This paper describes the process used by the Izaak Walton Killam (IWK) Regional Poison Centre in moving from a purely paper-based charting system to electronic charting and a computerized database of patient records. The experience was both rewarding and challenging at times.

At the time of this paper, the IWK Regional Poison Centre recorded all emergency and non-emergency data in a paper record. Cases requiring follow-up were placed in a separate area to ensure recognition. Statistical data was limited to select data points collected manually and entered onto a paper tally sheet. Subsequently, the tally sheet information was entered into a rudimentary Microsoft Excel database. On an increasing

basis the Poison Centre was queried regarding specific exposure types within a certain demographic, this information was unavailable. It became apparent that this information would be valuable to many groups such as physicians involved in treating poisoning cases, poison centre staff involved in recommending treatment for these cases as well as many other research and educational opportunities. The Poison Centre is hoping that an electronic charting system will enhance the workflow when dealing with emergency calls and consequently the care provided to patients. Auditing of information and general data verification strategies are easily employed and allow for better quality assurance when working with electronic systems as compared to paper-based methods. A computerized database can be easily searched to discover like-cases and subsequent trends. This may provide public health surveillance for chemicals and toxins. It will also allow for early detection of relationships between cases. This recognition may be used to more rapidly administer lifesaving treatment based on improved best-practice guidelines. Trends seen in the abuse or misuse of specific drugs or other substances may be pivotal in mounting an educational defense or improved treatment strategy in dealing with these exposures.

2. Canadian Poison Centres

The Canadian Association of Poison Control Centres consists of seven poison centres, which respond to emergency poison situations (toxic exposures) along with information inquiries. The IWK is one of five centres in Canada that also meet the criteria for membership with the American Association of Poison Control Centers (AAPCC). A survey of these five Canadian Centres was taken to determine the current use of electronic charting systems. The IWK centre was the only one of five that did not have any type of electronic charting. The use of electronic health records and computers within the healthcare system is not a new phenomenon but rather a very under-used tool to provide better healthcare to consumers [1].

The Ontario Regional Poison Information Centre has the most current and advanced system in use in Canada. The system was not created specifically for the Toronto-based poison centre, but rather purchased from a vendor in California, USA. The systems in place at the remaining three major poison centres ranged from a partially computerized DOS-based system with bubble sheet and optical reader input in Quebec, a uniquely created system with only partial input of information and a relatively unintuitive graphical user interface (in Calgary) to a fully-computerized system in Vancouver with no access by Specialists in Poison Information (SPIs). With regards to the Vancouver system SPIs answer both emergency and non-emergency inquiries, record the information on a paper chart and the information is subsequently reviewed and entered into the system twice daily. None of the systems in use in Canada have a web-based interface and only the Visual Dotlab© (VDL) system in Toronto has some form of remote access.

Currently, a national database of poison information does not exist in Canada. It was an ongoing project for a number of years, however in 2002 just prior to implementation funding became an issue and the project known as ProdTox was cancelled [2]. The ability to submit information to a national database is important to the IWK Regional Poison Centre. Thus it was necessary to ensure that a move toward electronic records was made, as well any system whether created or purchased must be compatible with any future plans for ProdTox.

There is hope of the resurrection of ProdTox and preliminary plans are to use much of the work already completed with regards to data streamlining and specific data collection. The method of collection remains at the discretion of individual poison centres. The national database project is designed to allow users to contribute information without stipulating the system required. Information would be transferred via delimited text files and a web-based user interface would provide poison centres and other stakeholders with access to the highly valuable statistical data.

3. Initial planning

Initially the IWK Regional Poison Centre planned to have a system built in-house. This strategy consisted of directly mapping information from the paper chart to an electronic version. Preliminary work was undertaken to provide an information technology (IT) specialist with the information regarding data fields and collection methods. A disconnect existed between the technical knowledge of the IT specialist and the clinical knowledge of the SPIs (poison centre staff) involved in the project. This knowledge gap created challenges in determining the specific requirements of the IWK Regional Poison Centre. Neither the IT specialist nor the poison centre SPIs were able to clearly define the appropriate list of requirements for an electronic charting and database system. The information necessary for this task was divided between the two departments lacking the bridge needed for effective knowledge transfer. Prior to programming however, a health informatics representative was added to the team to enable effective multidiscipline communication. The effective knowledge transfers allowed for proper research and planning.

The IWK Regional Poison Centre had many considerations throughout the project. These topics included: all stakeholders involved, the flow of information, standards for poison centre software and information, as well as coding schemes for poisonous substances. Five main issues with regards to specific system design were also researched: privacy and security; usability and an intuitive interface; feature richness of the system; support; and accessibility.

The stakeholders were found to be involved for various reasons, such as funding; possible users of the system; technical support; persons or groups charged with ensuring the privacy of patient information; and persons or groups involved with the collection of statistical information. The flow of information into and out of the poison centre may involve one or many of the stakeholders identified. The actual movement of information must be reviewed carefully with the type of data being collected and distributed and subsequent privacy concerns sufficiently addressed. Representatives from the IWK Quality Resources and Health Records departments were included in the planning process to ensure that issues of privacy were dealt with early. Because the Poison Centre is directly involved with patient care it is often necessary to collect personal and identifying information about patients in order to follow their case closely and provide the best possible care. However, this identifying information is not required for research and educational purposes. It is necessary to keep the original records including any personal information because these are considered health records.

Privacy is an issue at the forefront of health informatics. It is a concern for many healthcare professionals and members of the public that illegal access to personal health information will become easier when computers are used for data storage [3,4,5]. Unauthorized access to medical records whether paper-based or electronic is a security issue. It is necessary for the IWK Regional Poison Centre to ensure that privacy as well as security is strongly considered regardless.

The main focus with regards to accessibility was remote system use. Because there are many options for remote program accessibility, the limiting factor is often concern for security. The recent closure of the Ontario Regional Poison Centre (Ottawa Site) lead to a much higher call volume at the Toronto Site and a subsequent need for more SPIs. Some of the demand was met by employing SPIs from the former Ottawa Site remotely. The use of the system in this way was inspiring to the IWK Regional Poison Centre.

The design of the system in relation to workflow and the associated requirements of the Poison Centre was considered when evaluating usability. The relative intuitiveness of the user interface was also viewed as a measure of usability. It was important that the user interface had more drop-down and checkbox selections rather than copious amounts of typing. This was to allow for faster work by users with limited computer and typing experience. It was extremely important to research and thoroughly plan for the system prior to implementation. This included both clinical knowledge regarding the use of the system and technical knowledge with respect to possibilities that exist in creation or purchase of the new application.

There are no direct standards for Poison Centre information collection within Canada. In the United States however, Poison Centres must submit to the Toxic Exposure Surveillance System (TESS). In general Canadian Poison Centres follow similar guidelines with regards to information collection, however much less strictly. The ProdTox program was to use similar data items to TESS. When examining standards the IWK Regional Poison Centre was satisfied with a system that met TESS data requirements to meet future ProdTox requirements as well. In order to reduce storage space and accurately analyse the data collected the use of an appropriate coding scheme for poisonous substances is required. At the time of this paper, the IWK Regional Poison Centre used a rudimentary coding scheme based on abbreviations of categories taken from listings of the AAPCC. These abbreviations however were not of uniform length and style. Also, the coding system did not allow for as fine a breakdown as the AAPCC generic codes found in the Thomson Micromedex System [6]. The AAPCC generic codes consist of 6 digit codes for fairly concise categories of products. Specific product codes are also available through the Thomson Micromedex System (Poisindex database) [6] these codes are specific to the brand and formulation of a specific drug or substance. Some poison centre electronic charting systems available commercially use both the generic AAPCC codes as well as the specific Poisindex product codes for statistical analysis. The other poison centres in Canada use the AAPCC generic coding system or a variation thereof.

Full technical support of a new product or implementation must be evaluated to ensure the application runs without issue. In a healthcare setting this may be of the utmost importance. If a system is essential for patient care such as an electronic charting and

database system in the poison centre it is extremely important that this system remain in good working order preferably 100% of the time with no data loss.

It was anticipated that there would be challenges surrounding the workflow changes involved in moving from a paper-based to a fully computerized system. Ensuring that the system implemented could accommodate the way in which the SPIs practice at the IWK Regional Poison Centre minimized these workflow adjustments.

4. The decision to purchase software

After determining the requirements of the IWK Regional Poison Centre for the electronic charting and database system the next question to be answered was: Is it better to create a system specific to the Centre's needs or purchase a commercial-off-the-shelf application? In order to answer that question properly it was necessary to determine what systems were available for purchase and how they would suit the needs of the centre. In healthcare because computers are so widely under-used the availability of software may be somewhat limited. This is especially seen in the case of poison centres where there are a relative finite number of these agencies in operation.

The conclusion to purchase software involved not only the verdict against unique software construction but also evaluation and selection between available applications. This process was made more painless by the limited options available. However, fewer options could easily steer an agency towards the creation of software if the limited selection is dissimilar to their original plans and requirements.

In the case of poison centre software VDL, Toxicall, Casepro and Poison Call Tracking Software by PathTech Solutions are the four systems in use across the United States and Canada that were all originally thought (by the IWK) to be available commercially. VDL was created by a Certified Specialist in Poison Information (CSPI)/ Doctor of Pharmacy from the California Poison Control System – Fresno/Madera Division. This software is available through a small company called WBM Software and is the second most widely used software system of this type across the United States. Toxicall is owned by Computer Automation Systems Incorporated and is the most widely used system of this type, at 70% of the poison centres across the United States. Casepro and the PathTech software are used at a relatively small number of centres with the PathTech software at the Florida Poison Information Center (all three locations) and the Georgia Poison Center. It is unknown which centres if any are currently using the Casepro software. Damarco Solutions originally owned the Casepro software. However, the software has since been sold to an unknown organization. The Poison Call Tracking Software from PathTech was created specifically for the Florida Poison Information Center and subsequently modified to meet the needs of the Georgia Poison Center. Although Strategic Technologies is now the owner of PathTech Software Solutions, the Florida Poison Information Center holds the rights to the Poison Call Tracking Software, which may limit its capacity for commercial distribution.

The new information discovered, left VDL and Toxicall as the two main commercially available products for the purposes of electronic records and statistical databases for poison control centres.

A small survey was completed to determine the level of satisfaction of poison centres with regards to the different applications. Each centre could only provide information relating to the system they had currently in use. Because this type of survey does not allow for direct comparison between systems it is of limited value. However, the purchase of software not well liked by other centres would be unwise. The information provided by each vendors relating to their products was a strong deciding factor along with software demonstrations.

