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REVIEW OF INFORMATION SYSTEMS FOR ADMINISTRATION AND PLANNING IN THE VANCOUVER ISLAND HEALTH AUTHORITY'S MENTAL HEALTH AND ADDICTIONS SERVICES

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EXECUTIVE SUMMARY

The purpose of this paper is to illustrate the health information requirements of health care administrators and providers in VIHA Mental Health and Addictions Services. Currently measures of health system efficiency and effectiveness are based on proxies of resource utilisation. Such measures fail to adequately inform administrative decision makers on health system performance.

The paper is primarily concerned with health information requirements of administrators; because administrative information is directly dependent on information practices of care providers, there is frequent reference to the care provider perspective of health information. The paper is divided into three main sections. The first section identifies health information requirements of health care providers and administrators, and discusses the role electronic health records play in satisfying those needs. The second part of the paper provides an overview of existing health information systems in VIHA Mental Health and Addictions Services; estimates the size of the target population and the challenges it faces; and evaluates existing health information systems and databases relied upon by mental health administrators. The third section identifies strengths and limitations of existing practice and provides solutions to addressing the challenges. The paper closes with recommendations to administrators of VIHA Mental Health and Addictions Services on how to best accommodate health information requirements.

Information used by administrators is directly dependent on information collected by health care providers. Currently, health information systems in Mental Health and

Addictions Services lack standardisation. Because administrative information systems maintain aggregated, anonymised information rolled-up from care providers, data is treated uniformly, failing to account for differences in data collection practices. The lack of standardised clinical vocabularies, assessment methodologies and health information systems seriously affects the usefulness of information once aggregated at the administrative level. In addition, valuable detail that would permit administrators to more accurately risk-adjust data to achieve better outcome measures is either lost or simply not collected.

The introduction of electronic health records (EHRs) in recent years, has offered a solution to the problematic transfer of information from care providers to administrators. EHRs offer the functionality required by both care providers and administrators. Federal EHR initiatives promoting the development of national EHRs are underway in Australia, UK and Canada. Health Canada and provincial ministries support initiatives geared towards the development of electronic health records.

The target population of VIHA Mental Health and Addictions Services is difficult to measure. Prevalence indicators from epidemiological studies may be used to estimate the size of the population expected to suffer from mental health and addictions problems, however results may not be representative of all populations. Target populations of Mental Health and Addictions Services and community-based programs and agencies frequently overlap, indicating a great deal of valuable information is potentially available at the community level. Currently communications between the hospital sector and the community are hindered and likely do not conform to existing privacy legislation.

Current coding practices also fail to inform health system administrators: the incidence rate of a particular disorder does not identify causes of resource utilisation variance. Care providers treat functional status rather than diagnosis, yet existing performance measurement practices rely upon diagnostic and length of stay criteria. The inability for administrators to appropriately risk-adjust data, based on known intervening variables, seriously restricts the validity of performance measures.

Because of the reliance on proxies to measure health system performance, existing indicators may be inappropriate. The ability to assess clinical functional status in a standardised manner at the level of the care provider will permit administrators to assess more accurately health system performance. Currently there exists a disconnect of communication between care providers and administrators; the adoption of an information system that satisfies information needs of both parties, and has the capacity to transfer information between parties, would be an efficient solution.

Existing technological capacities of Mental Health and Addictions Services in the three VIHA regions is highly variable. Remote areas (primarily found in VIHA North) do not have access to high-speed Internet connections. This seriously impedes the region's ability to participate in an EHR. Health information practices throughout the three regions at both the administrative and care provider levels are inconsistent. Lack of standardised clinical vocabularies and assessment tools hinders communication among and between care providers and administrators of both the community and acute care sectors.

Available health information systems offer administrators limited insight into health system activities and performance. Issues surrounding the quality of the data maintained in these systems may be traced back to both the functional design of the systems themselves and the manner in which information arrives to the systems. Inconsistencies of practice matched with non-standardised clinical vocabularies seriously affect the validity of mental health and addictions information when aggregated.

Information pertinent to the needs of administrators in VIHA Mental Health and Addictions Services is currently distributed throughout a number of information systems and databases. These systems are problematic from a data quality standpoint, raising concerns over the timeliness, relevance, accuracy and accessibility of information.

A solution to the problems of existing information practice is found in the preparation for EHRs. Initiatives directed towards development of EHRs are plentiful. Electronic information systems that are developed in compliance with existing health information, technical and privacy standards will someday comprise a pan-Canadian EHR. To best prepare itself, VIHA Mental Health and Addictions Services must achieve standardisation of clinical vocabularies and assessments. Mental Health and Addictions Services must adopt an information system that satisfies both the needs of care providers and administrators. The information system must be integrated and easily accessible by intended users. Deployment plans should incorporate the community sector in order to maximise information capacities.

The need to prepare for participation in the pan-Canadian EHR cannot be over-emphasised. Existing information practices lack appropriateness, effectiveness and efficiency. New standards for mental health and addictions information must be established, and an appropriate tool with which to employ such standards must be widely deployed. Health care providers and administrators stand to benefit from improved capacity to communicate, provide care, and assess performance; ultimately improving quality of care to individuals suffering mental health and addictions disorders.

INTRODUCTION

TOWARDS INTEGRATED HEALTH INFORMATION PRACTICES

Effective provision of health care is possible only when health care decisions are informed. Health care information can be presented in a variety of formats, each of which is open to multiple interpretations. Consistent, reliable health information presented in a meaningful manner is essential to delivery of quality care.

Population trends throughout North America indicate both an aging and growing population (United States Census Bureau, 2002). Such effects place ever-increasing demands on health care systems. The Canadian health care system is publicly funded and universal, which create even more conflicting pressures than what would face a system that could charge more for its services, select its clientele and report only to its shareholders. For example, the public demands increased accountability and improved quality of care, while also calling for limited increased funding. A careful balance must be maintained by health care systems to prove to their publics that the most adequate health care is provided economically. In order to justify spending and improve accountability to the public, health care systems must rely on quality information when making administrative decisions.

Administrative health care decisions are restricted by tight budgets, informed by existing health information systems, guided by best practices and monitored by the public. The role of health information in this tetrad is paramount, as the quality of the information used when making administrative health care system decisions greatly influences health system performance and health outcomes.

Health information practices are currently under close scrutiny. In efforts to improve efficiency and effectiveness, health systems throughout the world have devoted significant resources to the development and implementation of electronic health information systems. The primary impetuses for this course of action are the desire to maintain a broad access to patients' health information across the health system, in order to create a comprehensive continuum of care for service recipients. This could also lead to the minimisation of health care system operations costs. In order to accomplish this, health systems must develop standardised information practices across different health services.

Health information systems form the basis of Electronic Health Records (EHRs). Initiatives directed towards the development of EHRs are quickly becoming the norm in many jurisdictions throughout North America, Europe and Australia (Office of Health and the Information Highway, 2001). The availability of technology and comparable inconvenience of paper records have facilitated the advance towards electronic records systems. In 2000, the Canadian Federal Government announced a commitment to accelerate the development and adoption of modern information technology systems in health care (Canadian Intergovernmental Conference Secretariat, 2000). The lure of standardised information collection practices, improved security of information and immediacy of information exchange have prompted health care providers and administrators to recognise the long and short-term advantages of electronic records.

STATEMENT OF THE PROBLEM

Existing health information practices at VIHA Mental Health and Addictions Services lack efficiency and effectiveness. Health information systems currently used are inefficient due to functional overlaps requiring multiple data entry and duplication of other administrative procedures. Information required for decision-making is sparse and distributed throughout a number of discrete information systems, databases and written records. These systems have grown within independent program areas, resulting in multiple systems that lack integrative capabilities. In addition, such systems fail to adequately satisfy privacy and security requirements expected of modern health information systems.

The health information systems lack effectiveness, as they do not capture (or fail to make available) information required for administrative decision-making; they do not collect complete information, seriously impeding health care providers' ability to offer timely and appropriate service. The compound effects of this situation result in an inability of health care administrators and providers to make informed decisions; fundamentally impeding health care professionals' abilities to assess the effectiveness of Mental Health and Addictions Services.

VIHA Mental Health and Addictions Services are in need of a comprehensive, integrated health information system that employs standardised clinical vocabularies to satisfy the needs of health care providers and administrators.

ORGANISATION OF THE PAPER

This document provides an exposition of health information needs for VIHA Mental Health and Addictions Services. The paper begins with a background to the existing problem: including a definition of health information, the role of information technology and exploration of health information stakeholders' perspectives. Existing trends in health information are then identified; a brief review illustrates activities in other jurisdictions.

Following the backdrop of the problem, a review of health information systems and databases accessible to health care administrators and providers in VIHA in general, and more specifically in the VIHA Mental Health and Addictions Services is presented. This provides the reader with an understanding of VIHA Mental Health and Addictions Services' current health information practices. The paper is primarily focused towards the needs of health care administrators, but because the needs of administrators are largely dependent upon the information practices of health care providers, their needs are also discussed.

The discussion examines the strengths and weaknesses of existing health information practices, and provides an illustration from a user's perspective. Specific challenges standing in the way of health information reform are defined and priorities are identified.

The paper closes with conclusions and recommendations, which outline detailed requirements for health information practices in VIHA Mental Health and Addictions Services. Specific recommendations to fully implement performance measurement and performance management are beyond the scope of this paper.

BACKGROUND and LITERATURE REVIEW

This section provides definitions and a brief overview of health information and opportunities provided by information technology. The focus is on user's perspective (health care administrators and providers) and on mental health information. Shortcomings of existing practice are also identified. Recent developments in health information practice, such as EHRs, are discussed and exemplified in a brief jurisdictional review.

DEFINITIONS

The health care sector in general, and mental health and addictions care also, involve a wide array of health care professionals and is delivered in a variety of settings. As the term *patient* is used only when an individual's relation to a physician is explicit the term *client* is used throughout this document to denote recipients of mental health and addictions care.. In the same respect, the term *care provider* is used to denote any individual in a health or health-related discipline who provides service to clients. The term *administrator* is used to denote any individual involved with the administration or management of health programs or services.

There is an implied distinction between *Mental Health and Addictions Services* and *mental health and addictions services*. The former is the collection of programs and services provided exclusively by the Vancouver Island Health Authority. The latter groups all the informal programs and services directed towards or providing services to individuals with mental health and/or addictions issues; this may or may not include programs and services provided by the Vancouver Island Health Authority.

The term *information practices* is used frequently throughout this document and should not be confused with *information systems* or *information resources*. In the context of this paper, *information practices* refers only to the activities involved with and the resources related to the acquisition, retention, storage, retrieval, communication, utilisation and destruction of health information. *Information systems* are the set of procedures in which health information transit and is stored, while *information resources* are either information systems or databases available to care providers and administrators.

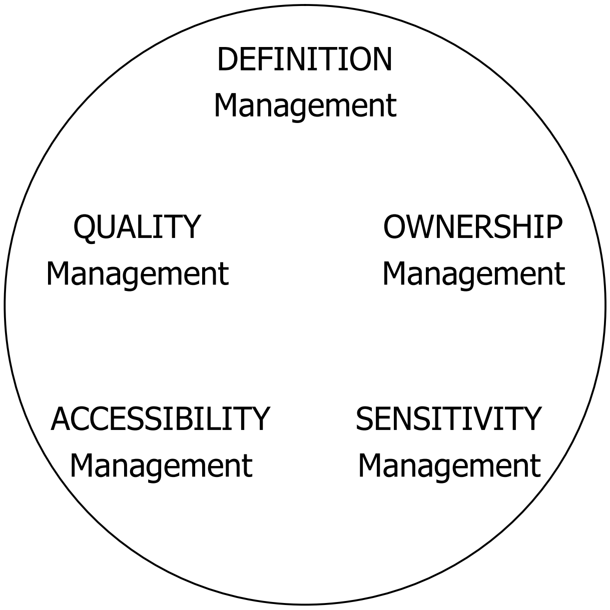
HEALTH INFORMATION

The online Oxford English Dictionary defines information as “knowledge communicated concerning some particular fact, subject, or event.” Information may also be viewed as a composite of individual data elements provided within a context that supplies individuals with knowledge. A complex network of relationships (e.g., reliability of data origins or timeliness of data) supplies context that help individuals process data into useful information so appropriate actions may be taken.

Context must be defined through standards of practice, such as the use of a common language and observance of rules surrounding proper handling of information. Context of information may also be defined in terms of the parties involved (for example who collects the information, for what purpose, and whom the information is about).

Figure 1 illustrates five domains of information management: quality, definition, ownership, sensitivity and accessibility (Office of Information Technology, 1997). The domains represent fundamental characteristics of information as defined by the New South Wales government and was selected for inclusion in this project because it explicitly identifies information management considerations which must be addressed when considering the implementation and management of health information systems. As well, the combined effect of the five domains provides information with context, bestowing meaning to the data for use by a variety of individuals.

Figure 1. Five Domains of Health Information Management.



NSW Government Office of Information Technology
Information Management and Technology Framework Guideline (1997).

The five information management domains identified in Figure 1 influence the manner in which health care professionals handle information.

- *Ownership* – Health information is a commodity that may be owned. This is a complicated issue as technology permits multiple care providers to have access to information they did not necessarily collect and gives them the ability to alter it. Individuals handling information must be able to index data elements according to their owner in order to properly define and assess issues surrounding sensitivity and accessibility management.

- *Sensitivity* – Health information is considered extremely personal and as such, issues surrounding privacy, confidentiality and physical security of data become influential elements in the practice of information management. The capacity to limit access to information based on role is essential to upholding privacy standards.
- *Accessibility* – Health information must be accessible, yet not accessible by all. Understanding and limiting who may read, write or print information in a system requires the employment of technology and the implementation of appropriate policies and procedures.
- *Quality* – Health information must be accurate, reliable, complete and current. Only when these criteria are satisfied is health information useful for making critical care decisions that affect the health of individuals.
- *Definition* – Health information must be clearly defined. Information that is shared with others must be interpretable, and so the use of common clinical vocabularies is an essential component of information conveyance.

Information is subject to lifecycle activities such as collection, storage, access, use and disposal (Information Management Resource Centre, 2002). Each of these activities is strongly influenced by the nature of the information involved and the parties responsible for performing these functions. Recognising the sensitivity of health information, it is necessary that all activities involving health information are modified by practices which observe issues surrounding privacy, security and confidentiality.

The advent of large databases and EHRs has been accompanied by concerns about the privacy and confidentiality of personal health information. The ability for organisations to collect, store and share information in an electronic environment has brought with it concerns over abuse of health information management privileges. Concerns over the sale or disclosure of health information to third parties or unauthorised access are legitimate. Federal and provincial privacy legislation acknowledge an individual's control over the collection, use, disclosure, retention and disposal of personal information by collecting organisations (Health Canada, 2001a). Health care organisations in British Columbia must comply with the provincial Freedom of Information and Protection of Privacy Act (FOIPP) and the federal Privacy Act. In January, 2004, privacy practice in health care must also accommodate the Personal Information Protection and Electronic Documents Act (PIPEDA), initially intended to regulate information practice in the private sector (Spencer, 2001).

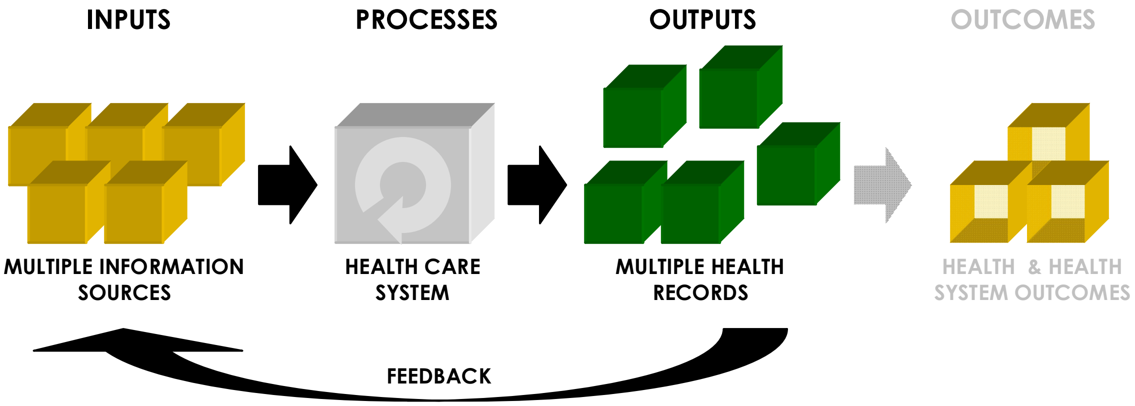
A recent British survey examined perceptions of health information privacy and confidentiality as it pertains to EHRS (National Health Service, 2002). Respondents were more concerned over who used health information and whether it was anonymised than the manner in which information would be used. Access to information on a need-to-know basis was a priority for many respondents. Summary results of the survey are presented in Appendix A.

In many ways, technology may be used to address popular privacy concerns such as those identified in the NHS Survey. Automated audit trails of record access, encryption technologies to anonymise data, and the ability for software to limit access to health information based on role or assigned privilege all help satisfy the privacy and confidentiality needs of health care recipients. The Canadian Standards Association (CSA) has created a voluntary national standard for the protection of personal information composed of ten principles; when followed, the code ensures privacy practice adheres to provincial and federal legislation (see Appendix B for a summary of the CSA Privacy Principles).

Figure 2 is a high-level logic model that was created for this report to illustrate existing information practices in VIHA Mental Health and Addictions Services. Information used by care providers is drawn from a variety of sources (personal history, multiple client records, health care providers' knowledge, academic sources and so forth). This information is often fragmentary, yet may be processed as if complete, and is used to establish course of treatment. In addition, because of the multiplicity of information sources, existing practices make it impossible for care providers to gather all pertinent clinical information together; therefore only a portion of the relevant information may be processed by the care provider. The effect of fragmented, multiple records is the opportunity for inaccurate care decisions, consequently corrupting the validity of clinical outputs. Outputs of this particular model include information in the form of multiple clinical charts, medical records, and care providers' notation. Ultimately, changes in health status are expected from these processes, and health care professionals rely upon clinical extrapolations from health outputs to inform future health system decisions. Health outcomes (a true measure of system performance) rarely enter the process at all because of a lack of ability to acquire and process the appropriate information.

In order for such outputs and outcomes to inform future decisions, information must be made available to health professionals in consumable formats. Existing health record practices at the care provider level do not readily supply health care administrators with information required to answer questions regarding resource allocation and performance monitoring.

Figure 2. Simplified Health Information Path.



Information Quality

In this report, the term *quality* is used to denote the fitness for use of data or information. Statistics Canada identifies that whether data are fit for use depends on the intended uses and on their fundamental characteristics of quality. Although there is no standard definition of quality employed by all statistical agencies, there is a generally accepted range of quality dimensions (Statistics Canada, 1998). The following table illustrates dimensions of information and data quality identified by three statistical agencies.

Table 1. Dimensions of Information and Data Quality by Statistical Agency

Statistics Canada	Eurostat	AusStats
Relevance	Relevance	Relevance
Accuracy	Accuracy	Accuracy
Timeliness	Timeliness	Timeliness
Accessibility	Accessibility	Accessibility
Interpretability		
Coherence	Coherence	
	Comparability	Comparability
	Completeness	Comprehensiveness
		Consistency
		Cost Effectiveness

Sources: Statistics Canada, 1998; Eurostat, 2000; Australian Bureau of Statistics, 2001.

Common to all these quality frameworks are the dimensions of relevance, accuracy, timeliness and accessibility. Table 2 provides definitions for each of these dimensions as defined by Statistics Canada (1998):

Table 2. Selected Dimensions of Quality of Information.

Relevance	A qualitative assessment of the value contributed by the data, characterised by the degree to which the data or information serve to address the purposes for which they are produced and sought by users.
Accuracy	The degree to which data correctly estimate or describe the quantities or characteristics that the statistical activity was designed to measure.
Timeliness	The length of time between its availability and the event or phenomenon it describes, but considered in the context of the time period that permits the information to be of value and still acted upon.
Accessibility	The availability of information from the holdings of the agency, also taking into account the suitability of the form in which the information is available, the media of dissemination, the availability of meta-data, and whether the user has reasonable opportunity to know it is available and how to access it.

Source: Statistics Canada, 1998.

See Appendix F for a detailed description of the six dimensions of quality as defined by Statistics Canada.

INFORMATION TECHNOLOGY

> *"Most interactions between patients and health care service*
> *providers are still recorded using paper and pen,"*
> *(Ministry of Health Planning, 2002, p. 48).*

Today, the influence of information technology affects all aspects of daily life. Information technology in the health care system is used for client care (diagnostics and record keeping), administrative functions (planning both what health services to offer and how to allocate resources, payroll, reporting, etc.), communications and security. Technological advancements such as faster processing speeds, increased capacity to manage and store information, declining costs for implementation and maintenance, have given information technology a prominent role in health care systems.

One of the primary benefits of information technology is reduced time spent on administrative tasks (scheduling, documenting and communicating), allowing care providers to spend more time with clients. Information technology permits the streamlining of administrative tasks and transformation of information into knowledge using fewer resources while lessening redundancy. Technology also permits the integration of information systems in healthcare, ensuring the most up-to-date information is available to clinical decision-makers. Such systems improve the quality and safety of care provided to health care consumers while facilitating communication among service providers.

Disadvantages to rapid advancements in information technology include variability in the capacity for users to understand new technologies. Changes in information systems require users to re-train and organisations to acquire new hardware and software. These responsibilities often require significant investment and a high degree of commitment from lead decision-makers. Information systems tend to grow old quickly. As technology moves forward in leaps and bounds, legacy systems become outdated, limiting their use to individuals and systems. The capacity for an information system to grow and change with the demands of the users should be of primary concern to organisations considering implementation of new information systems. Other problems are: (1) higher dependability on machines and electricity to provide health care (which make the system more vulnerable to equipment breakdown and electricity blackouts); (2) Faster dissemination of information, a disadvantage when the information is false or incomplete.

Health care systems today manage high volumes of complex information. Health information is often gleaned from multiple sources, such as academic resources, information systems, databases, clinical records and other health care professionals. A discrete paper chart environment is fraught with challenges. Paper records can be illegible and often lack consistent or complete information. Paper charts can only be in one place at a time, unless completely photocopied, and are costly to transfer, store and retrieve. There is the added challenge of maintaining up-to-date health records, should clients access health services at a variety of locales. In addition, multiple points of treatment result in the creation of multiple client records, thus a great deal of redundancy can result. Technological advancement in recent years has provided incentive to migrate health records to a strictly electronic format. The drive towards electronic format is accompanied by the necessary inclusion of standarised clinical vocabularies.

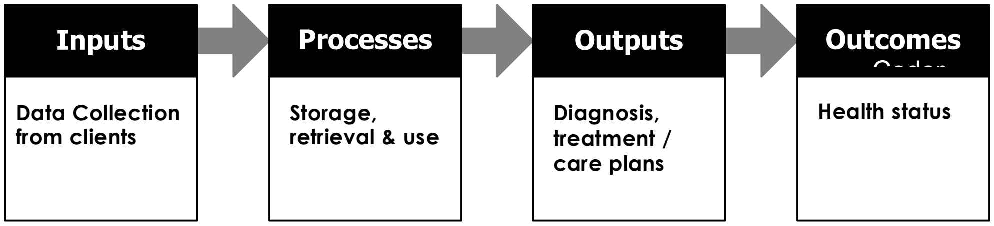
INFORMATION PRACTICE PERSPECTIVES

Administrators and care providers will agree that there is room for improvement within healthcare. Across British Columbia, there is evidence of a systematic recognition for the need to change mental health and addictions services (Vancouver Island Health Authority, 2001; Vancouver Coastal Health Authority, 2002; Fraser Health Authority, 2002; Interior Health Authority, 2003; Northern Health Authority, 2002). Specifically, in VIHA's Mental Health and Addictions Services, this is indicated by the broad-based Mental Health Renewal project currently underway; and the introduction of nearly six and a half million dollars in new funds for the enhancement of community-based mental health and addictions services. The provincial governments' commitment of new funds to Mental Health and Addictions Services is especially convincing when considered against the backdrop of extensive funding cuts occurring throughout the majority of the provincial public sector.

Care Provider Perspective

Care providers are the primary information portals of health care systems. Health care data originates with care providers and is dependent on accurate collection, documentation and interpretation. The logic model below was created for this report to illustrate information movement from the care provider perspective.

Figure 3. Care Provider Information Logic Model



Inputs

Information enters the health system at the level of the care provider. Care providers of disciplines within and outside acute care are primarily interested in information at the level of the individual client. In order to provide the most appropriate care, service providers require accurate, up-to-date clinical information about their clients. Service providers currently collect such data (at varying degrees of completeness) at the individual level in both the acute care and community sector. The result of this is the creation of multiple client records populated with valuable clinical and non-clinical data.

Proper health information practice dictates that information is collected about clients on a need-to-know basis. Care providers are encouraged to collect only information that is necessary to perform their function. Generally, information is collected to inform clinical care decisions or satisfy operational requirements. With a multitude of service providers collecting information at a variety of points of service, there is no doubt that some information is common to all service providers and some is provider-specific. In certain cases, information that is not collected on a regular basis is useful to service providers. As such, informal and unregulated information sharing practices have developed among service providers both within and outside the acute care sector.

Currently, there is great variation in the content and quality of clinical records (Ehnfors & Smedby, 1993; Ellis et al., 1991). A great deal of information fails to get documented because care providers do not have the appropriate tools to properly record their knowledge. As a result, care providers must retain information in their heads, seriously impeding the capacity to share clinically relevant information with other service providers.

Processes

Health care providers store clinical information in a variety of formats. Care providers in the acute care sector maintain paper charts for their clients. In addition, electronic information systems are used to a limited extent. Current clinical charting trends that encourage charting by exception (a method of practice by which only deviations form pre-established norms are charted) lend themselves easily to an electronic information system environment.

The ability for care providers to share valuable clinical information is impeded by a lack of essential tools: a means by which to share information and a standard of communication. Information systems used by care providers are not typically integrated, and information maintained in these systems lack appropriate standards. Standardised clinical vocabularies and assessment methodologies that cross boundaries separating acute care from community care are not available for mental health and addictions services. Currently, health care providers in both sectors collect valuable information in a non-standardised manner, limiting its transferability between service providers.

Outputs

Clinical information is used to make diagnoses, determine treatments and develop care plans. Communication about these clinical outputs is seriously limited between the community and acute care sectors. The results of this knowledge barrier include service duplication, lost or misplaced cases, and poor coordination of services.

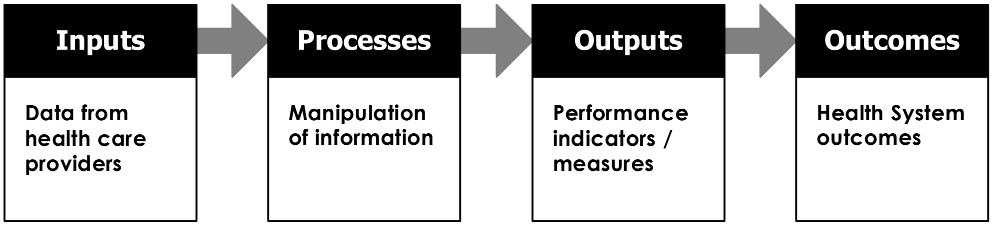
Outcomes

Indicators of improved health outcomes are the ultimate goal of care provider information processes. Population health outcomes are a measure of change in population health status, and are often difficult to assess at the level of the care provider. Population health outcomes are generally determined using aggregate data at the administrative level. Individual health outcomes may also be difficult to consistently assess as clients may discontinue involvement with services and programs unexpectedly.

Administrator Perspective

Health care administrators are the data termini of health care systems. Health care data originating with care providers is anonymised, grouped and aggregated, then delivered to health care administrators in a variety of formats. The logic model below was created to illustrate information movement from the perspective of the administrator.

Figure 4. Administrator Information Logic Model



Inputs

Hospital and community sector health care executives (managers, policy planners, administrators) require quality data that inform decisions surrounding delivery of health care services. Administrators are primarily interested in aggregate clinical data (that which sorts clients into what are considered clinically meaningful and distinct groupings), and statistics related to population, financial planning and resource utilisation.

Administrators have different information requirements than care providers Data inputs for administrators are essentially aggregate data outputs of care providers. This data (consisting primarily of diagnosis and length of stay information) is typically contained in clinical records and abstracted into information systems by non-clinicians. Reliance upon diagnosis and length of stay information raises some significant issues: (1) diagnostic classifications are not sufficiently homogeneous with respect to care requirements; and (2) length of stay is a joint function of care requirements and available discharge options.

Resources maintaining abstracted clinical information include hospital ADT (admission/discharge/transfer) systems and clinical information systems. ADT systems provide administrators with coarse measures of service utilisation. Clinical information systems provide administrators with information associated with most responsible diagnosis to an episode of care. Administrative decisions are based on these information sources, yet several critical pieces of information are absent: client functional status, clinically meaningful measures of outcomes, and utilisation data for the community sector. The absence of this type of information seriously limits administrators' capacity to risk-adjust data.

Clinical information has the potential to be risk-adjusted upon many more variables that what are currently available to administrators. However, aspects such as housing status, socio-economic status, drug use behaviours, help seeking behaviours, and incidence of previous hospitalisations or grave disability are difficult to capture in the acute care sector. The ability to capture better information surrounding these and other variables would permit administrators to risk-adjust data so that differences in outcomes may be better accounted for. This would ultimately provide health care systems with more valuable indicators of performance and improved client outcomes.

Processes

Administrators process available data into performance indicators to assess health system operation. Measures have been developed to address eight domains of health system performance (see Appendix C). However, existing information practices make reporting on many of these indicators very difficult, if not impossible. In some instances, information required to satisfy a performance measure is simply not available in the acute care sector.

The limited availability of data and limited capacity to maintain data have undoubtedly influenced the development of common performance measures. Measures such as length of stay are largely relied upon as service utilisation indicators, yet were likely first collected because the information is readily available and effortlessly standardised. Similarly, case rates will provide health care administrators with an indication of how many mental health diagnoses were made in a given period, but such rates will not necessarily indicate how many *individuals* were diagnosed or how many individuals received adequate treatment.

Outputs

In acute care, information is mined from clinical charts and entered into information systems. Extracted data consist mainly of length of stay and primary diagnosis. This information is then delivered to a national body that prepares the data for consumption by provincial ministries. The ministries then provide the data to health care decision makers at regional levels. This multi-stage preparation and dissemination process affects the integrity of what is already problematic information.

Information that has been cycled through the above process is relied upon by health care administrators to evaluate health services. Performance measures such as length of stay and case rate are calculated using information that is predominantly based upon primary diagnosis. The main fault herein lies that health care providers do not treat diagnosis; rather they treat functional clinical characteristics of clients. Thus effective health care indicators and performance measures must be based upon the functional characteristics of clients rather than the diagnostic categorisation of mental illness.