Due to the nature of the work in a poison centre and the need for poison centres in the United States to submit data to TESS the data collected by the different systems is extremely similar. The differences lie in the graphical user interface and layout of the screens, the backend database management system (DBMS) and its stability as well as security and accessibility features. Along with these factors, the general interaction between the front-end graphical user interface and backend database was an important consideration. Support was also considered as well as the possibility for future development of the product. Some differences in the products arose in this area where some applications were produced by larger organizations and others by companies comprised of fewer than five employees. This may be cause for concern relating to support and future development.

The functionality, usability, security and possibility for remote access outweighed any potential small company limitations for the IWK Regional Poison Centre's needs. The more than competitive price and timeline for availability found with a commercially available system was a further deciding factor over the in-house creation of software. The cost and timeline for software updates was another consideration when deciding between the purchase of commercial software and the creation of software.

5. The backup plan and future additions

Based on the functionality required by the IWK Regional Poison Centre the web-based database option was slated as a backup plan to the purchase of commercially available software (non-web-based).

Although there is a misconception surrounding web-based applications, the system is not necessarily accessible through the world-wide-web or Internet. This misconception however may have lead to initial hesitations at the suggestion of a new web-based system.

Web-based interfaces do allow for great accessibility by any healthcare worker as a required user. The nature of a web-based interface allows the user to work with the application from any workstation regardless of previously installed software or operating system. This accessibility allows for ease of workflow for busy healthcare workers often on the go.

Web-based applications are becoming more widely used in many different settings. It is very common to do web-based banking and shopping. The healthcare field has slowly ventured into the web-based world. Web-based health education currently exists along with some systems involving health records [7,8,9].

At the time of this paper additional database interfaces were being considered to augment the product slated for purchase. The possibility of smaller web-based interfaces were being discussed to allow medical consultants working remotely in relation to the poison centre to review, remark and sign off on exposure cases.

6. Conclusions

At the time of this paper it was the hope of the IWK Regional Poison Centre that actual implementation of the new electronic charting and database system was to take place within one to two months. Future plans were also considered to augment the electronic charting system. Plans regarding the possibility of remote access, unlimited statistical reporting through a purchased or created interface along with the possibility of accepting data from 911 database systems and outputting data to a national database remain under consideration.

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8.4 APPENDIX D

Database Table Designs and Relationships

Created by: Sarah Wanderer
From January 27, 2006 to March 9, 2006

Table Of Contents

Table Design

User Tables

1. Users Table

User ID	Login Name	Password (Encrypted)	User Type
Auto increment Integer	Text	Encrypted Text	Pre-defined

2. User Type Permissions

User Type	Table Access	Field Access
Text	?	?

3. Medical Consultants Users Table

ID	First Name	Last Name	Signature	Email Address	Pager Number	Phone Number	Fax Number
Auto Number	Text	Text	?	Text (parameters)	7-digit Number	7-digit Number	7-digit Number

4. SPI Users Table

ID	First Name	Last Name	Signature	Email Address
Auto Number	Text	Text	?	Text (parameters)

5. Other Users Table

ID	First Name	Last Name	Email Address
Auto Number	Text	Text	Text (parameters)

Call Status Tables

1. Call Information Table

Case #	***Automatic***
Wrong Number	Boolean
Type of Call	Type of Call Code (integer) (drop-down)
Information Other details	Text
Type of Caller	Type of Caller Code (integer) (drop-downs)
Site of Caller	Site code (integer) (drop-down)
Location	County Code (integer) (drop-down)
Highest Level of Care Received	Text (drop-down)
HLCR Other	Text
Transport	Air/Ambulance
Medical Outcome	Drop-down (text)
Non-follow-up outcome	Radio button (text)
Status (F/U Required)	Integer [status ID] (drop-down)
# of people involved	Integer
F/U Total Time	Calculated (Integer)
Research/ Charting Time	Integer
Total Time	Calculated (Integer)
Fax Sent	Boolean
Info Pack	Boolean
Teaching	Boolean
Total # of F/Us	(Auto increment from 0)
Additional comments (initial call)	Long Text
Medical Consultant	***Med consult ID***
Date/Time called med consult	***Date/Time***
Date/Time med consult responded	***Date/Time***

2. Follow-up Table

F/U ID	*Case #*	*F/U #*	*Next follow-up date/time*	*SPI*	*Date/ Time opened*	*Date/ Time Closed*	*F/U Notes*	*F/U Call Time*
Auto Incre.	*From initial call info. table*	*Auto incr. from 0 (for specific case)*	*(calc.) Date/ Time*	*SPI ID*	*Auto Date/ Time*	*Auto Date/ Time*	*Long Text*	*Int (calc.)*

3. Medical Consultant Review Table

Med consult Review ID	*Case #*	*Reason for Review/ Questions?*	*SPI Comments*	*Medical Consultant ID*	*Remarks*	*Medical Consultant Notes*	*Date/Time Open*	*Date/Time Closed*
Auto Incre.	*From initial call info. table*	*Text (drop-down)*	*Long Text*	*From initial call info. table*	*Remarks code (integer) (drop-down)*	*Long Text*	*Auto Date/Time*	*Auto Date/Time*

4. Caller/Patient Identifying Information Table

Personal Information ID	*Case #*	*F/U #*	Caller Name	Area Code	Exchange	Phone Number	Other Phone Number	Other Phone Number Details	Patient First Name	Patient Last Name
Auto Incr.	*From call info. table*	*From F/U table*	Text	3-digit Int	3-digit Int	4-digit Int	10-digit Int	Text	Text	Text

Exposure Tables

5. Exposure Information Table

Exposure Information ID	***Case #***	***F/U #***	Circumstances	Site of Exposure	Time of exposure	Time since exposure exact	Time since exposure estimate
Auto Incre.	***From call info. table***	***From F/U table***	Circumstances code (picked from drop-down menus) check only singular	Site code (picked from drop-down menus) check on only singular	Date/time	Calculated (current time- time of exposure)	Drop-down Time estimate code

6. Exposure Route Table

Exposure Route ID	Auto Increment
Case #	From initial call info. table
F/U # (0 for initial)	Integer (From F/U table??)
Ingestion	Boolean (default to False)
Dermal	Boolean (default to False)
Inhalation	Boolean (default to False)
Ocular	Boolean (default to False)
Bites and Stings	Boolean (default to False)
Parenteral	Boolean (default to False)
Otic	Boolean (default to False)
Rectal	Boolean (default to False)
Vaginal	Boolean (default to False)
Other	Boolean (default to False)
Unknown	Boolean (true iff all others are false)
Other Details	Text

Patient Data Tables

7. History Table

History ID	Auto Increment
Case #	From initial call info. table
F/U # (0 for initial)	Integer (From F/U table??)
Age	Integer
Age Unit	Time unit code
Age Estimate	Code (integer) from drop-down
Weight pounds	Real (calculated)
Weight Kilograms	Real (calculated)
Gender	Gender code or Boolean??
Medical History	Boolean
Medical History Notes	Long Text
Pregnant	Boolean
Length of Pregnancy	Integer
Length of Pregnancy Units	Time unit code (drop-down)
Psychiatric History	Boolean
Psychiatric History Notes	Long Text
Immunization History	Boolean
Medications	Boolean
Medication Notes	Long Text
Allergies	Boolean

8. Allergy List Table

Allergy ID	Auto Increment
History ID	From History Table
Medications	Boolean
Medications anaphylaxis	Boolean
Food	Boolean
Environmental	Boolean
Other	Boolean

9. Allergy Other Table

Allergy Other ID	Allergy ID	Other Allergy
Auto Incre.	From Allergy List table	Text

Product Information Tables

10. General Product Information

Product ID	Case #	F/U # (0 for initial)	**Product Code (AAPCC)**	**Product Name**	Poisindex Code	Product N/A	Original	Child resistant	Warning symbol	Container available
Auto Incre.	From initial call info. table	Integer (From F/U table??)	**Drop-Down (Integer)**	**Text**	Integer	Boolean (by itself or if CA=0)	Boolean	Boolean	Boolean	Boolean

11. Ingredient Information

Ingredient ID	Product ID	Ingredient Name	Strength	Strength Unit	Single Dose	Single Dose Unit	Amount	Amount Unit	Total Dose	Mg/kg
Auto Incre.	From general Product Info. Table	Text (drop-down??)	Real	Unit code (drop-down)	Real	Unit code (drop-down)	Real	Unit code (drop-down)	Calculated (real)	Calculated (real)

Assessment/Symptoms Tables

12. Assessment

ID	Case #	F/U # (0 for initial)	Symptomatic	Symptomatic related (hidden unless symptomatic)	Circumstances of event Notes	Assessment Notes
Auto Incre.	From initial call info. table	Integer (From F/U table??)	Boolean	Boolean	Long Text	Long Text

13 a. Cardiac Symptoms

ID	Auto Increment
Case #	From initial call info. Table
F/U # (0 for initial)	Integer (From F/U table??)
Asystole / Cardiac Arrest	Boolean
Bradycardia	Boolean
Chest pain (incl. Noncardiac)	Boolean
Conduction disturbance/ ECG Change	Boolean
Dysrhythmia	Boolean
Hypertension	Boolean
Hypotension	Boolean
Shock	Boolean
Tachycardia	Boolean
Pain	Boolean
Other	Boolean

13 b. Dermal Symptoms

ID	Auto Increment
Case #	From initial call info. Table
F/U # (0 for initial)	Integer (From F/U table??)
Blisters/ Bullae	Boolean
Dermal Burns (superficial)	Boolean
Dermal Burns – 2^{nd} & 3^{rd} degree	Boolean
Diaphoresis	Boolean
Ecchymosis/ Bruising	Boolean
Edema / Local inflammation / Cellulitis	Boolean
Erythema / Flushing	Boolean
Irritation/ Pain	Boolean
Necrosis	Boolean
Pallor	Boolean
Pruritis	Boolean
Puncture wound / Sting/ Bite	Boolean
Rash / Hives/ Welts	Boolean
Pain	Boolean
Other	Boolean

13 c. Gastro Symptoms

ID	Auto Increment
Case #	From initial call info. Table
F/U # (0 for initial)	Integer (From F/U table??)
Abdominal Pain	Boolean
Anorexia	Boolean
Blood per rectum	Boolean
Constipation	Boolean
Melena	Boolean
Nausea	Boolean
Hypersalivation	Boolean
Excess secretions	Boolean
Dehydration	Boolean
Diarrhea	Boolean
Dry Mouth	Boolean
Dysphagia	Boolean
Esophageal injury / Stricture	Boolean
Fecal incontinence	Boolean
Gastric burns	Boolean
Gas / Bloating	Boolean
Hematemesis	Boolean
Ileus / No bowel sounds	Boolean
Oropharyngeal / Oral irritation / pain / superficial burns	Boolean
Oropharyngeal burns (2^{nd} & 3^{rd} degree)	Boolean
Vomiting	Boolean
Pain	Boolean
Other	Boolean