Community care providers are much more in touch with non-clinical aspects of client mental health status such as economic and housing conditions, and drug use behaviours than their acute care colleagues. Because of their often longer-term direct involvement with clients, community care providers are in a much better position to acquire this data than the hospital sector. Understanding relations between risk characteristics and service utilisation would ensure better-informed administrative decision-making. The ability to combine comprehensive clinical and non-clinical information that has been collected in a standardised format would strengthen administrative decision making in both the acute care and community sectors. Unfortunately, technological incompatibilities and lack of standards of practice obfuscate the divide between the acute care and community sectors.

The result of this fracture in information management is the reliance on health care performance indicators that are developed from measures that serve merely as a proxy to actual health (functional) status.

Outcomes

Indicators used to evaluate health system outputs influence ultimate health system outcomes. The inability to accurately and appropriately measure system outputs seriously impedes administrators' capacity to assess outcomes. Because of this, health system outcomes are frequently overlooked. To better assess outcomes, information practice reform must start at the level of data collection by the health care provider, supported by tools such as appropriate means of documentation (standardised clinical vocabularies and information systems with the capacity to handle and process complex information).

Clinical Vocabularies

The Canadian Institute for Health Information (1999, para. 1) defines clinical vocabularies as "standardized sets of encoded terms that allow clinical data to be captured 'at the source' (i.e., entered directly into an electronic record by a health service practitioner)."

The application of clinical vocabularies to health information is called terming. Terming is used to record and retrieve clinical data, and is generally the natural clinical language of health care providers. Currently there is no single standard employed for mental health terming in the community and acute care sectors. The need for such a standard has been recognised worldwide (National Centre for Classification in Health, 2000).

Clinical vocabularies are paramount to mental health information practice as they form the basis upon which codes and groups are assigned. Coding schemes encode and classify termed information. The most prominent coding schemes are the ICD-9 (International Classification of Diseases, ninth revision) and ICD-10. Coded information is classified into clinical groupings, which are intended to classify individuals into homogeneous groups according to symptomatic behaviour for purposes of determining health system resource consumption.

Traditionally, clinical groupings have been determined based on diagnosis and length of stay. Because neither of these indicators is an accurate measure of actual resource consumption, it is necessary to revisit grouping methodologies. Case mix groups (CMGs) should be homogeneous with respect to resource utilisation, however existing groups are not accurate indicators of such. Only through the employment of structured assessments and standardised clinical vocabularies that reflect the functional status rather than diagnosis of clients, may appropriate grouping methodologies evolve. The advent of reformed grouping methodologies will assist with the development of more effective health system performance measures.

In mental health and addictions, clinical vocabularies may be used to create multidimensional descriptions of clients. However, comprehensive clinical vocabularies that cover both mental health *and* addictions have yet to be developed. Efforts have been made to develop clinical vocabularies for mental health at both the national and international levels (CIHI, 1996).

From a technological perspective, clinical vocabularies permit information to be stored in a way that allows computers to recognise and manipulate information. The ability to couple effective clinical vocabularies with appropriate tools for assessment and documentation would permit care providers to communicate essential information within an electronic information systems environment.

Health care professionals worldwide recognise the importance of controlled clinical vocabularies (CIHI, 1996; Raymond & Dold, 2002; WHO, 1999). Clinical vocabularies function as a common language across health care disciplines, supporting both clinical and administrative decision processes. The integration of well-defined clinical vocabularies and information technology provides potential for health care administrators to gain insight into health system performance at a calibre never before realised.

ELECTRONIC HEALTH RECORDS

The use of electronic records and the advent of Internet technology have prompted the concept of EHRs. There exist many definitions of an EHR (HINA, 2000; OHIH, 2001; WERC, 2002a). The Advisory Committee on Health Infostructure provides a comprehensive definition of an EHR:

> *[An electronic health record is] a longitudinal collection of personal health information of a single individual, entered or accepted by health care providers, and stored electronically. The record may be made available at any time to providers, who have been authorised by the individual, as a tool in the provision of health care services. The*

> *individual has access to the record and can request changes to its content. The transmission and storage of the record is under strict security. (Health Canada, 2001b, p. 16).*

Although there is a great deal of EHR documentation available, it is not until EHRs have been operational for a number of years that empirical evidence of benefits to their ability to maintain longitudinal health information will be established. Before such point, we must rely on literature pertinent to short-term evaluations of efficiency and effectiveness. Health care systems that are working towards or already operating EHRs and their constituent information systems have contributed a wealth of information for peer review.

TECHNOLOGICAL DEVELOPMENTS IN HEALTH INFORMATION

As a result of widespread adoption of new technologies and concurrent expansion of data quantity, information practices are subject to necessary reformation. Both private and public sectors recognised the necessity of changing information practices to accommodate ever-increasing data requirements. Timely access to information continues to become more important as restrictions of economy impose upon business practice.

As the use of computers and data warehouses became more widely accepted by health care administrators and practitioners, opportunities to enhance existing information practice arose. The introduction of the Internet has had a profound impact on the ability to access and retrieve information from a wide variety of sources and locations in a time-effective manner. Advancements in technology have also introduced concepts such as tele-health and electronic patient records.

Issues surrounding privacy have arisen from advancements in information technology as applied to the health field. Multiple care providers' ability to access records and share clinical information in a variety of environments has brought about new concerns over the safety and protection of personal health information. In this respect, both technology and modifications of conventional clinical practice play a role in efforts to maintain privacy.

Health care professionals primarily rely on two types of health information systems: (1) operational systems used by administrators for purposes of resource allocation, planning and policy development; and (2) informational or clinical systems used by care providers for purposes of client care provision. Administrators use systems that can provide information about health system performance (generally in the form of aggregate client-related data). Care providers use systems that can provide client-specific information to assist with health care decisions at the level of the individual.

The advent of the EHR concept, also known as Virtual Patient Record (VPR), Electronic Medical Record (EMR) or Computer-based Patient Record (CPR) has resulted from technological developments which allow a single information system to provide both functionality required at the administrative and care provider levels. The ability to combine these two types of information systems has prompted great interest by health care systems throughout the world. Since the late 1990s, there have been some limited national initiatives to create EHRs in the United Kingdom, Australia, Canada and the United States (OHIH, 2001).

Health Canada and the Provincial Ministries are committed to the development and enhancement of EHRs (Health Canada, 2002b). Table 3 presents a multitude of benefits to be derived from the implementation of EHRs as identified by Health Canada (the complete table is provided in Appendix D):

Table 3. Stakeholder Benefits of EHRs.

Stakeholder	**Potential Benefits**
Public	Expanded reach of effective health care
Patients	Improved health care and decreased risks Integrated health services Increased confidence knowing that all health care professionals have access to all relevant parts of their medical history Improved confidentiality and security of health-related data Reduced waiting lists
Health Professionals	Integrated view of patient data Enhanced productivity, reduced administrative costs Increased access to other related and integrated patient information Improved decisions with up-to-date patient information on an as-needed basis
Health Administrators	Access to data to support clinical governance and local planning Reduced health care costs
Government	Improved accountability Improved health resource allocation

Source: Health Canada

While potential benefits of EHRs affect a variety of stakeholders, surprisingly few documents list disadvantages to EHR implementation. Some disadvantages that have been recognised include: costs associated with hardware, software, training, maintenance and updating; lack of standards and policies of practice; and issues surrounding data safety, integrity, security and availability (O’Rourke, 1999).

A common theme of health care reform is decentralisation of authority and service delivery (CIHI, 2000). In light of this, there is an increased reliance on programs and services outside the hospital sector in efforts to achieve a seamless continuum of care and reduce service redundancy. This change in service delivery structure necessitates reliance on a wider range of health care professionals and service delivery sites. In order to best provide client care and reduce duplication of service, health care organisations recognise the need to share client-related information. EHRs permit health care providers to share this information in a regulated manner.

Ideally, EHRs are inclusive of all health care disciplines. Comprehensive EHRs require participation of programs directed towards public health, seniors' health, and mental health; physicians and labs; as well as those service areas in acute care. The mental health component of the electronic health record proves to be particularly challenging. Mental health information is highly complex and historically subjective. Adding complexity to this situation is the fact that a large number of mental health clients receive services outside the hospital sector, from other government agencies, the non-profit or private sectors. Therefore a large number of care providers both within and outside the hospital sector maintain valuable pieces of clinical information. Although much of this information is captured in electronic and paper records, a great deal of valuable information is not recorded because care providers lack appropriate documentation methodologies. The ability to document unrecorded knowledge and link various information resources will give care providers information at a level of comprehensiveness never before achieved, reduce the amount of data redundancy and requirement of clients to repeat information, and provide health care administrators with a wealth of knowledge useful for evaluating health system performance. The fusion of community and acute care services into a multidisciplinary system of health care gives rise to the need for a new evaluation paradigm (Rigby, 1999).

JURISDICTIONAL REVIEW

United Kingdom

Electronic Patient Record initiatives in the UK National Health Service (NHS) have been in development since the mid 1990s. England is considered the world leader in health information initiatives at the national level (Protti, 2001). The NHS efforts aim to create a lifelong electronic health record for each individual in the four countries composing the UK. A primary goal of this initiative is to create a seamless continuum of care for individuals served by health care providers in the hospital and community sectors. Currently, there are four key demonstration sites taking part in the NHS EHR program and the first generation of a national EHR is expected by the end of 2005 (Zeidenberg, 2003).

Australia

Commonwealth, State and Territory ministers in Australia initiated the Healthconnect project in 2001 (AIHW, 2002). The goal of this project is to develop plans for a national network of EHRs. The initiative identifies a number of key priority areas such as indigenous health, population health, health system performance and health information management. Currently there are trials being run in two states, the goals of which are to test collection, storage and exchange of health information and test important components such as consent, privacy, storage and participation (HealthConnect, n. d.).

Canada

In 1997, Health Canada created the Office of Health and Information Highway (OHIH) to act as the focal point for all matters concerning the use of health information and communications technologies. OHIH coordinates, facilitates and manages health infostructure-related activities. The Canada Health Infoway Inc. (CHII or Infoway) fosters and accelerates the development and adoption of health information systems, ensuring compatible standards and communications technologies are employed in all initiatives. Health Canada has committed $500M through CHII aimed at the development of EHRs on a pan-Canadian basis. Developments at the federal level are however limited by the fact that health is under provincial government's jurisdiction.

At a more local level, the Western EHR Regional Collaborative (WERC) is a formal partnership of several health regions in western Canada[1]. Its function is to bring together knowledge, experience and resources to accelerate the development of EHRs at the care delivery level. The Vancouver Island Health Authority maintains the role of observer in this collaborative and is currently in the process of building the foundations for EHRs (Western EHR Regional Collaborative, 2002b).

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[1] WERC includes the following health authorities: Calgary Health Region, Alberta Capital Health Authority, Regina Health District, Saskatoon District Health, Winnipeg Regional Health Authority, Vancouver Coastal Health Authority, Vancouver Island Health Authority.

Health Information Systems in British Columbia

Health Canada (2002a) recognises BC as a leader in the establishment of health information standards and development of EHR building block systems (for example PharmaNet and the Client Registry). The Canadian Health Infostructure Partnership Program (CHIPP) is a federally-funded program aimed to co-fund information technology initiatives aimed toward directly improving patient care. In British Columbia, nine projects were approved, of which five are EHRs. In this section on BC we present health information systems that are of interest for this report as they employ Internet-based technologies to support delivery of mental health and addictions services.

HealthNet/BC is a division of the Ministry of Health Services' Information Management Group, the purpose of which is to enhance communication and sharing of information and applications between health stakeholders throughout British Columbia's regionalised health system. HealthNet/BC's mission statement is as follows: "The right information in the right hands at the right time to support health system decision making." One of HealthNet/BC's primary roles is to define the standards that facilitate information sharing between health service providers.

Health information system projects in British Columbia recognise the necessity of involving community care providers in EHR initiatives. Three mental health information projects in BC that have emphasised the involvement of community care providers are the SYNAPSE project in the former North Shore Health Region, the ICMHIS project in the former Capital Health Region, and the PARIS project in the former Vancouver /

Richmond Health Authority. Although each of the information systems mentioned below are intended to be deployed (at least in part) in the community sector, it is not explicitly clear that physicians will be excluded from any or all of the systems in practice. It is expected that physicians working in the public sector will interact with the systems in future.

SYNAPSE

The SYNAPSE project in the North Shore Health Region is a multi-jurisdictional mental health information system intended to collect and present clinical and administrative information in the form of an EHR. The system tracks care episodes across the full continuum of care including psychiatry, emergency, outpatient, community and residential programs. The SYNAPSE system maintains client demographics (using links to provincial registries); tracks program intakes; allows for customisable clinical assessments and administrative reports; and manages activities such as waitlists and medication profiles. The SYNAPSE project does not extend into the non-profit sector, nor does it have the required privacy framework to permit this.

SYNAPSE is currently operational in the North Shore Health Service Delivery Area, the Northern Interior Health Services Delivery Area, Coast Garibaldi, Sea to Sky, Powell River and Sechelt.

ICMHIS

Development of the ICMHIS (Integrated Community Mental Health Information System) in the former Capital Health Region began two years ago. Like SYNAPSE, the ICMHIS is designed to follow clients throughout the entire continuum of care, from the hospital into the community. The ICMHIS project is generating a standards-based methodology for capturing clinical and service access information held by a variety of service providers, enabling the exchange of information between government, regional authorities and community-based service providers. The system permits users to customise the system at the administrative level to meet specific business needs.

The ICMHIS is currently operational in shelters operated by the Victoria Cool Aid Society (VCAS). It will soon be available to other program areas within VCAS as well as read-only access to VIHA South Emergency Mental Health Services.

PARIS

The PARIS (Primary Access Regional Information System) project is a Vancouver Coastal Health Authority initiative designed to support 47 community sites and over 60 community programs with one clinical information system (PARIS Project, 2002). Program areas using the software will include public health, mental health, continuing care, alcohol and drug programs, primary care clinics, communicable disease control, and others. The first phase of the project will permit programs to register and refer clients; phase two will include additional functionality such as care planning, service scheduling and waitlist management. The system is currently operational in some sites and preparation is currently underway to include Vancouver Mental Health Services.

In sum, there has been wide-spread recognition that the employment of EHRs is necessary. Many jurisdictions are taking steps towards a composite health record, though nation-wide (or Pan-Canadian) EHRs are still in planning stages, efforts are being made at localised levels to ensure components of the electronic health record are in place.

HEALTH INFORMATION PRACTICES, REQUIREMENTS AND RESOURCES: METHODOLOGY OF THE ASSESSMENTS

The approach to examination of the existing state of information practice was done in three parts: (1) a regional assessment, (2) an examination of the VIHA population, and (3) an examination of existing information resources.

VIHA REGIONAL ASSESSMENT

Examination of existing information practices and technologies available to programs and services in the North and Central regions was accomplished through telephone interviews with a convenience sample of administrators from the North and Central regions. A brief, informal method of information collection was employed as VIHA Mental Health and Addictions Services plans a rigorous environmental scan of these regions later this year.

Administrators were asked to comment on four areas: (1) whether shared information systems were used by the programs they are responsible for; (2) the perceived level of compliance with the provincial reporting system CPIM (to be discussed below); (3) methods by which programs and services currently report utilisation statistics; and (4) the existing state of technology available in their regions.

Information practices for VIHA South were assessed using results from a review of information practices of Mental Health Services formerly belonging to the Capital Health Region conducted in 2001. A summary of results from this review is tabled in Appendix E.

EXAMINATION OF THE VIHA POPULATION

To gain an understanding of the demand for mental health and addictions services, the population of VIHA was assessed in terms of size, distribution and growth. The Ministry of Health Services PURRFECT database was used for the majority of this information. Queries made to the database included population by region, age and year (for purposes of projection). In addition, growth rates for the province were attained from BC Stats publications.

Based on population information acquired from the above-mentioned sources, best estimates of incidence and prevalence of mental illness and addictions were applied to the VIHA population to help assess the size of demand for addictions and mental health services. This establishes a baseline of information upon which information gleaned from other data sources may be compared.

Specific challenges that affect the population in need of Mental Health and Addictions Services are discussed.

ASSESSMENT OF HEALTH INFORMATION RESOURCES

The paper presents data from a variety of information systems and databases commonly relied upon by health care administrators. The seven health information resources to be examined include (1) the Ministry of Health’s Health Data Warehouse and (2) PURRFECT database, (3) British Columbia Vital Statistics Agency, (4) Medical Services Plan, (5) Statistics Canada, (6) BC Stats, and (7) VIHA (South) Clinical Information

Services. All these systems use anonymised, aggregate information, thus examination of data contained did not compromise individual privacy or violate confidentiality. One exception to this is the Hospital Clinical Information system that contains information at the level of the individual, but reports only anonymised aggregate information to hospital administrators.

Information resources will be assessed against four main criteria previously defined in Table 2: (1) timeliness, (2) accessibility, (3) relevance, and (4) accuracy. These criteria are based on criteria commonly used to assess data quality (Statistics Canada, 1998; Brackstone, 1999; Office for National Statistics, n.d.). Because data accuracy was not assessable, data integrity was substituted. The criteria selected primarily relate to the Quality Management domain of health information management (see Figure 1). Relevance, in this is a measure of usability, it does not necessarily reflect the capacity for a system to provide adequate measures of effectiveness and efficiency.

Table 4 presents these concepts and the manner in which they have been operationalised for the purposes of this assessment. Assessment of the data quality was performed by the author through his practical observations, personal experiences and access and use of the data over the previous two years as an information professional at VIHA Mental Health and Addictions Services. Measures used are strictly qualitative, they are not computed nor are they consensus-based. The coding scheme was created to indicate whether the author felt the various dimensions of data quality examined were met by the information system or database. Examples of information drawn from each of the systems examined are provided to illustrate discrepancies and shortcomings of systems relied upon by Mental Health and Addictions Services professionals.

Table 4 is composed of two columns: the criteria by which quality of information is assessed and an operationalisation of each criterion.

Table 4. Operationalisation of Data Quality Criteria.

Criteria	**Operationalisation**
Timeliness	The most recent information is equal to or less than one year old.
Accessibility	The information may be accessed by authorised users from an Internet-ready computer.
Relevance	The information is pertinent to the needs of administrators.
Integrity	The information is consistent, exhibiting internal validity.

Below is an example of an information system or database assessment. The white triangle indicates whether a particular criterion was met. The example below illustrates an information system or database where: (1) the most recent information in the system is less than one year old; (2) the information system or database may be accessed from an internet-ready computer; (3) the information contained in the system is of little or no use to health care administrators, and (4) the integrity of the information contained in the system is questionable.

▷	Timeliness
▷	Accessibility
	Relevance
	Integrity

A thorough assessment of these health information resources would include the formal participation of administrators and care providers, and possibly of all stakeholders as identified in Table 3 (page 38). However, this would be beyond the scope of this document, which simply aims at providing an initial assessment.

RESULTS OF THE ASSESSMENTS

The results section begins with a description of the general population served by VIHA and then explores the population towards which Mental Health and Addictions Services is targeted. Specific issues affecting individuals suffering mental illness are described. This helps in defining the health information requirements as indicated in the second element of the previous methodology section. Once these requirements are identified, the results of the VIHA Mental Health and Addictions Services' environmental scan of health information practices is presented. Finally, the assessment of the selected health information resources commonly used by administrators and care providers at VIHA is presented.

HEALTH INFORMATION REQUIREMENTS: POPULATION SERVED

General Population

The population served by the Vancouver Island Health Authority is geographically disseminated. From the contiguity of the former Capital Health Region to the remote rurality of northern communities such as Zeballos, Tahsis and Alert Bay, the Vancouver Island Health Authority provides health services in a wide range of environments. Serving approximately 701 000 individuals, VIHA is divided into three regions: North, Central and South. The regions are defined in two ways. No official terms for the two approaches exist, but they have been referred to as the *administrative approach* and the *care seeking behaviours approach* (L. Lawrason, personal communication, October 16, 2002).

(1) The *administrative approach* divides VIHA into its regions using pre-existing regional boundaries for the Capital Health Region, the Central Vancouver Island Health Region and the Upper Island/Central Coast CHSS (the existing VIHA no longer includes the Central Coast).

(2) The *care seeking behaviours approach* allocates VIHA into its regions by pre-existing person-based reporting/service planning boundaries.

It should be noted that only the Ministry of Health Services identifies VIHA by the care seeking behaviours approach for statistical and reporting purposes. The Vancouver Island Health Authority itself uses the administrative approach described in (1) above. Table 5 below presents the significant population differences between the two approaches to regional division of the Vancouver Island Health Authority:

Table 5. VIHA Population Profile by Service Boundaries.

Local Health Area (LHA)	Population	Care-Seeking (Province)	Administrative (VIHA)	2012	Change	% Change
61 Greater Victoria	205 319	SOUTH Pop. 396 448	SOUTH Pop. 334 940	370 150	35 210	10.5%
62 Sooke	54 587					
63 Saanich	60 348					
64 Gulf Islands	14 686					
65 Cowichan	54 940		CENTRAL Pop. 245 576	294 461	48 885	19.9%
66 Lake Cowichan	6 598					
67 Ladysmith	15 287	CENTRAL Pop. 243 796				
68 Nanaimo	94 772					
69 Qualicum	40 561					
70 Alberni	33 408					
71 Courtenay	59 768		NORTH Pop. 122 536	135 535	15 038	12.5%
72 Campbell River	42 063	NORTH Pop. 60 729				
84 Vancouver Island West	3 251					
85 Vancouver Island North	15 415					
Total	701 013			800 146	99 133	14.1%

Population Statistics from PURRFECT 7.1

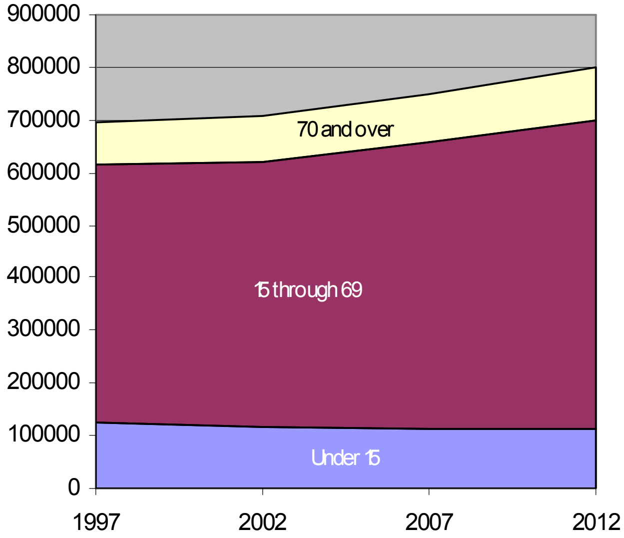
The two manners by which the VIHA regions are defined have little impact on the size of the central region, however have a significant impact on the size of the north region. By VIHA's definition, the North Island region is twice the size claimed by the Ministry of Health Services. The implications of this discrepancy are unknown. It does, however, make analysis of data complicated as the provincial database (PURRFECT) used primarily for administrative purposes segregates information in a manner that does not complement the management of the health authority.

Statistics presented herein will abide by the regional boundaries as defined by VIHA (see map of VIHA in Appendix G). The South Island region is composed solely of the former Capital Health Region. Serving approximately 335 000 individuals throughout Greater

Victoria, Sooke, Saanich and the Gulf Islands, the South Island is the most populous and most densely-populated region within VIHA. The Central Island region is composed of Cowichan, Lake Cowichan, Ladysmith, Nanaimo, Qualicum and Alberni areas. Serving nearly 246 000 individuals, this region is second most populous and second most densely populated region within VIHA. Finally, the Northern Island region is the largest geographical area served by VIHA and the least-densely populated, accommodating only 123 000 individuals. The Northern region is composed of Courtenay, Campbell River, Vancouver Island West and Vancouver Island North health areas.

Populations may be characterised in terms of trends in size and demographic characteristics. Population growth patterns are used by administrators of health services to prepare for future health care demands. Currently, the population of VIHA is growing at 1.0% per year, a considerably slower rate than British Columbia as a whole (1.4%). Figure 5 illustrates expected VIHA population growth from 1997 through 2012. The fastest growing population is those aged 70 and over. The population age 15 and under is expected to shrink considerably.

Figure 5. Projected Population Growth for VIHA (1997 – 2012).



Source: Ministry of Health Services PURRFECT Database

Estimates indicate there will be over 800 000 residents in VIHA by 2012. As Table 5 illustrates, the Central region will experience the majority of growth. By 2012, VIHA Central is expected to have grown by approximately 44 000 people (49.3% of VIHA's expected growth). In comparison, VIHA South is expected to have grown by only 35 210 individuals. Appendix H exhibits additional population growth information by region.

Mental Health Clients

A vast body of knowledge exists regarding the incidence and prevalence of addictions and mental illness. Hundreds of studies and research projects have been devoted to constructing estimates of the numbers of individuals affected by addictions and mental illness. There is a great deal of disparity among the results of these studies. As with any research, there are confounds. Differences between study design, study location, participant selection, aspects and definitions of mental illness examined will influence validity and applicability of results. Studies tend to gravitate towards an average lifetime prevalence of approximately 20% of the population (Kessler, et al., 1994). A great fault of this research is that most studies tend to exclude individuals who are homeless, incarcerated or institutionalised. Populations such as these tend to have higher rates of mental illness than the general population (Motiuk & Porporino, 1991).

Two invaluable research projects are frequently drawn upon by mental health administrators and epidemiologists who wish to examine the prevalence of mental illness. The well known and highly comprehensive Epidemiological Catchment Area Study (ECA) carried out in five catchment areas of the United States retrieved valuable data from over 20 000 respondents. This study examined the prevalence of mental illness in both the community and institutional settings. The results of the ECA indicate that one fifth (20%) of those interviewed experienced an active mental disorder in the previous year. The ECA also estimated a prevalence rate of 2.8% for severe mental illness. A second noteworthy American study is the National Comorbidity Survey (NCS), the "first survey to administer a structured psychiatric interview to a national probability sample in the US," (Kessler, et al., 1994). The NCS was a collaborative epidemiologic investigation that studied the prevalence and correlates of DSM-III-R (Diagnostic and Statistical Manual of Mental Disorders, third edition, revised) diagnoses as well as patterns and correlates of service utilisation for mental disorders. The NCS interviewed individuals who were non-institutionalised and data retrieved is based on self-reports. The NCS reported a serious mental illness prevalence rate of 3.2%, higher than the ECA estimate.

Although it is recognised neither of these large-scale studies examined Canadian populations, there are no comparable large-scale Canadian studies. The National Public Health Survey (NPHS), though large-scale and based on Canadian population did not adequately assess mental illness. This study examined symptoms of depression and alcohol use, but did not address other psychiatric or addictive disorders known to afflict clients of mental health and addictions services.

By applying existing epidemiological findings to the populations of the three VIHA regions, it is possible to create estimates of prevalence for the population served by VIHA Mental Health and Addictions Services. Table 6 applies ECA prevalence estimates for any DIS (Diagnostic Interview Schedule) disorder to the VIHA population age 18 and over. The complete table is available in Appendix I.

Although health care administrators may not expect all individuals with mental illnesses to seek treatment, it is useful to note the distribution and size of populations potentially affected by the disorders listed above. Such information may prove valuable when setting health care system standards and goals, planning for public education and allocating resources.

Table 6. Estimated Prevalence of DIS Disorders in VIHA Population.

Estimates from Regier et al., 1993

		Population 18 and over			
		271 284	*193 122*	*90 508*	*554 914*
Disorders	**1-Year Prevalence Rate per 100**	**South**	**Central**	**North**	**VIHA Total**
Any DIS disorder	**28.1**	*** 76 200**	**54 300**	**25 400**	**155 900**
Any DIS disorder except alcohol or drug	22.1	60 000	42 700	20 000	122 700
Any mental disorder with comorbid substance abuse	3.3	9 000	6 400	3 000	18 400
Any substance use disorder	9.5	25 800	18 300	8 600	52 700
Schizophrenic/schizophreniform disorders	1.1	3 000	2 100	1 000	6 100
Affective disorders	9.5	25 800	18 300	8 600	52 700
Anxiety disorders	12.6	34 200	24 300	11 400	69 900
Somatization disorder	0.2	500	400	200	1 100
Antisocial personality disorder	1.5	4 100	2 900	1 400	8 400
Cognitive impairment (severe)	2.7	7 300	5 200	2 400	14 900

* Figures rounded to nearest hundred; individual calculations will not sum to total as some persons may experience more than one diagnosis

Special Issues

The population seeking services or that is in need of services provided by Mental Health and Addictions Services and community partners face multiple barriers. Issues such as poverty and homelessness seriously affect an individual's ability to seek treatment, and impede care providers' ability to provide adequate care. Many individuals involved with

Mental Health and Addictions Services suffer from both addictive disorders and mental illnesses. The confound effects of concurrent disorders make accurate diagnoses and treatment complicated. In some instances barriers to care may be environmental, such as geographic isolation or cultural differences. Limited accessibility restricts both the care providers' ability to provide treatment and the care seeker's ability to acquire and remain in treatment. Common to all of these issues is the fact that valuable information that could be used to help this population is largely unavailable to service providers within and outside the hospital sector. The main impediment is not the lack of information collected or known, but rather external service providers' inability to access this information.

Homelessness and Poverty

The BC Ministry Responsible for Housing identifies homelessness in Canada as a national emergency. An estimated 200 000 people in Canada are without shelter.

There is currently no way of measuring the number of homeless individuals in VIHA. Little is known about the distribution of homelessness, although it is generally believed homeless individuals gravitate towards urban centres where resources (food, shelter, and services) are more readily available. Estimates for 2001 suggest there are over 500 homeless persons in the former Capital Health Region (now VIHA South), of whom 60% are estimated to suffer from some form of mental illness (Suwala, 2001).

Estimates of incidence and prevalence of mental illness among the homeless population are numerous and wide-ranging. It is believed approximately 20-25% of the single adult homeless population suffer from some form of severe and persistent mental illness (National Resource Center on Homelessness and Mental Illness, 1992). However, research that generates these results is often confounded by a multitude of issues such as reliance on self-reports, incomplete information, population sampling limitations and inconsistencies surrounding the definition of mental illness and homelessness. Having more accurate information at a regional level would help support administrative decision making around issues such as the need for increased case management faculties, detoxification facilities, safe injection sites and shelters which permit drug or alcohol use.