13 d. Hematologic/Hepatic Symptoms

ID	Auto Increment
Case #	From initial call info. Table
F/U # (0 for initial)	Integer (From F/U table??)
Carboxyhemoglobin	Boolean
Methemoglobin	Boolean
AST / ALT increased	Boolean
Bilirubin increased	Boolean
Cytopenia	Boolean
DIC	Boolean
Hemolysis	Boolean
INR/PT prolonged	Boolean
Other coagulopathy	Boolean
Other Liver Function Test abnormality	Boolean
Icterus	Boolean
Hepatitis	Boolean
Pain	Boolean
Other	Boolean

13 e. Neuromuscular Symptoms

ID	Auto Increment
Case #	From initial call info. Table
F/U # (0 for initial)	Integer (From F/U table??)
Agitation /Irritability	Boolean
Ataxia	Boolean
Coma	Boolean
Confusion	Boolean
CVA	Boolean
Dizziness / Vertigo	Boolean
Drowsiness / Lethargy	Boolean
Dystonia	Boolean
Encephalopathy	Boolean
Euphoria / Intoxication	Boolean
Fasciculations	Boolean
Hallucinations / Delusions	Boolean
Headache	Boolean
Hyperreflexia	Boolean
Hyporeflexia	Boolean
Insomnia	Boolean
Intracranial bleed	Boolean
Muscle / Joint pain	Boolean
Muscle Rigidity	Boolean
Muscle weakness	Boolean
Numbness	Boolean

Paralysis	Boolean
Peripheral neuropathy	Boolean
Rhabdomyolysis	Boolean
Seizure	Boolean
Seizures repeated (status)	Boolean
Slurred speech	Boolean
Stuporous	Boolean
Syncope	Boolean
Tremor / Twitching	Boolean
Pain	Boolean
Other	Boolean

13 f. Eyes/Ears/Nose Symptoms

ID	Auto Increment
Case #	From initial call info. Table
F/U # (0 for initial)	Integer (From F/U table??)
Blurred vision	Boolean
Corneal abrasion	Boolean
Deafness	Boolean
Ear irritation/ Pain	Boolean
Eye irritation/ Pain	Boolean
Lacrimation	Boolean
Miosis	Boolean
Mydriasis	Boolean
Nasal irritation/ Pain	Boolean
Nystagmus	Boolean
Ocular Burns	Boolean
Papilledema	Boolean
Photophobia	Boolean
Pupil(s) nonreactive	Boolean
Red eye / conjunctivitis	Boolean
Tinnitus	Boolean
Visual defect	Boolean
Pain	Boolean
Other	Boolean

13 g. Renal / Genital -Urea Symptoms

ID	Auto Increment
Case #	From initial call info. Table
F/U # (0 for initial)	Integer (From F/U table??)
Creatinine increased	Boolean
Crystal Urea	Boolean
Hematuria	Boolean
Hemo / myoglobinuria	Boolean
Oliguria / anuria	Boolean

Polyuria	Boolean
Renal failure	Boolean
Urea (BUN) increased	Boolean
Urinary incontinence	Boolean
Urinary retention	Boolean
Urine colour change	Boolean
Pain	Boolean
Other	Boolean

13 h. Respiratory Symptoms

ID	Auto Increment
Case #	From initial call info. Table
F/U # (0 for initial)	Integer (From F/U table??)
Airflow Obstruction	Boolean
Bronchorrhea	Boolean
Bronchospasm	Boolean
Coughing / Respiratory Tract Irritation	Boolean
Cyanosis / Hypoxemia	Boolean
Dyspnea	Boolean
Excess secretions (respiratory)	Boolean
Hyperventilation/ Tachypnea	Boolean
Pneumonitis (chemical)	Boolean
Pulmonary edema (cardiogenic)	Boolean
Pulmonary edema (non-cardiogenic)	Boolean
Respiratory arrest	Boolean
Respiratory depression	Boolean
X-ray findings (+)	Boolean
Pain	Boolean
Other	Boolean

13 i. Metabolic abnormalities Symptoms

ID	Auto Increment
Case #	From initial call info. Table
F/U # (0 for initial)	Integer (From F/U table??)
Acidosis	Boolean
Alkalosis	Boolean
Anion gap increased	Boolean
CK elevated	Boolean
Electrolyte abnormality	Boolean
Hyperglycemia	Boolean
Hypoglycemia	Boolean
Osmolal gap increased	Boolean
Pain	Boolean
Other	Boolean

13 j. Miscellaneous Symptoms

ID	Auto Increment
Case #	From initial call info. Table
F/U # (0 for initial)	Integer (From F/U table??)
Adverse drug reaction to treatment	Boolean
Bleeding (other)	Boolean
Fever / Hyperthermia	Boolean
Hypothermia	Boolean
Symptomatic	Boolean
Unspecified Pain	Boolean
Other	Boolean
Unknown	Boolean

14. Labs

ID	Auto Increment
Case #	From initial call info. Table
F/U # (0 for initial)	Integer (From F/U table??)
Date/Time Collected	Date/Time
PH (A,V, C) ???	Real
PCO_2 (A,V, C) ???	Real
PO_2 (A,V, C) ???	Real
HCO_3 (A,V, C) ???	Real
O_2 sat (A,V, C) ???	Real
Na	Real
K	Real
Cl	Real
Gl	Real
BUN	Real
Coag	Real
AST	Real
ALT	Real
ALKP	Real
CREA	Real
Urine pH	Real
Temp	Real
BP (Systolic)	Integer
BP (Diastolic)	Integer
HR	Integer
RR	Integer
LOC	Integer?? GCS??

Recommendations Tables

15. Disposition

ID	Case #	F/U #	**Remain At**	**Remain At other details**	**Go To**	**Go To Other details**
Auto Incre.	From initial call info. table	***From F/U table***	**Drop-down**	**Text**	**Drop-down**	**8.4.1.1.1.1.1 Text**

16. Receiving HCF

ID	Case #	F/U #	HCF Code
Auto Incre.	From initial call info. table	***From F/U table***	HCF code

17 a. Management (General Treatment)

ID	Auto Increment
Case #	From initial call info. Table
F/U # (0 for initial)	Integer (From F/U table??)
Oxygen	Code (integer from management code table) Default to 0

17 b. Management (Life Support)

ID	Auto Increment
Case #	From initial call info. Table
F/U # (0 for initial)	Integer (From F/U table??)
Intubation/ Ventilation	Code (integer from management code table) Default to 0

17 c. Management (Decontamination/Elimination)

ID	Auto Increment
Case #	From initial call info. Table
F/U # (0 for initial)	Integer (From F/U table??)
Charcoal AD	Code (integer from management code table) Default to 0
MDAC AD	Code (integer from management code table) Default to 0
Lavage AD	Code (integer from management code table) Default to 0
Cathartic	Code (integer from management code table) Default to 0
Ipecac	Code (integer from management code table) Default to 0
Eye Irrigation	Code (integer from management code table) Default to 0
Oral Rinse	Code (integer from management code table) Default to 0
Skin Irrigation	Code (integer from management code table) Default to 0
Skin Irrigation Details	**Text???**
Hemodialysis/ Hemoperfusion	Code (integer from management code table) Default to 0

17 d. Management (Diagnostics)

ID	Auto Increment
Case #	From initial call info. Table
F/U # (0 for initial)	Integer (From F/U table??)
Medical Assessment	Code (integer from management code table) Default to 0
EKG	Code (integer from management code table) Default to 0
EKG Serial	Code (integer from management code table) Default to 0
Cardiac Monitor	Code (integer from management code table) Default to 0
O_2 Sat Monitor	Code (integer from management code table) Default to 0
X-ray Foreign Body Search	Code (integer from management code table) Default to 0
X-ray Chest	Code (integer from management code table) Default to 0
X-ray Abdomen	Code (integer from management code table) Default to 0

Endoscopy	Code (integer from management code table) Default to 0
Ph	Code (integer from management code table) Default to 0
Ph Urine	Code (integer from management code table) Default to 0
Ph Tears	Code (integer from management code table) Default to 0
ASA	Code (integer from management code table) Default to 0
APAP	Code (integer from management code table) Default to 0
Lytes	Code (integer from management code table) Default to 0
Gases	Code (integer from management code table) Default to 0
LFT	Code (integer from management code table) Default to 0
RFT	Code (integer from management code table) Default to 0
Glucose	Code (integer from management code table) Default to 0
PT/PTT	Code (integer from management code table) Default to 0
INR	Code (integer from management code table) Default to 0
CBC	Code (integer from management code table) Default to 0
U/A	Code (integer from management code table) Default to 0

17 e. Management (Specific Antidotes)

ID	Auto Increment
Case #	From initial call info. Table
F/U # (0 for initial)	Integer (From F/U table??)
Atropine	Code (integer from management code table) Default to 0
Bicarb (Bolus)	Code (integer from management code table) Default to 0
Bicarb (Maintenance)	Code (integer from management code table) Default to 0
Calcium	Code (integer from management code table) Default to 0
Chelation	Code (integer from management code table) Default to 0
Chelation2	Code (integer from management code table)

	Default to 0
Chelation Details	**Text ??**
Cyanide Kit	Code (integer from management code table) Default to 0
Cyanide Kit2	**Code (integer from management code table) Default to 0**
Cyanide Kit3	**Code (integer from management code table) Default to 0**
Cyanide Kit Hydroxocobalamine	Code (integer from management code table) Default to 0
Digibind	Code (integer from management code table) Default to 0
Digibind Details	**Text??**
Ethanol	Code (integer from management code table) Default to 0
Ethanol Oral	Code (integer from management code table) Default to 0
Ethanol Oral Details	**Text??**
Ethanol IV	Code (integer from management code table) Default to 0
Ethanol IV Details	**Text??**
Flumazenil	Code (integer from management code table) Default to 0
Folic Acid	Code (integer from management code table) Default to 0
Fomepizol	Code (integer from management code table) Default to 0
Glucagon	Code (integer from management code table) Default to 0
Hyberbaric Oxygen	Code (integer from management code table) Default to 0
Insulin	Code (integer from management code table) Default to 0
Leukovorin	Code (integer from management code table) Default to 0
Methylene Blue	Code (integer from management code table) Default to 0
NAC n-actcysteine (Oral)	Code (integer from management code table) Default to 0
NAC n-actcysteine (IV)	Code (integer from management code table) Default to 0
Naloxone (Bolus)	Code (integer from management code table) Default to 0
Naloxone (Infusion)	Code (integer from management code table) Default to 0