Data on homelessness are extremely limited and somewhat problematic. Information on homelessness is best collected from the population itself, thus homeless shelters, services for homeless individuals and so forth are the natural repository for this information. However, homeless individuals may access services in an ad hoc manner, resulting in multiple service providers managing partial information. As well, these agencies operate on limited budgets and generally cannot afford to devote labour to systematic data collection. In an environment where resources are limited and service demand is high, data collection is generally considered a low priority.

In addition, even if somewhat accurate counts of homeless individuals using shelters were available, there would still be a large contingent of what are referred to as *invisible homeless* (individuals and families who take temporary accommodation in motels, campgrounds, homes of friends or relatives, and so forth). For this group, there is no data collected anywhere, and it will never be possible to accurately assess demand for services. Plainly, even the most advanced information practices will not be effective in this regard.

Homeless people with mental disorders remain homeless longer, have fewer social supports, encounter more barriers to employment, tend to be in poorer physical health, and have more contact with the legal system than homeless people without mental illness (Coalition on Homelessness and Housing in OHIO, 1999). Individuals who are homeless run higher risks of suffering from the following problems and disorders than the general population (Ministry of Community, Aboriginal and Women's Services, 2001):

- **Mental Health and Substance Misuse**
- **Chronic & Acute Physical Disorders**
- **HIV and AIDS**
- **Nutritional Problems**
- **Premature Death**
- **Tuberculosis**
- **Dental Problems**
- **Sleep Deprivation**

Poverty and adverse economic conditions may be considered precursors to homelessness. Certainly there are many other preconditions and issues that affect an individual's housing status, however the vast majority of homeless individuals are impoverished.

Homelessness is generally directly related to poverty and has a strong connection to mental illness and substance abuse disorders. The relationship between poverty and mental illness is quite complex, as causal relationships appear to operate in both directions: poverty may contribute to mental health problems, and mental illness can make it difficult to live above the poverty line (Health Canada, 2002c). Existing information practices offer limited insight into this causal relationship due to lack of documentation surrounding intervening and confounding variables. The ability to establish a broader knowledge base would allow health care professions to identify determinants of homelessness more accurately.

Common indicators of regional socio-economic status examine proportions of populations classified as: low income, employment insurance beneficiaries, recipients under age 65 of BC Benefits, and households spending 30% or more of their income on shelter. Data for these indicators may be found in recent publications of *Health Region Statistical Profiles for BC*, however some figures date back as far as 1995. Equivalent data for current years are available through a variety of sources.

Indicators show that Central VIHA has the largest proportion of low-income households in VIHA while the North region has the highest proportion of employment insurance beneficiaries aged 19 to 64. VIHA Central has the largest proportion of households spending more than 30% of household income on shelter. As well, recipients of BC Benefits are most numerous in VIHA Central. Clearly, the Central region is most economically disadvantaged of the three VIHA regions, and so it may be expected that numbers of homeless (or at risk of homelessness), addicted or mentally ill individuals may be disproportionately higher than the other VIHA regions. Data described in this section are presented in Appendix J.

Deinstitutionalisation has been a major contributor to increased homelessness, incarceration, and acts of violence in the mentally ill population (Ministry of Health Planning, 2002). Lack of resources available to those with mental illness may also result in homelessness, criminal activity, and re-admittance into health care systems. Estimates suggest that at any given time, there are more individuals with schizophrenia who are homeless or incarcerated in jails and prisons, than in treatment facilities (Treatment Advocacy Center, n.d.).

The need for better information about the size and risk characteristics of the homeless population is clear; both from a health care provider perspective and an administrative perspective. However, barriers such as the inability for programs and services to accurately track information on this population impede the capacity of care providers to reach this population, in turn making it difficult for administrators to justify an increase in resources allocated to this population.

Substance Abuse

Rates of substance abuse among populations served by Mental Health and Addictions Services are over three times higher than that found in the general population (Hatfield, 1996). It is estimated that as much as fifty percent of the mentally ill population has a substance abuse problem (Hatfield, 1996). Alcohol, marijuana and cocaine are the most commonly abused substances among the mentally ill, while prescription drugs may also be abused. Estimates suggest that nearly thirty percent of individuals with a mental disorder have coexisting substance use disorders (Regier et al., 1990).

Dual diagnosis, the occurrence of one or more mental health disorders in the presence of a substance abuse disorder, has traditionally been a complicated condition to treat. Until recently, the Ministry of Health Services Addictions Branch was responsible for individuals suffering substance use disorders. However, individuals with substance use disorders often have concurrent psychiatric disorders, placing them outside the service reach of the ministry. At the former Capital Health Region Mental Health Services, clients suffering substance abuse disorders were sometimes excluded from service as many programs required clients to be drug free. Now that the services for addictions have amalgamated with the hospital sector, planning is underway to eliminate impediments to receiving care. However, concurrent diagnoses are often difficult to identify as separating the psychiatric condition from the effects of drug use is problematic. Many individuals suffering concurrent disorders are not within the health care system at all. Some may be homeless, in the criminal justice system, or simply living undiagnosed.

Currently, information systems fail to effectively track drug use. Available drug use indicators include incidence rates for drug-induced deaths, and primary diagnoses related to drug and alcohol use. Existing data sources do not permit health care providers and administrators to assess what conditions predispose individuals suffering psychiatric illness towards drug use behaviours. In addition, reliable data regarding characteristics of drug use behaviours and functional status are not captured consistently in a standardised format. Community agencies that provide service to individuals who abuse substances (needle exchanges, shelters, outreach services) are in many ways better suited to capture quality information than their colleagues in the hospital sector.

Help-Seeking Behaviours

Health care providers and administrators need to know the characteristics of the population served by Mental Health and Addictions Services. In addition, valuable information about the population that does not seek assistance is required. Though it is valuable to report on numbers of individuals served by programs and services, it is also of value to know the characteristics of the population that does not receive services or treatment, and the reasons why these individuals are not involved with care provision.

Not everyone with a mental illness will seek treatment, and not everyone who seeks treatment necessarily has a mental illness (Bland, 1997). A study of help-seeking behaviours in Edmonton found of 1 964 individuals, the one-year prevalence rate for Diagnostic Interview Schedule-Diagnostic and Statistical Manual (DIS/DSM-III) diagnoses was 31%. Of those with a DIS/DSM-III diagnosis, nearly 72% did not seek help in the previous year. Perhaps the most valuable result of this study to health administrators is the fact that 14.1% of the sample sought help, regardless of whether a DIS/DSM-III diagnosis was present. Predictors of those who sought help were sex (female) and age (under 45). Diagnosis, marital status, education, employment and income were not found to be determinants of help-seeking behaviours. Comorbidity was found to be highly influential: the help seeking rate of those with one diagnosis was just over 20%, for those with more than one diagnosis, the rate increased to over 42%. Results of other studies found help-seeking behaviour to range between 12.9% and 14.7% of the samples examined (Bland, Newman & Orn, 1997; Lin, et al., 1996).

A new study based on data from the NCS reports that of respondents, just over 46% with serious mental illness (SMI) had obtained treatment sometime during the two years of the study (Mechanic, 2002). Over half of those with SMI who did not seek treatment said they did not believe they had a problem requiring treatment. One sixth of those who received treatment during the 12-month period ended up dropping out of treatment. Interestingly, those living in rural areas were found to have a greater likelihood of receiving treatment for SMI and were less likely to report experiences of stigma than their urban counterparts.

The research indicates the presence or absence of a DSM diagnosis or SMI has little influence on help seeking behaviours. Rabinowitz and colleagues (1999) examined perceived need for help in relation to help-seeking behaviours. The researchers found that the majority of individuals who feel they need help for mental health issues do not seek help. This result supports previous research by Regier et al. (1993) and Kessler et al. (1994). Major reasons provided for not seeking help were: 74% solved problems on their own; 11% did not feel comfortable; 6% had economic reasons; and 9% lacked trust in the health care system.

The literature cited above suggests that individuals with mental disorders often do not enter the health care system and that individuals who seek assistance for a mental health problem may not have a diagnosable mental illness. Langle and his colleagues (2000) build on these notions, hypothesising that in any catchment area there are individuals with chronic mental illness who are unknown to the health care system. In their research, Langle et al. (2000) note general practitioners attest that provision of specialised psychiatric care was the most pressing need for patients, followed by the need for psychosocial services. The research also discovered that the primary reason individuals did not participate in the mental health system was simply refusal of such services. The researchers did not investigate reasons for refusal of services.

Certainly all the above studies have limitations. For example, many studies rely on self-reports that may be biased. As well, many studies run the risk of not being representative of the population. As the majority of surveys are only administered to households, studies ignore those populations who are homeless, incarcerated or perhaps already involved in the mental health system.

Although results from these studies tend to vary, a picture of what can be expected of help seekers from this information can be developed. For example, we might predict that up to 14% of a given population will seek treatment for mental health issues; and that a significant portion of those individuals who seek treatment may not have a diagnosable mental illness. However, information available in existing systems does not support these figures. Better information practices will help assess the size of the population seeking and requiring help, identify where this population resides and determine what resources are required to best accommodate their needs.

HEALTH INFORMATION PRACTICES: VIHA REGIONAL ASSESSMENT

The three regions of VIHA Mental Health & Addictions Services have very different resource bases, complicating comparisons between regions. Resources may be viewed in terms of programs or services provided, number of staff (including availability of psychiatrists), size and capacity of facilities (beds devoted to psychiatry), and materials (computers, equipment, and other physical resources).

The primary focus of this regional assessment is on the current state of information systems used by Mental Health and Addictions Services throughout VIHA. The existence and characteristics of use of shared information systems, and the availability of hardware resources (computers and Internet connections) are of key interest in this overview.

VIHA North

Currently, in the VIHA North region, the state of existing information systems is deficient. No hospital information system exists that links all facilities in the region. Campbell River Hospital and St. Joseph's Hospital (in Comox) have hospital-wide information systems, however these systems are not linked to one another. Throughout the North region, there are no outpatient information systems; program-specific information is tracked manually. The provincial Client/Patient Information Management (CPIM) system is used, however compliance is poor as the system lacks practicality in some respects. Lack of compliance with the system is especially disconcerting as the Mental Health Evaluation and Community Consultation Unit (Mheccu) uses information collected in CPIM as a basis for regional funding allocation. Historic use of CPIM has been sporadic. After a period of disuse, Campbell River Hospital recommenced use of CPIM in 2001.

VIHA North relies on Caseload Listings drawn from CPIM to understand program utilisation. Caseload Listings are used consistently, but fail to capture unregistered clients (those served in the community), thus unregistered clients must be tracked manually. Mental health programs have largely developed their own paper-based systems for tracking clinical information. In some instances, stand-alone computer-based electronic information systems have been developed in software applications such as Microsoft Word or Excel.

A major obstacle in VIHA North is the highly disparate technological resource base. In some areas of the North, it is not possible to get broadband (dedicated) Internet connections, and so Internet and e-mail users must rely on slower, dial-up systems that are not constantly connected. The computer hardware for this region is also in scarce supply; the workstations in remote areas are believed to be of older technology (Pentium 486s), unable to meet the demands of contemporary use. The impediment of using outdated technology will not be fully realised until broadband Internet connections are available in the remote areas of the North Island. At this point large file transfers will be practicable, however the slow processing speed will restrict hardware functioning. In addition, older, 486 computers are ineffective at using current software standards such as Windows ’98 and newer, and Microsoft Office applications. Although upgrades to the

486s are possible, the cost of such upgrades would undoubtedly be more than the purchase of newer, faster computers that are able to handle faster Internet connections and support industry-standard software versions. Overall, from a technological standpoint, VIHA North Mental Health and Addictions Services is at a serious disadvantage and will require considerable investment to bring up to an acceptable standard.

VIHA Central

The Central region of VIHA does not have a centralised mental health information system in use. There is a proposal for such a system to be developed by Meditech, the current provider of hospital information systems in the region. Meditech systems currently in operation are used by acute care services for ADT (admission, discharge and transfer) functions.

The Central region uses the CPIM system consistently throughout to register all new clients (both adults and seniors). For some communities, this is the only electronic information system that is used consistently. Other program information is tracked on a manual basis.

In Nanaimo, Access and Crisis Services (Mobile Response Team, Counselling Clinic and the Crisis Stabilisation Unit) consistently use a shared Acute Mental Health Database (AMHD) constructed in Microsoft Access. The AMHD is also available to inpatient units so acute care providers may contribute discharge summaries. Other mental health services in the Nanaimo area have access to this database on a read-only basis. The Seniors Outreach Team and the ASTAT (Acute Short Term Assessment and Treatment) programs use stand-alone information systems for their record-keeping purposes.

For information systems to be most effective in this region, it is believed that staff requires additional training on the use of some aspects of standard software programs (Access or Excel). Currently, monthly statistical reports are generally provided in the form of Microsoft Excel spreadsheets.

From a technological perspective, the Central Island region is well outfitted. Systems were upgraded in recent years to meet Y2K compliance issues. Hardware supply is currently sufficient; staff in some programs share computers, however this is an attribute of job function and necessity of use, not for want of equipment. It is believed dedicated Internet connections are currently available and employed throughout the Central Island region; dial-up connections are not in use.

VIHA South

VIHA South region currently operates a shared Mental Health Database (MHDb). Only a few outpatient programs use this system consistently. The system is approximately 12 years old and is not a Microsoft Windows application. The system is criticised for being difficult to navigate, lacking comprehensiveness and not supporting all programs and services within the Mental Health and Addictions Services portfolio. From an administrative perspective, the MHDb lacks reporting capacity, offers no structure for assessments and is incapable of exporting data in any form other than free text. Inpatient programs and a few outpatient programs use the hospital-based ADT system for registering clients and tracking information. Information sharing between programs is limited, and impeded by the constraints of the systems currently in place. Existing systems do not have the capacity to limit access at a user level, and as such, VIHA employees accessing the information system can access any client's information. The capacity for an information system to limit access to client records on a role-based level is an essential component of a shared health information system.

Most programs in the VIHA South Mental Health and Addictions Services track client information in stand-alone information systems. These generally take the form of Microsoft Office applications (such as Access, Excel or Word), and are used in a consistent manner. Some programs rely on hand-written records requiring significant resources to extract statistics and generate reports. A review of mental health programs in the former CHR approximately two years ago indicated that most programs using their own stand-alone databases track similar types of information for their record keeping practices.

The CHR ceased using the CPIM system in October of 1999. The system is used only for registering clients for Plan G (a requirement for participating in British Columbia's Pharmacare no-charge psychiatric medication program). The system was criticised for being impractical, not capturing desired information, and its inability to generate useful reports. In addition, the CPIM system was viewed as simply one more place to enter information as linking existing information systems into the CPIM for automatic entry was not possible. The inclusion of the CPIM system would require programs to enter information to the Mental Health Database, the ADT system, and perhaps their own information system; the daunting task of multiple data entry has undoubtedly led to inconsistency of practice.

Technologically, VIHA South is likely the most advanced of the three VIHA regions. Hardware and software are routinely upgraded and dedicated broadband Internet connections are available throughout.

HEALTH INFORMATION RESOURCES ASSESSMENT

A variety of information systems and data repositories contribute individually to create a fragmented picture of population health. Such systems are discrete and lack integrative functionalities necessary to elicit a composite picture of population health. Certainly hospital inpatient and outpatient data is of considerable value to health system administrators and care providers, but such systems lack valuable information that potentially provide the context in which hospital data may best be interpreted.

Health information systems are required to support decision-making by policy makers, administrators, managers, health care service providers and clients. Good information systems contain information that is accurate, timely, relevant, and accessible by intended users. Timely information systems contain information that is kept up-to-date and provide information to users upon demand. In order to be most useful, systems must contain information relevant to the needs of the user. To best accomplish this, perspectives of systems users must be acknowledged. For instance, the information needs of health care providers are different from those of administrators, yet the capacity for one system to fulfil the needs of both users increases the value of the information system. To meet the needs of user groups, the information system must provide users with relevant, useful information upon which decisions may be made. Information systems are only practical when made accessible to intended users; systems that fail to permit users access are not of value to decision-makers and care providers.

The following sub-sections examine information systems and databases that contain health information pertinent to mental health administrators and care providers. Each information system or database is assessed against the four criteria addressed in the methodology: (1) timeliness; (2) accessibility; (3) relevance; (4) data integrity.

PURRFECT

Currently the most comprehensive resource available for examining acute care mental health and addictions utilisation statistics is the Ministry of Health Services' PURRFECT (Population Utilisation Rates and Referrals for Easy Comparative Tables) database. The Ministry of Health Services receives anonymised data from the Canadian Institute for Health Information (CIHI) where data submitted by health regions across Canada is processed. (See Appendix K for an illustration of health information cycle within the former Capital Health Region.) Because this process involves many stages, information available in the PURRFECT database is at minimum one year old. The most recent data available in this database is from the 2001/2002 period.

Intended primarily for administrators, PURRFECT contains diagnostic and length of stay information by geographic area, sex and age. Diagnostic information is presented in standardised formats of Major Clinical Category (MCC), Case Mix Group (CMG) or Diagnostic Short List code (DSL). Provincial geographic distinctions in PURRFECT are made in several ways: Health Authority (HA), Health Region (HR), Health Service Delivery Area (HSDA), Local Health Area (LHA), or hospital. Age groups are defined in five-year increments, complicating analysis should the user require more precise age groupings (e.g., adults aged 19 to 65). Because users are able to select data from multiple years for analysis, PURRFECT is particularly well suited to examination of trends.

Although this system appears quite comprehensive, it is essential to note that information populating this database has been collected from a variety of independent sources, manipulated by CIHI and then redistributed back to provincial authorities in a standardised format. The probability that information presented in PURRFECT is readily comparable between contributing regions seems idealistic.

Using PURRFECT to examine mental health information requires users to examine aspects of Major Clinical Category (MCC) 19 – Mental Diseases and Disorders. This clinical category covers Diagnostic Short-list Codes (DSLs) 057 through 066. Table 7 illustrates MCC 19, associated DSL codes and titles, as well as related ICD-9

(International Classification of Diseases Version 9) codes. The far right column identifies those DSL codes that are defined as *serious and persistent mental illness* and are commonly used in analysis.

Table 7. Diagnostic Short List Codes for Primary Diagnosis of Mental Illness.

Major Clinical Category[2]	**Diagnostic Shortlist Code**	**Title**	**ICD-9**	**SMI**
19 – Mental Diseases and Disorders	057	Senile & Presenile Organic Psychosis	290	
	058	Psychoses – Alcoholic	291	
	059	Psychoses – Schizophrenic	295	3
	060	Psychoses - Affective	296	3
	061	Psychoses - Other	292 - 294, 297 – 299	3
	062	Neurotic & Personality Disorders	300, 301	3
	063	Alcohol Dependence Syndrome	303	
	064	Drug Dependence	304	
	065	Mental Retardation	317 – 319	
	066	Other Mental Disorders	302, 305 – 316	3

Source: Jones, 1999

Analysis of mental health indicators generally includes only those DSLs denoted as *serious mental illnesses.* Traditionally, DSLs 057, 058, 063, 064 and 065 are considered less serious forms of mental illness and so are often not used in analysis of mental health data; these subsets of Mental Diseases and Disorders are often handled by other parts of hospital systems. Until recently, individuals suffering from alcohol and drug disorders were provided for by the Ministry of Health, Addictions Branch. Recent restructuring of the Ministry of Health Services and the introduction of provincial Health Authorities prompted delegation of the responsibility for Addictions Services to the Health Authorities. Thus, it is important that DSLs 058, 063 and 064 not be excluded from future

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[2] Major Clinical Categories (MCC) are developed by CIHI. The categories contain a number of Case Mix Groups (CMGs) that reflect a common body system derivation or other types of clinical problems. MCCs are split into medical and surgical.

analysis. Diagnostic Short List 065 (Mental Retardation) is not a responsibility of Mental Health and Addictions Services, and so should be excluded from analysis.

Initial examination of data available for Major Clinical Category 19 (inclusive of all DSLs listed in the Table 7) identified total acute care cases across VIHA to be 3 806, accounting for 46 690 hospital days. This represents an average case rate of 8.16 per 1 000 population and an average length of stay of 12.3 days for MCC-19 diagnoses.

Table 8. MCC 19: Mental Diseases and Disorders.

Region	Population	Cases	Case Rate
South	283 375	2 897	10.22
Central	201 225	1 698	8.44
North	96 501	835	8.65
VIHA Total	**581101**	**5 430**	**9.34**
Provincial Total	**3 328 298**	**29 475**	**8.86**

The data presented in Table 8 appear to show some consistency of case rates across the three regions of VIHA. VIHA South has the highest case rate, yet when the data is viewed at the Local Health Area (LHA) level, a considerable range in case rates is found. For instance, VIHA's highest and lowest crude case rates may be found in local health areas of the North Region: Vancouver Island North = 17.99, Campbell River = 5.34. Such a broad range in MCC-19 case rates at the LHA level may be due to a variety of reasons: case finding practices, diagnostic practices, reliance of individuals on resources other than the hospital system, unavailability of local resources or record-keeping practices. The cause for this discrepancy cannot be identified with the existing information system.

As previously mentioned, it is common for researchers to hold interest only in those DSLs that denote *serious mental illness*. However, when the two groups of diagnostic codes (serious and non-serious mental illness) are separated, more significant differences between the three VIHA regions begin to appear. Table 9 illustrates how case rates for serious mental illness decline as one advances from VIHA South to North. Conversely, case rates for those DSL codes not classified as serious mental illness increase as one advances from VIHA South to North.

Table 9. Diagnostic Short List Code Rates and Cases for VIHA (by Region).

	Serious Mental Illness DSL 059, 060, 061, 062, 066		**Less Serious Mental Illness DSL 057, 058, 063, 064**		**Proportion "less" SMI**
Region	**Cases**	**Rate**	**Cases**	**Rate**	
South	2 275	8.03	530	1.87	**19%**
Central	1 303	6.48	370	1.84	**22%**
North	565	5.85	247	2.56	**30%**
VIHA Total	**4 143**	**7.13**	**1 147**	**1.97**	**22%**
Provincial Total	**23 382**	**7.03**	**5 228**	**1.57**	**18%**

From these data it may be concluded that the population in VIHA South has a higher incidence of serious mental illness and that the population in VIHA North has a higher rate of less serious mental illness. However, health care administrators may grow weary of such information as it is unclear whether this is an effect of population characteristics, service availability, diagnostic criteria used by practitioners, and so forth. Clearly, information practices across regions must be scrutinised prior to drawing any of the above conclusions.

Examination of data available in PURRFECT at the level of individual Diagnostic Short List code elicits similar results: great disparity between regions. For example, examining data for DSL 60 (affective disorders), case rates for the three regions are remarkably dissimilar (see Table 10).

Table 10. Affective Disorders Cases and Rates for VIHA (by Region).

2000/2001 DSL: 060 (Psych-Affective)

Region	Cases	Rate
South	525	2.35
Central	350	2.18
North	77	0.93
VIHA Total	**952**	**2.04**

Information from PURRFECT, such as that presented in the table above, is not enough to permit health care administrators to make informed decisions regarding resource allocation. Certainly there are other variables affecting the considerably low case rates in VIHA North, however existing information systems do not permit health care administrators to identify and assess such influences.

	Timeliness
▶	Accessibility
▶	Relevance
	Integrity

In sum, PURRFECT is used primarily by administrators to assist with decision making. Data available in PURRFECT is at least one year old and subject to multiple error sources. Authorised access to the database is only available through networked computers or compact disc. Data contained in PURRFECT is considered useful for administrators, but due to limitations of existing data collection and documentation practices, information drawn from the system is potentially corrupt.

MSP Data

The Ministry of Health Services maintains data on MSP (Medical Services Plan) billings. This data is available to health authorities through the Ministry of Health Services in two ways. MSP data may be accessed via the Internet (in the form of pre-written reports) or through formal data requests to the Ministry. The Medical Services Plan maintains extensive data on medical and supplementary health care claims and payments for current and past years (primarily number and type of services provided by practitioners and received by consumers).

MSP also maintains information about physician counts and full-time equivalents (FTEs). Such information may be useful to health care administrators as indices of service accessibility. Table 11 illustrates the number of general practitioners and psychiatrists practising in each of the three VIHA service areas. Psychiatrists in VIHA North have three times the potential case load of those in the South, and so a greater number of general practitioners in the North may be required to assume the role of mental health care provider than their VIHA South counterparts.

Table 11. General Practitioners and Psychiatrists in VIHA (by Region) for 2000-2001.

		Number		FTEs		Pop. Per FTE		Ratio
Region	**Population**	**G.P.**	**Psych**	**G.P.**	**Psych**	**G.P.**	**Psych**	**GP:Psych**
North	122 536	130	7	113.83	6.68	1076	18 344	17.0 : 1
Central	245 576	260	19	248.67	15.41	988	15 936	16.1 : 1
South	334 940	481	57	399.18	55.67	839	6 017	7.2 : 1
VIHA	**703 052**	**871**	**83**	**761.68**	**77.76**	**923**	**9 041**	**9.8 : 1**

Source: Ministry of Health Services, Medical Services Plan, 2001

Examination of 2000/2001 data for Physician Service Code 64 (Psychiatrist) provides interesting insight into the use of psychiatry throughout VIHA. For instance, the crude case rate for use of Physician Service Code 64 is nearly ten times greater in VIHA South than VIHA North. This might first be explained by the fact that VIHA North has much fewer psychiatrists than the South. However, results for Patient Service Code 64 (Psychiatry) are not congruent with the above. Table 12 presents the number of psychiatric services performed by practitioners and received by patients throughout the VIHA regions.

Table 12. Service Code 64 By Physician and Patient for 2000-2001.

		Physician Service Code 64: Psychiatrist[3]		Patient Service Code 64: Psychiatry[4]	
Region	**Population**	**Cases**	**Case Rate**	**Cases**	**Case Rate**
South	**283 375**	1 837	6.48	1 685	5.95
Central	**201 225**	913	4.54	1 354	6.73
North	**96 501**	66	0.68	504	5.22
VIHA Total	**581 101**	**2 816**	**4.85**	**3 543**	**6.10**
Provincial Total	**3 328 298**	**15 997**	**4.81**	**21 857**	**6.57**

Source: Ministry of Health Services, Medical Services Plan, 2001

One might expect cases of patient service code 64 to be higher than cases of physician service code 64 as it may be reasonable to assume that individuals could receive psychiatric services from physicians other than psychiatrists. Data for the Central and North support this assumption, however data for the South suggest that more psychiatric services are rendered by physicians than are received by patients. An explanation for this

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[3] In the Morbidity database, each patient separation record has a code identifying the service to which the most responsible physician is assigned, indicating the doctor's specialty according to their training. Select Physician Services to display a list of physician specialties from which you can make your selection.

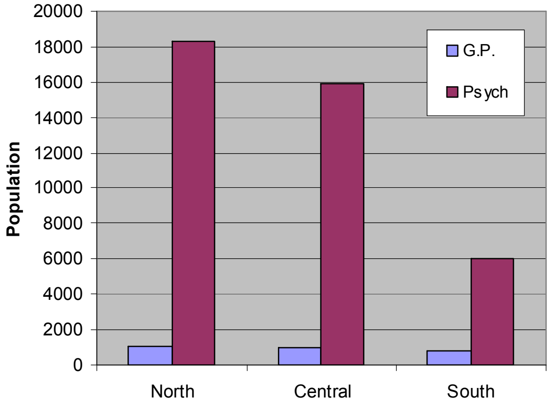
[4] In the Morbidity database, each patient separation record has a code indicating the service to which the patient was assigned for treatment during the greatest portion of the patient's stay. Click Patient Services to display a list of patient services from which you can make your selection.

discrepancy has yet to be uncovered. Clearly there are issues concerning the integrity of information available from MSP.

Although there are over eight times as many FTE psychiatrists in the South region than in the North region, the population is only three times the size of that of the North. Thus, each FTE psychiatrist in VIHA North is expected to accommodate a population three times the size of their VIHA South counterparts. As Table 11 illustrates, there are over 18 000 individuals per psychiatrist in the North region and only just over 6 000 individuals per psychiatrist in the South.

Such a discrepancy in service provider availability potentially has an effect on quality of service delivery and availability of service access. As illustrated by Figure 6, such a large resource discrepancy is not apparent when considering general practitioners.

Figure 6. Population per FTE General Practitioner and Psychiatrist.



Source: Ministry of Health Services, Medical Services Plan, 2001

With fewer psychiatrists per population, it is logical to deduce that each psychiatrist must carry a larger workload to accommodate shortfalls in psychiatrists in the Central and North regions. However, examination of MSP data indicates the opposite:

Table 13. MSP Services and Psychiatrists in VIHA (by Region) for 2000-2001.

Region	MSP Services		FTE Psych.	Services/FTE Psych.
South	94 975	*(76%)*	55.67	1 706
Central	21 344	*(17%)*	15.41	1 385
North	8 929	*(7%)*	6.68	1 337
VIHA Total	**125 248**		**77.76**	**1 611**

Source: Ministry of Health Services, Medical Services Plan, 2001

As the table indicates, psychiatrists in the North region are providing the fewest services per psychiatrist of the entire VIHA. This may be in part due to referrals from the North and Central regions to the South. Data available for 2000/2001 indicate that practitioners billing from VIHA South provide 5.6% of VIHA North and 8.6% of VIHA Central MSP Services for Psychiatry and Neuropsychiatry.

Information about distribution of psychiatrists and general practitioners throughout health authorities is of limited use to health care administrators. As physicians may allocate any proportion of their time to health authority or private practice, it is difficult to assess service availability to care seekers. Because MSP billing information is not identified as related to a particular health authority or private practice, it is not possible for health care administrators to accurately determine availability of psychiatry and general practitioner services to public care seekers. MSP data would be more useful to health care administrators if information on the number of psychiatric services provided for the health region were available. However, as a general guideline to service accessibility, grouped data are fair indicators.

MSP billing data are available for specific service codes only through data requests made to the Ministry of Health Services. Data can be broken down using service code, local health area and year. Should an administrator wish to know how many psychiatric services of a particular type are billed in a particular service area, MSP is able to provide such information. However, data requests such as these run the risk of taking much longer than expected, if data are delivered at all.

	Timeliness
▶	Accessibility
	Relevance
	Integrity

Data available from MSP are at minimum one year old. Although some information is available over the internet, it is not possible to get data specific to mental health. The information available through MSP lacks relevance to care providers and administrators as it includes statistics from physicians who may not be involved with the acute care sector. Finally, because of questionable results surrounding number of services delivered and received, integrity of the data maintained by MSP may be suspect.

Health Data Warehouse

The Ministry of Health Services' Health Data Warehouse (HDW) is available to authorised users over the Internet. The HDW is a data repository that provides online access to community-level population health indicators and data sets. Information contained in the HDW is comprised of a variety of sources providing data on health, crime, employment, deaths, and other health-related indicators. The HDW can be manipulated in much the same way as the PURRFECT database: users may select data by a variety of geographical boundaries and set parameters such as age, sex and year on many health data requests. Many of the same reports can be generated using the HDW as can be delivered in PURRFECT. The benefits of the HDW are that it is online, may be accessed by authorised users from any computer with Internet access, and affords users insight into other health-related indicators. Drawbacks to the HDW are that the system is difficult to navigate and most recent data available for many health indicators appear to be from year 2000.