Octreotide	Code (integer from management code table) Default to 0
Physostigmine	Code (integer from management code table) Default to 0
Pralidoxime (2-PAM)	Code (integer from management code table) Default to 0
Protamine Sulfate	Code (integer from management code table) Default to 0
Pyridoxine (Vitamin B6)	Code (integer from management code table) Default to 0
Other Details	**Text ??**
Vitamin K (Phytonadione)	Code (integer from management code table) Default to 0

17 f. Management (Other Drugs)

ID	Auto Increment
Case #	From initial call info. Table
F/U # (0 for initial)	Integer (From F/U table??)
Acetaminophen	Code (integer from management code table) Default to 0
Antihistamine	Code (integer from management code table) Default to 0
Benzodiazapine	Code (integer from management code table) Default to 0
Benztropine (Cogentin)	Code (integer from management code table) Default to 0
Cyproheptadine	Code (integer from management code table) Default to 0
8.4.1.1.1.1.2 Ibuprofen	Code (integer from management code table) Default to 0
Polysporin	Code (integer from management code table) Default to 0
Tetanus	Code (integer from management code table) Default to 0
Thiamine	Code (integer from management code table) Default to 0

Outcome Tables

18. Consultants Used

ID	Case #	F/U #	Type	Name
Auto Incre.	From initial call info. Table	***From F/U table***	Text (drop-down)	Text

19. Resources Used

Resources used ID	Auto Increment
Case #	From initial call info. table
F/U # (0 for initial)	Integer (From F/U table??)
Poisindex	Boolean
Other MDX	Boolean
Texts	Boolean
Product_Label	Boolean
Company	Boolean
MSDS	Boolean
PC Protocols / Guidelines	Boolean
Other SPI	Boolean
Other General	Boolean
MDX Listed	***Boolean***
Text books Listed	***Boolean***

Other Information Tables

1. Status Code

Status ID	Status
1	Open (f/u required)
2	**In use???**
3	Closed
4	Archived???
5	Open (consultant review only)
6	Open (learning review for SPIs only)

2. Province

Province ID	Province Name	Area Code
1	Nova Scotia	902
2	Prince Edward Island	902
3	New Brunswick	506
4	Other	N/A
5	Unknown	N/A

3. County

County ID	Province Name	County Name
1	Nova Scotia	Annapolis
2	Nova Scotia	Antigonish
3	Nova Scotia	Cape Breton
4	Nova Scotia	Colchester
5	Nova Scotia	Cumberland
6	Nova Scotia	Digby
7	Nova Scotia	Guysborough
8	Nova Scotia	Hants
9	Nova Scotia	Halifax
10	Nova Scotia	Inverness
11	Nova Scotia	Kings
12	Nova Scotia	Lunenburg
13	Nova Scotia	Pictou
14	Nova Scotia	Queens

15	Nova Scotia	Richmond
16	Nova Scotia	Shelburne
17	Nova Scotia	Victoria
18	Nova Scotia	Yarmouth
19	Nova Scotia	Unknown
20	Prince Edward Island	Kings
21	Prince Edward Island	Prince
22	Prince Edward Island	Queens
23	Prince Edward Island	Unknown
24	New Brunswick	N/A
25	Other	N/A
26	Unknown	N/A

4. Exchange

Exchange ID	County ID	Exchange
Auto Increment	From County Table (integer)	xxx

5. Call Type Dropdowns

ID	Drop-down name	Menu value
1	Type of Call	Human
2	Type of Call	Animal
3	Type of Call	Information
4	Info sub category	Teaching Requests
5	Info sub category	Posters
6	Info sub category	Drug ID
7	Info sub category	Pesticide Use
8	Info sub category	Medication Administration
9	Info sub category	PC Admin
10	Info sub category	Other

6. Type of Caller

ID	Caller Type	Member Group
1	Patient	Public
2	Parent	Public
3	Relative	Public
4	Agency	Public
5	Other	Public
6	Group Home	Public Agency
7	School	Public Agency
8	Media	Public Agency
9	Nursing Home	Public Agency
10	RN	HCP
11	Nurse Practitioner	HCP
12	MD	HCP
13	EHS	HCP
14	911	HCP
15	Other	HCP
16	Pharmacist	Other HCP
17	Veterinarian/Vet Tech	Other HCP
18	Ward Clerk	Other HCP

7. Exposure drop-downs

ID	Drop-down name	Menu value
1	Exposure route	Ingestion
2	Exposure route	Dermal
3	Exposure route	Inhalation
4	Exposure route	Ocular
5	Exposure route	Bites and Stings
6	Exposure route	Parenteral
7	Exposure route	Otic
8	Exposure route	Rectal
9	Exposure route	Vaginal
10	Exposure route	Other
11	Exposure route	Unknown
12	Site	Home
13	Site	Work
14	Site	Hospital
15	Site	School/Daycare
16	Site	Other
17	Time Since Exposure	#30 min
18	Time Since Exposure	30-60 min
19	Time Since Exposure	> 60 min > 24 hrs
20	Time Since Exposure	∃24 hours
21	Time Since Exposure	Chronic

8. Circumstances

ID	Circumstance	Intentional
1	General	No
2	Therapeutic Error	No
3	Food	No
4	Environmental	No
5	Occupational	No
6	Adverse Event?	No
7	Other	No
8	Unknown	No
9	Self-harm	Yes
10	Abuse	Yes
11	Misuse	Yes
12	Inflicted	Yes
13	Other	Yes
14	Unknown	Yes

9. Time Units

ID	Units	Group Belonging to
1	Weeks	LOP
2	Months	LOP
3	Days	Age
4	Months	Age
5	Years	Age

10. Units

ID	Units	Conversion to ml or mg	Group Belonging to
1	Cc	1	Volume
2	Ml	1	Volume
3	Dl	100	Volume
4	L	1000	Volume
5	US Cup	236.588238	Volume
6	US Pint	473.176475	Volume
7	Imperial Pint	568.261485	Volume
8	US Gallon	3785.4118	Volume
9	Imperial Gallon	4546.09188	Volume
10	US fluid ounce	29.5735297	Volume
11	Imperial fluid ounce	28.4130742	Volume
12	Swallow Child minimum	2.5	Volume
13	Swallow Child maximum	5	Volume
14	Swallow Adult minimum	10	Volume
15	Swallow Adult maximum	30	Volume
16	US Tablespoon	14.7867648	Volume
17	Imperial Tablespoon	17.7581714	Volume
18	Imperial teaspoon	5.91939047	Volume
19	US teaspoon	4.92892161	Volume
17	dr (drop, lick, taste)	0.05	Volume
18	US Quart	946.35295	Volume
19	Imperial Quart	1136.52297	Volume
20	Kg	1000000	Weight
21	Gram	1000	Weight
22	Mg	1	Weight
23	Mg	0.001	Weight
24	Ng	0.000001	Weight
25	Ounce	28349.5231	Weight
26	Grain	64.79891	Weight
27	Lbs	453592.37	Weight
28	Tab (tablet, pills)	NULL	Amount
29	Ea (each, bites, sting)	NULL	Amount
30	Hr (hours: gas, fumes)	NULL	Amount
31	**U (unknown)**	**NULL**	**Strength**

11. Patient Information drop-downs

ID	Drop-down name	Menu value
1	Gender	Male
2	Gender	Female
3	Gender	Unknown
4	Gender	N/A
5	Allergies	Medications
6	Allergies	Medications Anaphylaxis
7	Allergies	Food
8	Allergies	Environmental
9	Allergies	Other
10	<5	Age Estimate
11	5-10	Age Estimate
12	…	Age Estimate

12. Product Information??

Class	Category	Product Type	AAPCC Code
Non-Pharm	Adhesives, glues, cements and pastes	CYANOACRYLATES (SUPERGLUE, KRAZYGLUE)	163000
Non-Pharm	Adhesives, glues, cements and pastes	EPOXY	224000
Non-Pharm	Adhesives, glues, cements and pastes	TOLUENE/XYLENE (ADHESIVES ONLY)	191103
Non-Pharm	Adhesives, glues, cements and pastes	NON-TOXIC (WHITE GLUE, PAPER GLUES, ETC.)	036160
Non-Pharm	Adhesives, glues, cements and pastes	UNKNOWN TYPE OF ADHESIVE, GLUE, CEMENT OR PASTE	077104
Non-Pharm	Alcohols	ETHANOL (BEVERAGE)	019140
Non-Pharm	Alcohols	ETHANOL (NON-BEVERAGE, NON-RUBBING)	019141
Non-Pharm	Alcohols	HIGHER ALCOHOLS (BUTANOL, AMYL ALCOHOL, PROPANOLS)	223000
Non-Pharm	Alcohols	ISOPROPANOL (EXCLUDING RUBBING ALCOHOLS AND CLEANERS)	025140
Non-Pharm	Alcohols	METHANOL (EXCLUDING AUTOMOTIVE PRODUCTS AND CLEANERS)	031140
Non-Pharm	Alcohols	RUBBING ALCOHOL: ETHANOL-WITH METHYL SALICYLATE	019143