A fair indicator of prevalence of drug abuse may be found in drug-induced death rates. The HDW provides statistics on such deaths. Table 14 provides drug-induced death rates for the three VIHA regions. Interestingly, such rates are remarkably volatile across the three regions, perhaps indicating that there are no differences between regions on items such as drug use. It should be noted that drug-induced deaths are typically low-incidence measures, and that differences among regions may represent random variation rather than true differences in regional characteristics.

Table 14. Drug-induced Deaths (rate per 1 000) in VIHA.

Year	South	Central	North	VIHA Total
1995	0.10	0.09	0.08	**0.09**
1996	0.13	0.11	0.09	**0.12**
1997	0.12	0.13	0.18	**0.13**
1998	0.16	0.14	0.19	**0.16**
1999	0.17	0.08	0.13	**0.13**
2000	0.10	0.07	0.06	**0.08**

Source: Health Data Warehouse

The HDW does not indicate the origins of data for drug-induced deaths, should it come from Vital Statistics, information for year 2000 may yet be incomplete as coroners' reports are subject to delay (R. Armour, personal communication, October 24, 2002).

Although the HDW provides users with a variety of information supplied by a number of sources, it does not permit the user to generate cross-tabulated reports. The ability to cross reference drug-related deaths and drug-related diagnoses could prove quite valuable to health care administrators.

	Timeliness
▶	Accessibility
▶	Relevance
	Integrity

Information available from the HDW is updated frequently, yet acute care mental health data is updated annually. Authorised users from any computer with Internet capabilities may easily access the system. Information contained within the HDW is relevant to administrators and care providers as it provides information similar to that provided by PURRFECT for administrative decision-making purposes. The integrity of the data in the HDW is unknown as information that populates the system is gleaned from a variety of resources.

Vital Statistics

The Ministry of Health Planning Vital Statistics division provides birth-related and mortality data for British Columbia. Death-related statistics of interest to health planning professionals in Mental Health and Addictions Services may include suicide and drug or alcohol-related deaths. Although many statistics are available online in the form of published reports, there is no information system that may be manipulated by professionals external to Vital Statistics. The division accepts information requests from health care professionals.

Vital Statistics data on suicides within VIHA are presented in Table 15. The data presented illustrate aggregate suicide data for the three regions of VIHA. Coroner's reports indicate whether a mental illness was associated with cause of death using ICD-9 codes. Far less than half of suicides include ICD-9 codes associated with mental illness, indicating a possible shortcoming of communications between the coroner and mental health professionals.

Table 15. VIHA Suicide Data (1995 – 2000).

Year	**Population**	**Total Suicides**	**Rate per 1 000**	**Suicides with Mental Illness ICD-9 codes**	
1995	671 547	103	0.15	26	*25.2%*
1996	681 964	117	0.17	34	*29.1%*
1997	693 382	110	0.16	44	*40.0%*
1998	696 378	105	0.15	39	*37.1%*
1999	698 167	92	0.13	39	*42.4%*
2000	701 013	101	0.14	41	*40.6%*

Source: Ministry of Health Planning Vital Statistics Agency

Indicated in column five is the number of suicides that have mental illness ICD-9 codes associated with them (proportions are listed in italics). Please note that not all mental health ICD-9 codes denote a serious mental illness. Some codes associated with suicides may indicate alcoholism or tobacco abuse. Very few indicate disorders such as schizophrenia or major depressive disorders. The usefulness of this information is unclear.

	Timeliness
▶	Accessibility
▶	Relevance
	Integrity

Information available from Vital Statistics is limited in scope and at minimum one year old. Some information may be accessed through the Internet, but detailed information must be acquired through formal data requests. Information available from Vital Statistics is relevant to administrators, but is of limited use because of the questionable integrity of the data.

Client/Patient Information Management

The Client/Patient Information Management (CPIM) system maintains data describing the provincial system of mental health care including outpatient centres, Riverview Hospital and other mental health inpatient facilities (Goldner, 2001). The CPIM system is used primarily to register clients in outpatient programs. The system also supports the following business functions: (1) client registration/service tracking, (2) Plan G[5] eligibility and registration, (3) sharing of client data between service providers, and (4) extraction of anonymised data for purposes of planning and evaluation.

CPIM was implemented online approximately ten years ago; the goal was to track longitudinal data on clients' use of mental health services throughout the province. This system is readily available to mental health care workers and provides summary information for administrative personnel. The primary fault with data from the CPIM system is the inconsistency of practice (as identified in the regional assessment). CPIM has also been cited as not correlating well with health region quality dimensions (Simon

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[5] Plan G (Mental Health) Patients who require psychotropic medications may be eligible for this program if they are at risk for being institutionalised without their medication and there is a financial barrier to them obtaining their required mental health medications. Benefits are limited to a defined drug benefit list for Plan G. For most patients an annual review is required to maintain Plan G eligibility status. Mental health workers are involved, along with the patient's doctor, in determining eligibility for this plan. Payment is made directly to the pharmacy for all eligible drug costs and recognised dispensing fees. Plan G coverage is provided only to patients not on Plan B or on Plan C. *Source: Pharmacare in the New Era (2001).*

Fraser Health Region, 1999). To illustrate the vast discrepancy of use of the CPIM system, PURRFECT was used to generate data for the following table.

Table 16. CPIM Outpatient Cases and Plan G Recipients (Cases and Rates) in VIHA.

	Outpatient Cases			**Plan G Only**		
2000 / 2001	**Total Cases**	**%**	**Crude Case Rate / 1000**	**Total Cases**	**%**	**Crude Case Rate / 1000**
South	2 772	*22%*	8.28	1 252	*53%*	3.74
Central	7 080	*57%*	28.83	874	*38%*	3.56
North	2 600	*21%*	21.22	201	*9%*	1.64
Total	12 452	*100%*	17.71	2 327	*100%*	3.31

Source: Ministry of Health Services PURRFECT Database

Based solely on population distribution, one would expect VIHA South to have the largest proportion of outpatient cases. Because VIHA South reports only Plan G recipients in the CPIM system, it has a disproportionately small outpatient case rate. However, examination of Plan G Only data indicate that VIHA South in fact registers a number of clients in CPIM who are not enrolled with Plan G. Clearly, the usefulness of CPIM data for administrative planning purposes is seriously impaired.

▶	Timeliness
▶	Accessibility
▶	Relevance
	Integrity

Information contained in the CPIM system is updated regularly. Although the system is integrated, access is limited. The data within CPIM is highly relevant to care providers and administrators, however the integrity of the information contained is poor due to low levels of user compliance.

Hospital Clinical Information Systems

Hospital-based clinical information systems maintain a wealth of information for administrators and care providers alike. Such information is extracted from patient charts and maintained in up-to-date information systems that provide users with current data. An advantage of these systems is that they are localised, providing region-specific data on the majority of hospital transactions. However, because of the localised structure of these information systems, data comparisons between regions are complicated due to lack of data standards. In addition, these information systems are not readily accessible by administrators and health care providers, requiring information seekers to make data requests, which may take several weeks to fulfil.

▶	Timeliness
▶	Accessibility
▶	Relevance
▶	Integrity

Information contained in hospital-based information systems is updated regularly and accessible to users within the acute care sector. Information is relevant to care providers and administrators alike, however because of variance in clinical documentation, there may be concerns over the quality and consistency of the information contained in these systems.

Review

A multitude of data repositories exist from which mental health professionals may extract information. There exists no single system that reasonably satisfies the requirements of both health care administrators and service providers. Systems that are developed specifically for health care programs are most useful to service providers. The Ministry of

Health Services' PURRFECT database appears to offer health care administrators the most comprehensive statistical information. However, PURRFECT, as an administrative support tool, is challenged.

A single information system that addresses the needs of care providers and administrators must also be timely, accessible, comprehensive and relevant. Table 17 presents a summary of the information system qualities previously reviewed.

Table 17. Information System Assessment Grid.

	TIMELINESS	**ACCESSIBILITY**	**RELEVANCE**	**INTEGRITY**
PURRFECT		▶	▶	
MSP		▶		
Health Data Warehouse		▶	▶	unknown
Vital Statistics		▶	▶	unknown
CPIM	▶	▶	▶	
Hospital Clinical Information Systems	▶	▶	▶	▶

There are other considerations that must be addressed. Health care professionals would benefit from learning the following from information systems:

1. what are the populations sampled?
2. how is severity operationalised?
3. how are outcomes addressed?

Existing systems do not adequately address characteristics of the populations sampled. The majority of systems operate under the guise of reflecting the general population, however, it would be more valuable for administrators to know details about sub-populations at which services may be targeted. Information systems currently use proxies (such as diagnosis and length of stay), however severity of illness may better be understood in terms of functional status and resource utilisation. In general, health outcomes are not documented. High profile outcomes such as suicides and drug-related deaths are relatively easy to measure, but are troublesome indicators due to their low-incidence and inconsistent identification.

COMMUNITY INFORMATION SYSTEMS

In addition to information sources currently used for planning and care provision by VIHA professionals, there is a wealth of information collected in the community sector. Many community organisations and agencies serve clients of VIHA Mental Health and Addictions Services. Information that is collected by these services is likely quite similar to information collected in the acute care sector: demographics, attendance, or length of stay. In addition, some programs may also collect clinical information. Data is likely collected in a variety of formats such as paper records or computer files. Clearly, there is a great deal of information available in the community sector. However, there are currently no formal methods of communicating such information and so it is shared among service providers in an informal, non-standardised manner.

DISCUSSION

The population served by VIHA Mental Health and Addictions Services is large and geographically dispersed. While popular prevalence and incidence estimates show tens of thousands of VIHA residents may be expected to suffer mental health and addictions issues, numbers available in existing information resources do not reflect this. The population served by Mental Health and Addictions Services is challenging to accurately assess due to a variety of barriers.

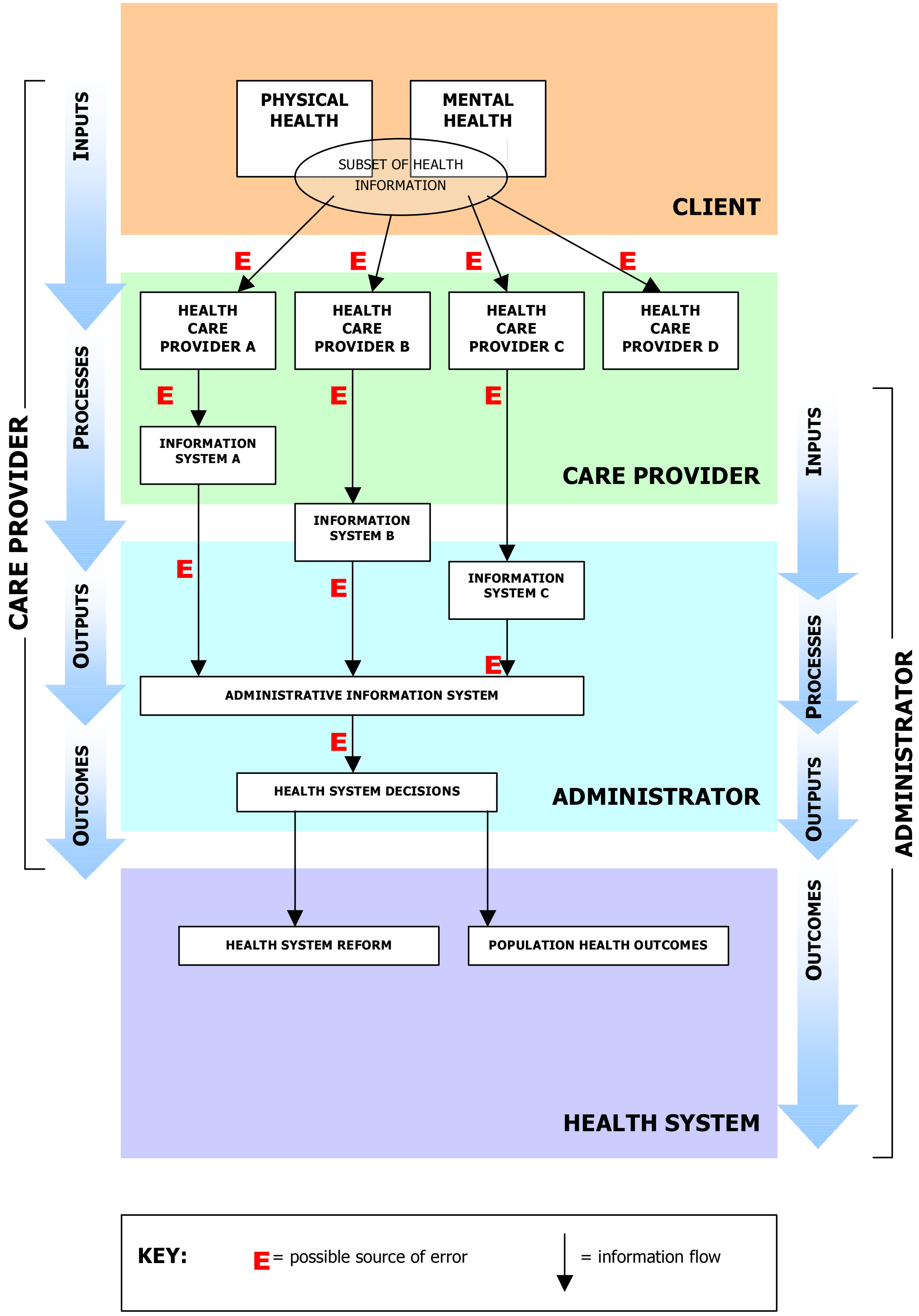
Many individuals suffering mental health and addictions problems never enter the acute care sector. Issues such as homelessness, the effects of substance misuse and help seeking behaviours (or lack thereof) all contribute to the poor representation in acute care data. Many of those individuals who do not reach the acute care sector perhaps do not require or desire the resources of acute care. In this instance, the community sector plays a vital role in provision of mental health and addictions care.

EXISTING INFORMATION PRACTICE

The following model (Figure 7), specifically developed for this study, illustrates the existing flow of information for clients of mental health and addictions programs. The model presents both care provider and administrator perspectives of the information process. Client information is collected by multiple care providers and entered into discrete information systems. In the model, information system A is maintained by the care provider. An example of this may be a written record, or program-specific database. Information system B is maintained jointly by administrators and care providers. An

Figure 7.

Health Information Process Model: Current Model



example of this may be the Mental Health Database of VIHA South, where both care providers and administrators use the system. Information system C is maintained by administrators and information is entered directly by the care provider. An example of this may be a hospital ADT system.

Health information collected from clients is only a subset of health status data (in the existing system health history and determinants of health are frequently unavailable). Health information is collected by a number of health care providers, both in the acute care sector and in the community. This information is placed in independent systems for use by health care providers. Information from these systems is passed along to other systems or individuals who use aggregate client data to inform administrative decisions. Administrative decisions influence clients, care providers and health care systems.