Non-Pharm	Alcohols	RUBBING ALCOHOL: ETHANOL-WITHOUT METHYL SALICYLATE	019142
Non-Pharm	Alcohols	RUBBING ALCOHOL: ISOPROPYL-WITH METHYL SALICYLATE	025143
Non-Pharm	Alcohols	RUBBING ALCOHOL: ISOPROPYL-WITHOUT METHYL SALICYLATE	025141
Non-Pharm	Alcohols	UNKNOWN RUBBING ALCOHOL	077141
Non-Pharm	Alcohols	OTHER TYPE OF ALCOHOL	077140
Non-Pharm	Alcohols	UNKNOWN TYPE OF ALCOHOL	077142
Non-Pharm	ARTS, CRAFTS, WRITING PRODUCTS AND OFFICE SUPPLIES	ARTIST PAINTS, NON-WATER COLOR	077202
Non-Pharm	ARTS, CRAFTS, WRITING PRODUCTS AND OFFICE SUPPLIES	CHALK	077203
Non-Pharm	ARTS, CRAFTS, WRITING PRODUCTS AND OFFICE SUPPLIES	CLAY	077204
Non-Pharm	ARTS, CRAFTS, WRITING PRODUCTS AND OFFICE SUPPLIES	CRAYON	077205
Non-Pharm	ARTS, CRAFTS, WRITING PRODUCTS AND OFFICE SUPPLIES	GLAZES	077206
Non-Pharm	ARTS, CRAFTS, WRITING PRODUCTS AND OFFICE SUPPLIES	OFFICE SUPPLIES-MISCELLANEOUS	077604
Non-Pharm	ARTS, CRAFTS, WRITING PRODUCTS AND OFFICE SUPPLIES	PENCIL	077207
Non-Pharm	ARTS, CRAFTS, WRITING PRODUCTS AND OFFICE SUPPLIES	PENS/INK	077208
Non-Pharm	ARTS, CRAFTS, WRITING PRODUCTS AND OFFICE SUPPLIES	TYPEWRITER CORRECTION FLUID	077213
Non-Pharm	ARTS, CRAFTS, WRITING PRODUCTS AND OFFICE SUPPLIES	WATER COLOR	077212
Non-Pharm	ARTS, CRAFTS, WRITING PRODUCTS AND OFFICE SUPPLIES	OTHER TYPES OF ARTS/CRAFTS/WRITING PRODUCTS, ETC.	077201
Non-Pharm	ARTS, CRAFTS, WRITING PRODUCTS AND OFFICE SUPPLIES	UNKNOWN TYPE OF ARTS/CRAFTS/WRITING PRODUCTS, ETC.	077200
Non-Pharm	AUTOMOTIVE/AIRCRAFT/BOAT PRODUCTS	BRAKE FLUID (ACTIVATED: 1/1/2001)	201001
Non-Pharm	AUTOMOTIVE/AIRCRAFT/BOAT PRODUCTS	AUTOMOTIVE PRODUCTS: ETHYLENE GLYCOL (ANTIFREEZE)	051221
Non-	AUTOMOTIVE/AIRCRAFT/BOAT PRODUCTS	AUTOMOTIVE PRODUCTS: GLYCOLS-OTHER	051220

Pharm			
Non-Pharm	AUTOMOTIVE/AIRCRAFT/BOAT PRODUCTS	AUTOMOTIVE PRODUCTS: GLYCOL AND METHANOL MIXTURES	051222
Non-Pharm	AUTOMOTIVE/AIRCRAFT/BOAT PRODUCTS	AUTOMOTIVE PRODUCTS: HYDROCARBONS (TRANSMISSION FLUID, POWER STEERING FLUID, ETC.)	039220
Non-Pharm	AUTOMOTIVE/AIRCRAFT/BOAT PRODUCTS	AUTOMOTIVE PRODUCTS: METHANOL (EG, DRY GAS, WINDSHIELD WASHING SOLUTIONS)	031220
Non-Pharm	AUTOMOTIVE/AIRCRAFT/BOAT PRODUCTS	NON-TOXIC AUTOMOTIVE/AIRCRAFT/BOAT PRODUCTS	036220
Non-Pharm	AUTOMOTIVE/AIRCRAFT/BOAT PRODUCTS	OTHER TYPE OF AUTOMOTIVE/AIRCRAFT/BOAT PRODUCTS	077220
Non-Pharm	AUTOMOTIVE/AIRCRAFT/BOAT PRODUCTS	UNKNOWN TYPE OF AUTOMOTIVE/AIRCRAFT/BOAT PRODUCTS	077221
Non-Pharm	BATTERIES	PENLIGHT/FLASHLIGHT/DRY CELL BATTERIES	077230
Non-Pharm	BATTERIES	AUTOMOTIVE (AIRCRAFT/BOAT) BATTERIES	077231
Non-Pharm	BATTERIES	DISC BATTERIES: ALKALINE (MNO2)	265230
Non-Pharm	BATTERIES	DISC BATTERIES: LITHIUM	265233
Non-Pharm	BATTERIES	DISC BATTERIES: MERCURIC OXIDE	265231
Non-Pharm	BATTERIES	DISC BATTERIES: NICKEL CADMIUM	265232
Non-Pharm	BATTERIES	DISC BATTERIES: SILVER OXIDE	265234
Non-Pharm	BATTERIES	DISC BATTERIES: ZINC-AIR	265236
Non-Pharm	BATTERIES	OTHER TYPE OF DISC BATTERY	265235
Non-Pharm	BATTERIES	UNKNOWN TYPE OF DISC BATTERY	265000
Non-Pharm	BATTERIES	OTHER TYPE OF BATTERY	077232
Non-Pharm	BATTERIES	UNKNOWN TYPE OF BATTERY	077233

13. Dispositions

Locations	Action	Expected Note
Text	Text	Boolean

14. HCFs

HCF ID	HCF Name	Phone #	Type	Location	Province Name
Auto Increment	Text	10 digit Int	Text	Text	Text

15. Management

Treatment DD Code ID	Treatment Label	Treatment Group
1	Oxygen	General Treatment
2	Charcoal AD	Decontamination/ Elimination
3	MDAC AD	Decontamination/ Elimination
4	Lavage AD	Decontamination/ Elimination
5	Cathartic	Decontamination/ Elimination
6	Ipecac	Decontamination/ Elimination
7	Eye Irrigation (20 min; 30 min; 30 min+ until IPH is normal)	Decontamination/ Elimination
8	Oral Rinse	Decontamination/ Elimination
9	Skin Irrigation	Decontamination/ Elimination
10	Hemodialysis/ Hemoperfusion	Decontamination/ Elimination
11	Medical Assessment	Diagnostics
12	EKG	Diagnostics
13	EKG Serial	Diagnostics
14	Cardiac Monitor	Diagnostics

15	O_2 Sat Monitor	Diagnostics
16	X-ray Foreign Body Search	Diagnostics
17	X-ray Chest	Diagnostics
18	X-ray Abdomen	Diagnostics
19	Endoscopy	Diagnostics
20	PH	Diagnostics
21	PH Urine	Diagnostics
22	PH Tears	Diagnostics
23	ASA	Diagnostics
24	APAP	Diagnostics
25	Lytes	Diagnostics
26	Gases	Diagnostics
27	LFT	Diagnostics
28	RFT	Diagnostics
29	Glucose	Diagnostics
30	PT/PTT	Diagnostics
31	INR	Diagnostics
32	CBC	Diagnostics
33	U/A	Diagnostics
34	Intubation/ Ventilation	Life Support
35	Atropine	Specific Antidotes
36	Bicarb (Bolus)	Specific Antidotes
37	Bicarb (Maintenance)	Specific Antidotes
38	Chelation	Specific Antidotes
39	Cyanide Kit	Specific Antidotes
40	Cyanide Kit Hydroxocobalamine	Specific Antidotes
41	Digibind	Specific Antidotes
42	Ethanol	Specific Antidotes
43	Ethanol Oral	Specific Antidotes
44	Ethanol IV	Specific Antidotes
45	Flumazenil	Specific Antidotes
46	Glucagon	Specific

		Antidotes
47	Hyperberic Oxygen	Specific Antidotes
48	Insulin	Specific Antidotes
49	Leukovorin	Specific Antidotes
50	Methylene Blue	Specific Antidotes
51	NAC n-actycysteine	Specific Antidotes
52	Naloxone (Bolus)	Specific Antidotes
53	Naloxone (Infusion)	Specific Antidotes
54	Octreotide	Specific Antidotes
55	Physostigmine	Specific Antidotes
56	Pralidoxime (2-PAM)	Specific Antidotes
57	Protamine Sulfate	Specific Antidotes
58	Pyridoxine (Vitamin B6)	Specific Antidotes
59	Vitamin K (Phytonadione)	Specific Antidotes
60	Acetaminophen	Other Drugs
61	Antihistamine	Other Drugs
62	Benzodiazapine	Other Drugs
63	Benztropine (Cogentin)	Other Drugs
64	Cyproheptadine	Other Drugs
65	Ibuprofen	Other Drugs
66	Polysporin	Other Drugs
67	Tetanus	Other Drugs
68	Thiamine	Other Drugs

16. Management Code

Treatment Code ID	Treatment Specifics
0	No management
1	Already Done (AD)
2	Advised by Poison Centre

	(AVPC)
3	PRN
4	Treatment Summary (TxS)
5	AD & AVPC
6	AD & PRN
7	AD & TxS
8	AVPC & PRN
9	AVPC & TxS
10	PRN & TxS
11	AD, AVPC & PRN
12	AD, AVPC & TxS
13	AD, PRN & TxS
14	AVPC, PRN & TxS
15	AD, AVPC, PRN & TxS

17. Level of Care??

Level of Care ID	Level
Auto Increment	Text

18. Transport

Transport Method ID	Transport method
1	Ambulance
2	Air

19. Medical Outcome

Medical Outcome ID	Outcome
Auto Increment	Text

20. General Resources

Resource ID	Resource General
Auto Increment	Text

21. Other MDX Resources

MDX Resource ID	MDX database name
Auto Increment	Text

22. Textbooks

Text ID	Text Category	Text specific
Auto Increment	Text	Text

23. Consultants Used

Consultants ID	Type of Consultant	Consults Name
Auto Increment	Text	Text

24. Consult Information

Consult Info ID	Type of Consultant	Consult Info
Auto Increment	Text	Text

25. MD on call

On Call ID	Medical Consultant ID	Current Date
Auto increment integer	Integer	Auto Date

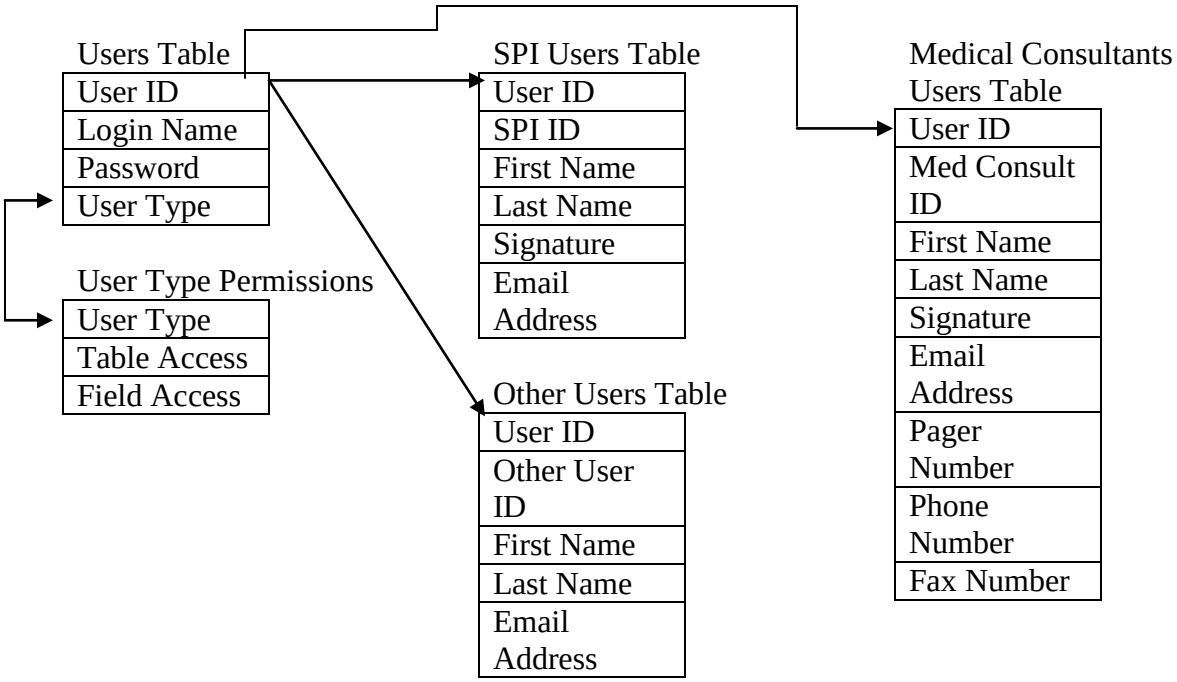
26. Review drop-downs

Review ID	Menu name	Menu value
1	Reason for review	Hospital Call
2	Reason for review	Interesting Case/ Educational
3	Reason for	Medical

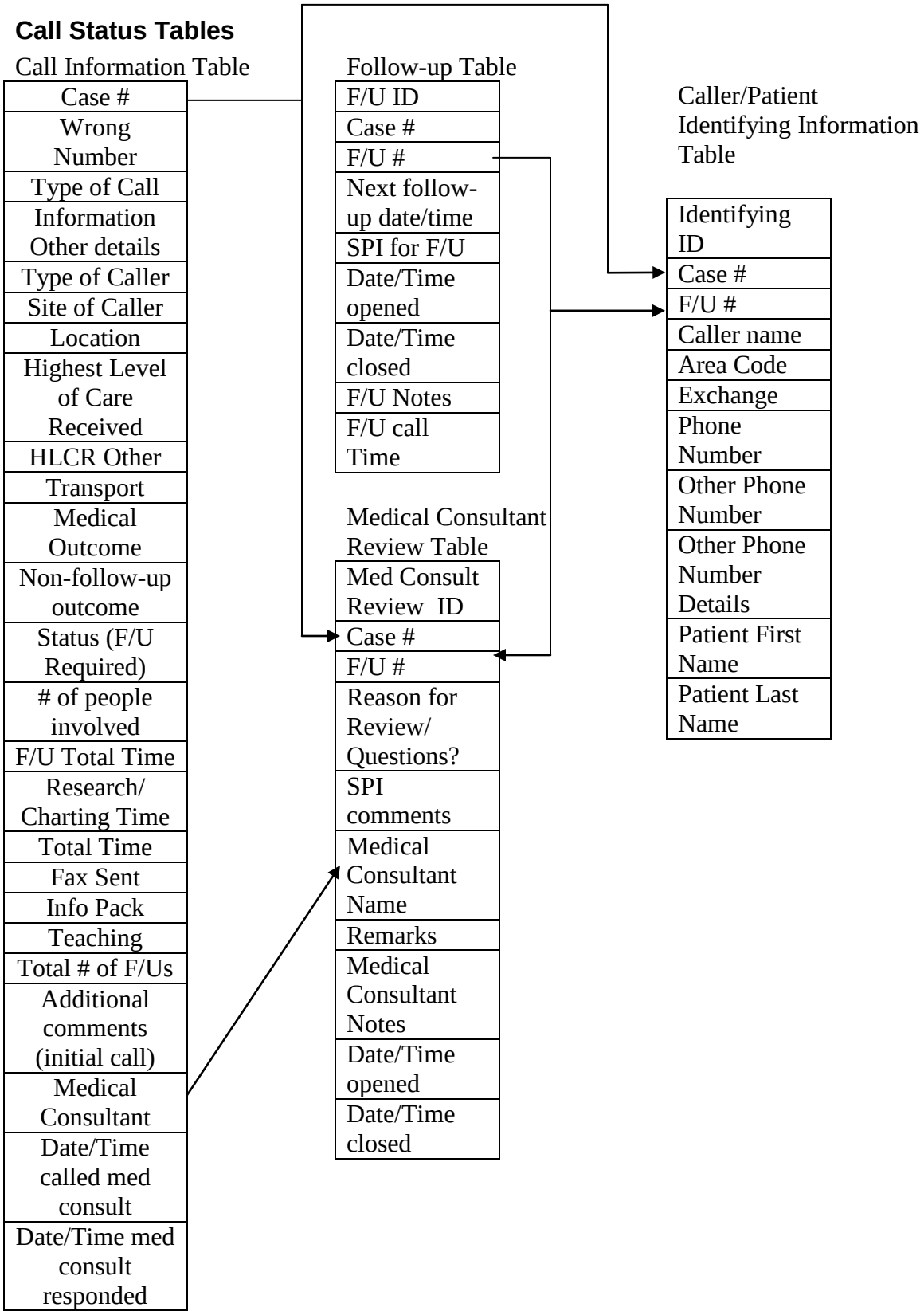
	review	Consultant Call
4	Reason for review	Other
5	Med consult remarks	Appropriate
6	Med consult remarks	F/U Recommended
7	Med consult remarks	M&M Case

Relationships

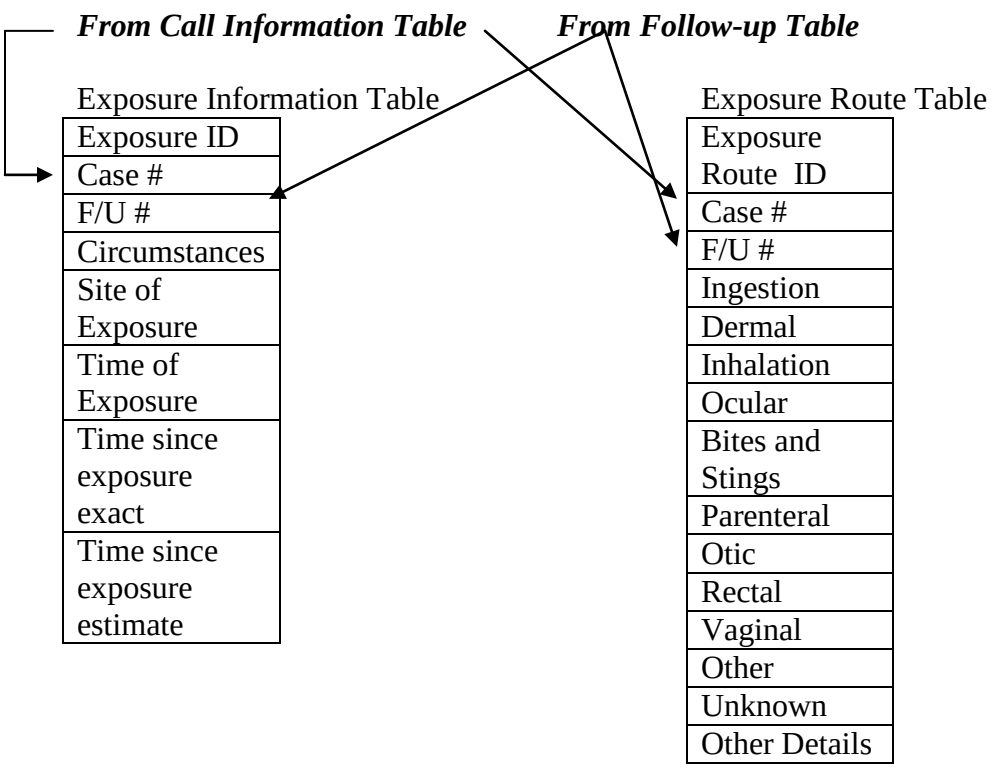
User Tables



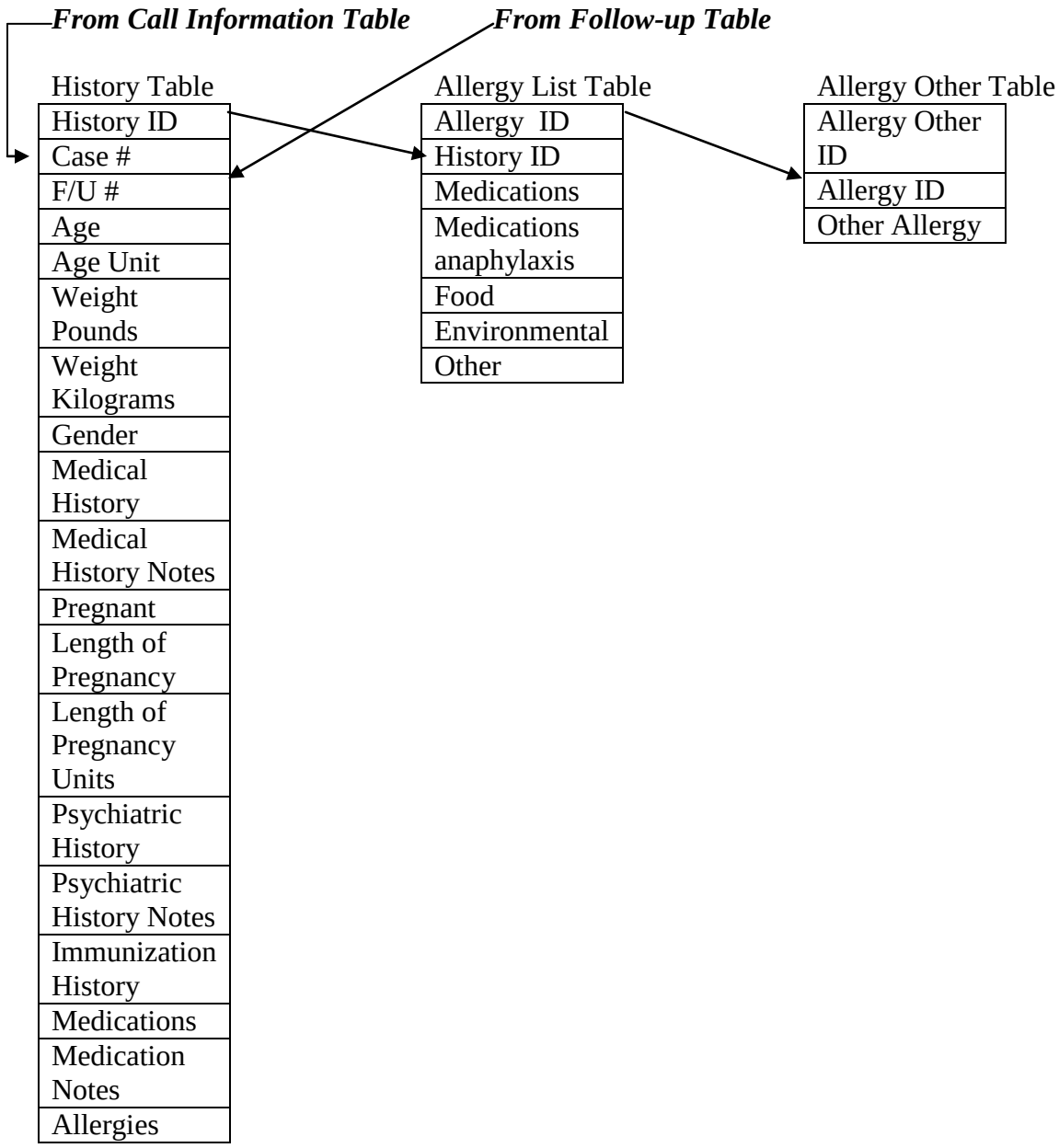
Call Status Tables



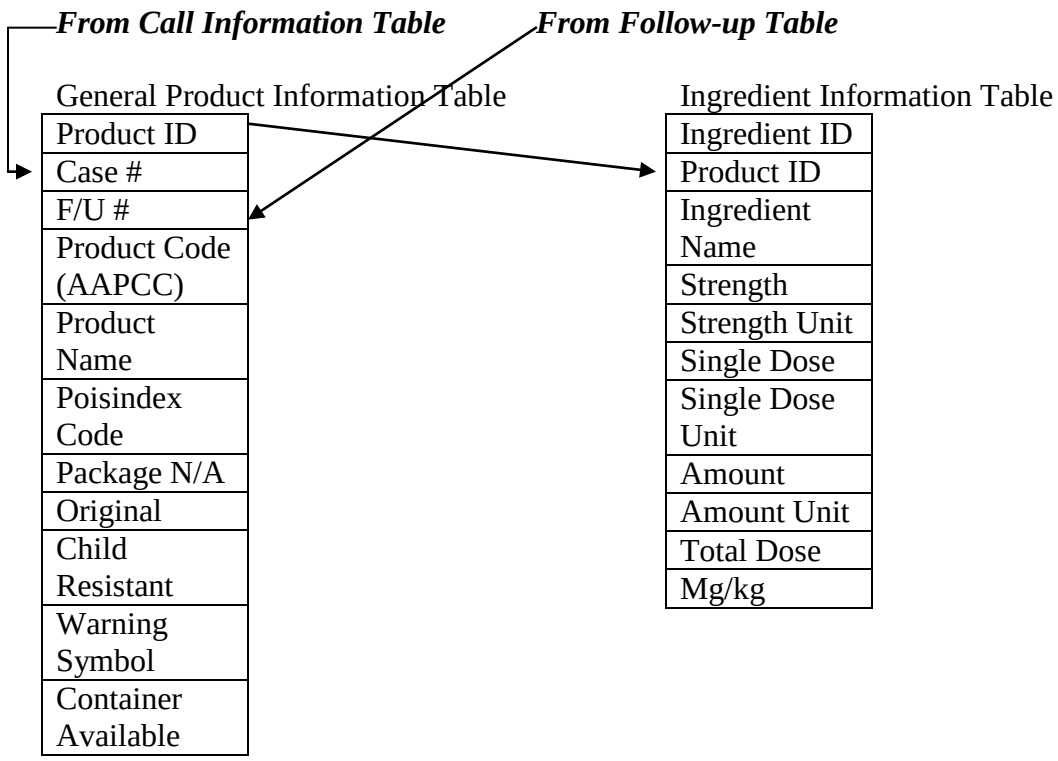
Exposure Tables



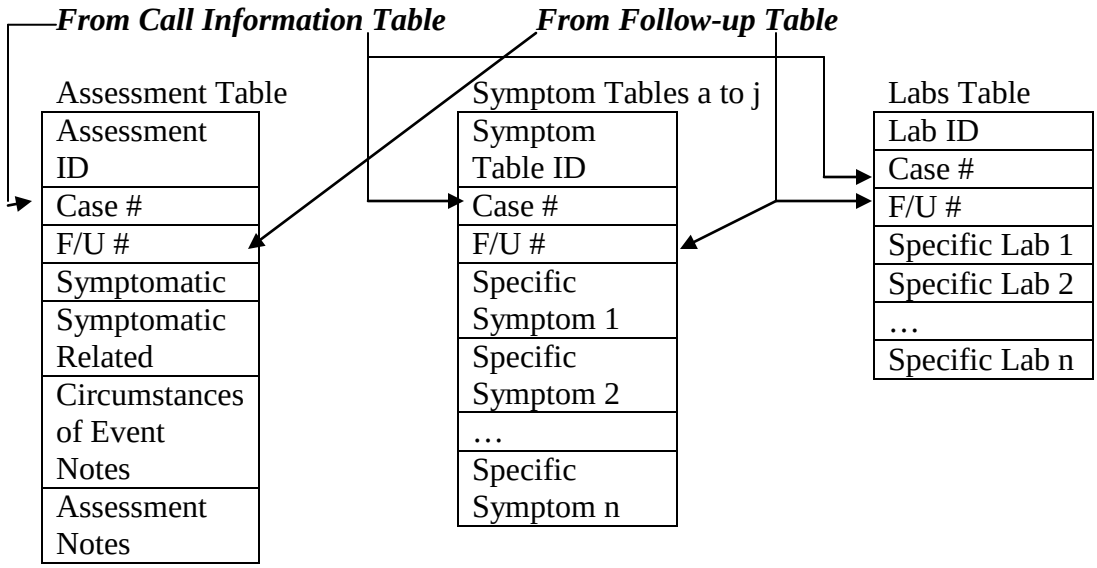
Patient Data Tables



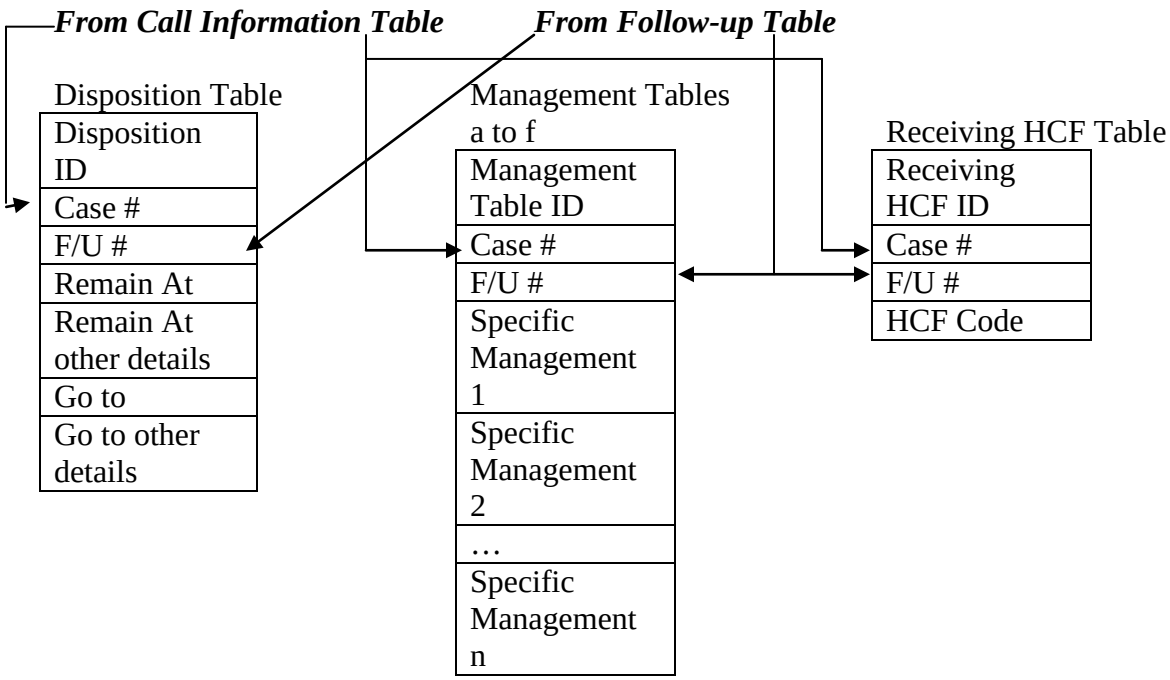
Product Information Tables



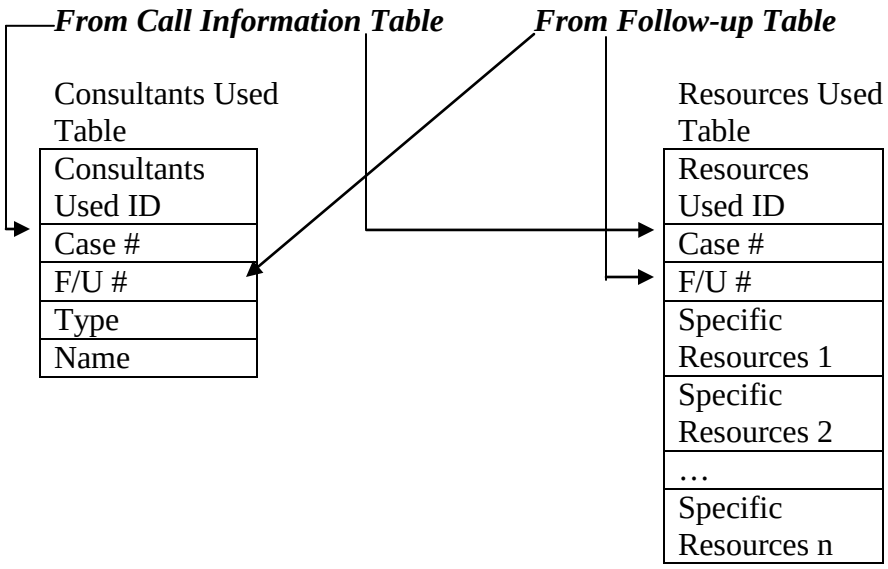
Assessment/Symptoms Tables



Recommendations Tables



Outcome Tables



8.5 APPENDIX E

Privacy Impact Assessment Form

Form filled-out by: Sarah Wanderer
Filled-out: February 9, 2006

Privacy Impact Assessment
IWK Health Centre

Purpose:

A Privacy Impact Assessment (PIA) :

- is a tool for assessing privacy issues and privacy risk related to the collection, use and disclosure of personal information
- determines the impact of an activity on an individual's privacy and assist you to identify and mitigate or avoid any adverse effects
- determines whether a project, program, service, initiative, proposal, strategy, technology or information system (electronic and paper based) meet privacy requirements

When Required:

A PIA is required for activities that involve the collection, use or disclosure of personal information including:

- ✓ a new program or service
- ✓ a significant change to a program or service (*change* means a change to a program of service that affects the collection, use, disclosure or retention of personal information and includes the implementation of a information system)

This tool is based upon the Canadian Standards Association's "Model Code for the Protection of Personal Information which outlines internationally accepted "fair information practices that are the basis of privacy legislation and privacy policies across Canada.

The completion of a PIA for existing programs and services is also encouraged.

What is Personal Information:

For the purpose of this PIA "*personal information*" means any information recorded about an identifiable individual including but not limited to: name, address, age, gender, marital or family status, medical history, diagnosis, course of treatment, Social Insurance Number, Health Card Number, etc.

Instructions:

Submit the completed PIA form and attach any relevant documents to:

Privacy Manager
Quality Resources and Decision Support Services
IWK Health Centre

The Privacy Manager will review the completed PIA form and provide further information and assistance as necessary.

1. General Information

a) Name of project/program: Electronic chart / database system for the Poison Information Centre.

b) Select project/program designation: New project/program: ✓ The project will involve the creation of a new version of an existing paper-based database Project/program with significant changes: ☐ Existing project/program: ☐

c) Provide contact information for the person responsible for answering questions regarding this project/program. Include name, department, location, telephone number and email.
Contact Person: Eileen Gillespie, Clinical Leader; Sarah Wanderer, Health Informatics Intern Department/Program area: Poison Information Centre Location: ?? Telephone: 470-8132; 470-6568 Email: eileen.gillespie@iwk.nshealth.ca sarah.wanderer@iwk.nshealth.ca

d) Provide key project/program dates. Include initiation date, implementation date(s), completion date, and other milestones, if applicable.	
Initiation date: September 2005 Implementation date: TBA	Explanation: Initial research is being conducted once some decisions are made regarding the features and type of system to be created/purchased implementation and

Completion date: TBA	completion dates will become easier to estimate.

2. Description

a) Provide a brief explanation of the project, program, service or change.

The data collected will allow for more comprehensive public health surveillance, to identify and predict trends, for regulatory activities, to evaluate product safety and collect data for future research .This is anticipated to be completed and in place in 2006.

b) Provide a description of the purpose, goals and objectives of the project/program.
What are you trying to accomplish with this project or program? Examples include improving delivery of patient care; education; research; statistics

Purpose: The project will move the IWK Regional Poison Information Centre from a paper-based records system into an electronic database/records system.

Goals: This project will increase efficiency and create a better work-flow, as well as increase the amount of information available to the centre and outside agencies with regards to statistics and surveillance.

Objectives: To implement an effective system to meet our purpose and goals, to be operational within the year 2006.

c) Describe the need for collecting personal information
Why are you making this new project, program or change? Is it required by law, policy or standards?

The new project is not a requirement by law or policy at this time, however it will be necessary in order to contribute to a national Poison Centre database in the future. Contributions to this national database will not involve demographic/identifying information. The personal information collected in the database is required for patient care only.

d) Provide a description of the flow of personal information *(attach a flow chart if applicable)*

The personal information is taken by the Specialist in Poison Information (SPI) from the caller (patient, relative, health care professional, etc.), the information is used for patient care, and identifying information is used by the SPI who took the call as well as any other SPI who may follow-up. The medical consultant involved in the case would also be provided with personal information. The identifying information is then archived and is not provided to any other groups or agencies.

3. Collection, Use and Disclosure of Personal Information

a) Provide a list of all of the information that is to be collected and the intended use for the collection. (for example: name, address, telephone, number, diagnostic history)
example
Information to be collected: *Telephone number*
Intended use: *To update or follow up with clients*

Information to be Collected	**Intended use of information**
The information to be collected is similar to that being collected currently. See attached chart.	The identifying information, including name of the patient and name of the caller is used strictly for patient follow-up to ensure the patient is/has been receiving the most appropriate care. The telephone number is used to determine general location (province and county) and is also only used for follow-up purposes. The age, gender, location, (general) medical history, etc. will be used for statistical collection and surveillance.

b) What is the source of the personal information? (e.g. patient, family member, third party provider, database, forms).

The personal information is provided by the caller, which may be the patient, a family member or other third party including health care professionals.

c) Is there a law, regulation, or authorized policy that allows you to collect, use and disclosure of the personal information outlined in the new service or program or change?
Does the information relate directly to and is it necessary for an operating program or activity of the IWK Health Centre?

Yes ☐ No ☐ Don't know ✓
If Yes, describe or attach supporting documents

If not, does the information relate directly to and is it necessary for an operating program or activity of the IWK Health Centre?

No, the information does not relate directly to an operating program or activity of the IWK Health Centre.

d) List all IWK Health Centre programs, any external agencies and any other groups that will have access to the information. Will there be data linkage with other collection systems? Explain why each requires access, the method of disclosure and what the information will be used for.

The Poison Centre and medical consultants will be the only health care professionals with access to the information. Some information will be provided to the Department of Health however this information will be lacking identifiers.

e) How is the personal information collected and transferred from the individual to the program/system? e.g. fax, email, paper, courier

The information is collected over the phone and is entered directly into the system by the SPI involved in the case.

4. Consent

Has the individual consented to the collection, use and disclosure of personal information? Yes ☐ No ☐

If yes, describe the consent process. Attach any consent form(s)

If no, explain why consent is not required.

We assume implied consent based on the fact that the information is provided for purposes of improved care delivered by the healthcare professionals involved in the case. The identifying information is not disclosed to anyone outside the immediate circle of care and therefore no consent is required for disclosure.

5. Maintenance and Accuracy

a) Describe how the personal information is kept accurate, complete and up-to-date for the requirements of the project/program

The information is required to be accurate only for the time the call takes place and the number of days required for follow-up after this time the information is archived and need no longer be kept up-to-date.

b) Provide details of the retention schedule or timetable for keeping the personal information collected? What is the plan and method for destruction of the information?

There is no plan to delete or destroy this information at any time. The personal information will be archived indefinitely within the database system and within an archive/back-up system.

6. Safeguards, Security and Access

a) Will individuals have access to their own personal information? Yes ✓ No ☐

If yes describe the process for allowing access to their personal information and describe any limitations on access.

By law patients have access to any type of medical or health record pertaining to themselves, there is no guideline as of yet to determine the process for the patient to receive a copy of the information. This has not been an issue during the existence of the poison centre and the same information is collected currently. It is possible for a copy of this information to be printed for viewing by the patient.

b) Where will the personal information be located? List all locations including physical locations.
The information will be located on dedicated servers within the IWK Health Centre no further details about these servers and back-up servers are available at this time. Printed versions may be appended to the patient record of patients within the IWK.
How is personal information stored? Electronic format ✓ Paper format ☐
Is electronic information stored on servers? Yes ✓ No ☐
If yes specify location of servers:

Will users store information on individual's computers or terminals? Yes ☐ No ☐
This is unknown at this time, however if any information is stored locally it will be temporary, only if there is a network outage and there is no immediate access to the server. When access to the server becomes available all information stored locally would be transferred.

If there is a data repository, provide the name, description and geographical location of the repository.

Unknown at this time.

c) List the users (positions, not names) who will have access to the personal information. Indicate a brief rationale for each user's need to access the information and indicate if there are limitations or restrictions to this access.

Specialists in Poison Information (SPIs): In order to enter information into the system at the point of call and manage the case, as well as to gain knowledge from previous cases.
Medical Toxicologist: To consult on cases and gain knowledge from previous cases and statistical trends.
Medical Consultants (emergency room physicians from QEII): In order to consult and aid in the care of the patient.
Poison Centre Administration Staff: In order to create reports.
SPIs will have complete access to the information along with the Medical Toxicologist and Medical Consultants, the administration staff need only require report writing information which would not include any identifying information. Medical Consultants would not have access to change any information.
Database administrators (IT department) would also have full access to the system in order to provide technical support.

d) Describe the administration safeguards in place to protect the personal information.
- Have all users signed confidentially agreements. Yes ✓ No ☐

- Has all staff received training to familiarize them with privacy, confidentiality and security policies and practices? Unknown (could be made a requirement)
Yes ☐ No ☐
-Do contracts with external service providers/vendors contain privacy provisions which meet IWK Health Centre requirements? Yes ☐ No ☐

Unknown at this time; will be ensured upon, prior to any purchase of software or agreement between any outside agencies.

- Is access to the personal information restricted on a "need to know" basis?
Yes ☐ No ☐
It can be if necessary
- Explain the process used to remove access to personal information when staff leave or change jobs or positions.
The username/password for the system will be eliminated upon the departure of a staff member and if any VPN access exists (not currently available but may be available in the future) it would also be revoked.
- Other Safeguards please describe:
The security features of the system will be specific to any system purchased or built these details are not currently available.

e) Describe the process in the case of a breach of privacy.

Unknown at this time

f) Describe the techniques used to protect the security of the information?
e.g. locked file cabinets, encryption, passwords, and password change routine.

Any identifying data sent through a network will be encrypted, and the system will be password protected with encrypted passwords. A password change routine may be a security feature of the system however the details are not available at this time. Other security features may be present however specific details are not available currently.

g) Is remote access to the information permitted? Yes ☐ No ☐
Unknown at this time.
If yes, describe the method of access.

This will be something worked out throughout the process of implementation. It is a consideration at this time however the methods have not be decided upon.

h) Is access to information monitored and audited? Yes ✓ No ☐

If yes describe:

Access to the system will be monitored and logged. Any changes will also be logged with the original information available as well as the new information. This is a necessary feature of any system involving patient records. Details about the auditing system are not available currently.

i) Will the project/program be tested to ensure privacy controls are functioning? Yes ✓ No ☐

It is important to test any new system to ensure every part of that system is functioning as required.

7. Mitigation of Privacy Risks

Provide any additional information, plans or proposals to minimize or eliminate risks to privacy of personal information in this project, program or change.

8. Additional Comments

Provide any additional comments or information related to the privacy impact assessment of this project, program or change.

It will be necessary to revisit some of the above responses when the project is further along. Currently the project is in the research phase. A lack of specific information is primarily due to the fact that the system has not as of yet been firmly decided upon. Once the decisions regarding the purchase or creation (design) of the system have been made there will be more appropriate responses to questions regarding privacy of information.

Completed by: _Sarah Wanderer_____ *Date:* _February 9, 2006__

Reviewed by: _____ *Date:* _____