Along this pathway are a number of possible error sources. The first instance where error can occur is at the data collection stage. Inaccurate client self-reports, incorrect interpretations of conditions and inconsistent health terminology practices are all sources of health information collection error. A second source of error occurs at the data entry stage. Inaccurate documentation, potential for information loss, and inaccurate interpretation all influence the potential for data documentation errors. A third source of error in the current model exists where clinical information is transformed into administrative information (through inappropriate aggregation or grouping methodologies). Data that arrives from multiple sources using variable clinical criteria will lack comparability. Information systems such as PURRFECT rely on the assumption that information was collected, recorded and used in a standardised manner. The final source of error exemplified by this model is at the point where decisions are made on the by health care administrators. The use of erroneous data to guide decisions has influence on outcomes to clients, care providers and health care systems.

STRENGTHS AND LIMITATIONS OF EXISTING PRACTICE

As presented in the results section, there is a multitude of information resources and data repositories from which mental health professionals may draw. However lack of standardisation and technological inadequacies have limited the usefulness of these systems. Such information systems were developed to fulfil program- or agency-specific purposes. Because these systems were created at separate times using various standards to fulfil limited functions, they largely tend to operate independently of one another. Information systems that operate independently to inform only specific user groups are of limited usefulness to health care systems.

Consumers of VIHA Mental Health and Addictions Services access a variety of resources and services outside the acute care sector. As such, information about this population is collected in a variety of environments for a range of purposes. Problems associated with community data collection are similar to those in acute care: lack of standardisation of language and practice.

Strengths

Strengths of the systems reviewed were likely most apparent when the systems were originally developed. At such point, information systems and databases would have been constructed using the latest available technologies, and the systems themselves would have been built to perform only a prescribed set of functions. In this respect, each system would have proven invaluable to primary users, as the programmers' intentions were realised and data requirements of users were satisfied.

Limitations

As technology advances, limitations of existing systems are unveiled. When technological trends permitted the integration of once stand-alone information systems, it grew apparent that those systems could be linked to share data resources. In addition, technological advances have made information systems more accessible. What was once available only on local hard drives became available to networked computers. Networked computers now compose the Internet, making systems accessible from virtually anywhere in the world through wired and wireless technologies. Information systems that are both integrated and accessible tend to maintain data that are more up-to-date than information systems employing older technologies or standards of practice.

Legacy information systems are limited in functionality from an information security and privacy perspective. Recent technological advancements have made it possible for information systems to be accessed and utilised by a variety of stakeholders exercising multiple levels of authority and permissions. Improved security standards have also been realised through the use of software technology such as passwords and firewalls, and (in some instances) hardware technology such as retinal or fingerprint scans.

Functional limitations are also apparent in existing systems, as most are not readily configurable to the needs of a variety of users. The ability for a single system to satisfy the requirements of a spectrum of users is invaluable from both cost-effectiveness and standards-based points of views. Existing information systems that are somewhat integrated or rely heavily on data input from a variety of users tend to lack data standards. Although information may often be treated uniformly when inputted to the systems, standardised data definitions and clinical vocabularies are not employed. When health care professionals from a variety of disciplines define clinical conditions, symptoms and behaviours in multiple ways, collected data lose validity and comparability.

Clearly, technological advancements occur at a rapid pace and cannot be predicted; thus systems are built with what tools are currently and readily available. As such, systems that are not malleable to meet user needs grow outdated faster than systems that can be reconfigured as user requirements evolve.

INFORMATION SYSTEM USER PERSPECTIVES

One of the primary shortcomings of current information practices within VIHA is the limited usefulness of information to a variety of stakeholders. Primary stakeholders in mental health information management include individuals from both the acute care and community sector: persons in administrative roles, care providers and clients of programs and services. Each of these stakeholder groups has vested interest in a variety of aspects of health information management.

Care Providers

Care providers require information systems that will enable better care delivery processes. In order to effectively cross service sectors, there must be a standardised, compact manner in which information is abstracted and documented without distorting clinical knowledge.

Information systems must permit timely access to information that is up-to-date, relevant and easily understood. Care providers require an integrated information system that mimics client activities; that is, it must be present in both the acute and community sectors, where clients are known to seek services. The system must be resilient, able to be modified to reflect the needs of a variety of users and accommodate the evolution of clinical vocabularies that support care provision.

Administrators

Administrators require information systems that will enable better evaluation of health system performance. From the administrative perspective, existing information practices have a number of shortcomings.

A fundamental shortcoming of existing practices from both the administrative and care provider perspectives is that current information systems do not cross sectoral boundaries (acute care and community). As noted above, this does not accurately reflect the movement of the population served. In order for information reform to best accommodate target populations, information systems must follow the population.

From a strictly technological standpoint, existing systems lack connectivity: data is maintained in discrete systems. In order for integration to occur, technological standards must be addressed in VIHA regions to ensure hardware compatibility.

The absence of standardised clinical vocabularies and assessment tools impedes the ability for systems to communicate. The lack of standards at the data collection and documentation stage seriously impacts mental health administrators' ability to accurately monitor health system performance.

Once technology is integrated between service sectors and standardised clinical vocabularies and assessment tools are employed, administrators will be better poised to reform administrative decision-making. A standardised practice will allow for re-examination of existing methodologies such as: (1) redefining case mix groupings to reflect functional status, not merely diagnosis; (2) evaluation and redefinition of utilisation and outcome indicators; and (3) determination of meaningful units of activity or service. The introduction of a comprehensive information system that will satisfy these requirements will allow administrators to risk-adjust data, and thus gain a better understanding of target subpopulations (size, functional characteristics, and resource requirements).

CHALLENGES

There are many challenges facing improvement of mental health information practices. As previously reviewed, programs within VIHA Mental Health and Addictions Services use incompatible information systems and fail to exercise standardised practice. Specifically, challenges facing mental health information practices are: (1) the complexity of health information, (2) the lack of standards for data collection, (3) the limited functionality of information systems, and (4) the lack of integration of information systems. Each of these challenges is discussed below.

Complexity of Mental Health and Addictions Information

Mental health information is highly complex, primarily due to it's subjective nature and the relatively high volume of narrative content. Pertinent health-related information ranges from the simplicity of sex and age to the highly complex constructs of substance use behaviours or intent to self-harm. Some information is readily accessible, while other information may only be captured indirectly through observation or with the assistance of relationship building: something care providers in the acute care system may not have opportunity to develop. Service providers in the community sector have opportunity to complement the mental health information maintained in the acute care sector. The ability to integrate a variety of information sources would prove highly beneficial to health care administrators intent on making decisions surrounding resource allocation and funding.

The involvement of multiple service providers in a single information system necessitates employment of standardised clinical vocabularies.

Non-Standard Data Collection Practices

As previously mentioned, the inconsistencies of data collection practices (both actual collection behaviours and types of information collected) seriously impede service providers' ability to report on accountability and performance indicators. The Ministry of Health Services has mandated the provincial health authorities to report on mental health data using the Mental Health Minimum Data Set (MH-MDS) as a result of historically poor reporting practices and a need to prepare for the Pan-Canadian EHR. The introduction of the MH-MDS requires health authorities to arrange their existing information practices around Ministry of Health Services minimum reporting requirements, thus encouraging reform of existing data collection practices. It is anticipated the acceptance of the MH-MDS and subsequent reporting on this data set will help reduce the incidence of multiple data entry through assimilation with the Client/Patient Information Management (CPIM) system.

The establishment of the MH-MDS will ensure that all programs are collecting the same data, defined in the same manner, to promote meaningful reporting practices. Ultimately, this will permit health authorities and the Ministry of Health Services to better align resources. The system must also assist care providers with the process of abstracting and communicating their knowledge through the employment of standardised assessment tools.

Limited Functionality

Existing information systems offer limited functionality. At the health care provider level, information systems are used for data storage and retrieval purposes. The ability to modify systems to accommodate changes in service provision and performance monitoring is not readily available in existing information systems. Although less formal methods of record keeping (such as Microsoft Word, Excel and Access files) offer the user better ability to customise information practices, these systems lack integrative capabilities and are of limited usefulness to users outside a particular program area. Consequently, administrators are unable to use these information systems and must rely upon data extraction from second parties. This practice provides opportunities for program operators to adapt data to suit needs and expectations of others.

Information systems used by administrators also have limited functionality. For example, the PURRFECT database does not permit users to select the three regions of VIHA for easy comparison; instead these regions are defined in a different manner than that used by the health authority. Some systems do not permit information to be delineated on a regional scheme such as Local Health Area. Systems that offer greater flexibility and the ability to generate user-defined reports would prove to be of greatest value to health care administrators.

Multiple Systems

There is a multitude of information systems relied upon by mental health care professionals throughout VIHA. These systems are largely independent and lack abilities to integrate or communicate. Having multiple information systems in operation is inefficient. In many cases, information about a client is collected more than once, documented more than once, and stored in more than one location. There is no ability to update various information sources simultaneously, and so file revisions are labour-intensive and place data integrity at risk.

Transfer of information between discrete systems is time consuming and largely unregulated. The ability to share information among service providers (especially between the hospital and community sector) is seriously impeded due to lack of system compatibility and integration. Information sharing practices between sectors are largely informal, lacking standardisation of practice, potentially breaching privacy legislation.

The problems mentioned above could be minimised through the introduction of a single mental health information system that will accommodate the requirements of multidisciplinary users. To best accommodate multiple users, information systems must be responsive to their needs. The ability to modify systems to meet the evolutionary needs of individuals programs and services is essential.

ADDRESSING THE CHALLENGES

As the results section indicates, existing information practices supply care providers and administrators with information that is suspect. The multiplicity of information systems and inconsistencies in data collection and documentation practice challenge the integrity of the information upon which mental health care and mental health system decisions are based.

To properly resolve these issues, it is essential that standards be employed. Four main problems need to be addressed: (1) lack of compatibility between existing information systems; (2) lack of standardised clinical vocabularies; (3) lack of standardised assessment/measurement tools; and (4) inability of existing systems to accommodate changes in mental health care provider and administrator requirements.

Compatible Information Systems

Existing information systems and information collection regimes are not compatible. This impedes accurate comparison of data between programs and services of the three VIHA regions. The introduction of a single information system to be deployed throughout VIHA Mental Health and Addictions Services will alleviate this fundamental shortcoming of existing practice. A single information system will effectively integrate disparate programs and services, unifying multiple client records. This will improve health system efficiency at the level of the care provider.

To accommodate a single information system for VIHA Mental Health and Addictions Services, technological upgrades are required to bring all hardware to the same level of operation. This will ensure the ability of the systems to integrate and communicate with each other, providing a more seamless continuum of care throughout the VIHA regions.

Opportunities to involve community-based programs and services cannot be overlooked. Organisations outside the acute care sector provide opportunity to enrich acute care providers' ability to appropriately serve their shared clientele, and vice versa.

Standardised Clinical Vocabularies

The multidisciplinary nature of programs and services directed towards individuals suffering from mental illness and addictions has resulted in a plethora of clinical and non-clinical languages. Currently no single standard exists that covers the broad spectrum of services and programs targeted towards mental health and addictions clients. The development and employment of standardised clinical vocabularies is essential to the successful deployment of an integrated information system.

Standardised clinical vocabularies must accommodate all programs and services involved with the care and treatment of mental health and addictions clients. Therefore it is necessary that clinical vocabularies address the needs of health care professionals both within and outside the acute care sector. The ability for both sectors to communicate valuable clinical knowledge within and across sectoral boundaries is dependent on the use of a common language.

Standardised Clinical Assessment Tools

To further support communication among service providers, standardised clinical assessment tools must be employed. Dependent on clinical vocabularies, standardised assessment tools permit service providers from multiple disciplines to consistently evaluate functional status. Such consistency of practice will ensure care providers from both the acute care and community sectors are able to communicate essential clinical information regardless of level of expertise. Therefore, an effective clinical assessment tool must not be discriminatory of variations in care provider faculties.

Information System Resiliency

To be most effective, a common clinical information system must be resilient. The system must be able to accommodate the needs of a variety of health and mental health care disciplines, therefore interfaces and functionalities must be readily customised to user requirements. As clinical vocabularies evolve and assessment tools develop, an effective integrated information system must be able to adapt to shifting needs in a manner that does not require ongoing re-investment of financial and human resources.

A REFORMED INFORMATION PRACTICE

The introduction of a single integrated information system that effectively crosses from the acute care sector into the community through the use of standardised clinical vocabularies and assessment tools offers opportunities for improved health care provision and improved health system performance.

Health Care Provision

An authority-wide information system will promote a more efficient Mental Health and Addictions Services. At the program level, a practical information system that is customised to the individual program will ultimately reduce human resource requirements, as the demand to enter data two or three times will be eliminated. As well, less time and resources will be used collecting information from clients (and others involved with client care) and transferring information between service providers. As the system populates with information from a variety of sources, a more composite picture of client health will be presented at the program level. Additional functionality may streamline referral and access/admittance procedures.

Improved information practices will foster communications among hospital-based programs and services as well as with community-based programs. Such improved communications will allow care and service providers to create a stronger network of care for service recipients. Integrated information practices translate to better-informed and more expedient decisions by care providers.

Health System Performance

The implementation of an integrated information system throughout VIHA Mental Health and Addictions Services and community partners will give rise to a more accountable, efficient and effective health system.

An integrated information system will make Mental Health and Addictions Services more accountable by providing opportunity for better reporting capabilities based on better quality information. Such accountability mechanisms are of top priority to the Ministry of Health Services as budgets are scrutinised and the public demands a higher quality of care. Programs and services across regions will benefit from the ability to use common terms to communicate and report on the Ministry of Health Services' minimum data set for addictions and mental health services.

Such a repository of information will provide administrative decision makers with a wealth of knowledge: a comprehensive picture of the clients served. Currently, information practices do not even allow for an accurate count of how many individuals access Mental Health and Addictions Services. A widely deployed integrated information system will be able to report on this, the simplest of statistics. Currently, programs and services report on what is available, not necessarily what most valuable. Indicators in acute care such as diagnosis and length of stay are readily available, but lack value as they fail to adequately indicate resource consumption. Through the use of standardised assessment tools that address functional status rather than diagnosis, better health system performance indicators may be developed. As better quality information comes available, indicators of accountability, resource utilisation and system performance may be refined to reflect the improved data quality and subsequently enhanced ability to risk-adjust data.

Health Canada recognises that existing mental health data provide a very limited profile of mental illness. In order to amend the situation, Health Canada has recommended the following indicators be collected in addition to existing hospitalisation data:

1. Incidence and prevalence of each of the mental illnesses by age, sex and other key variables (for example, socio-economic status, education, and ethnicity)
2. Co-morbidity of mental illnesses with other mental illnesses and/or with physical disorders
3. Exposure to known or suspected risk and protective factors
4. Impact of mental illnesses on the quality of life of the individual and family
5. Access to and use of primary and specialist health care services
6. Impact of mental illnesses on the workplace and the economy
7. Stigma associated with mental illnesses
8. Impact of mental illnesses on the legal and penal systems
9. Access to and use of public and private mental health services
10. Access to and use of mental health services in other systems, such as schools, criminal justice programs and facilities, and employee assistance programs
11. Treatment outcomes

Source: Health Canada, 2002c

Certainly a single information system for Mental Health and Addictions Services will not capture all of this information, but a comprehensive system that extends beyond the boundaries of acute care should address the majority of the data recommended above. Only through integration with other information systems such as those used in the criminal justice system and other ministries would a system be able to accommodate all of the indicators listed here.

In addition to the indicators identified by Health Canada, an integrated information system would potentially report on a variety outcomes that are either not currently tracked or are tracked ineffectively. Outcomes such as symptom remission; suicide; drug-related deaths; community tenure; incidence of grave disability; housing status; endemic disorders; and communicable disease may be tracked using an integrated system.

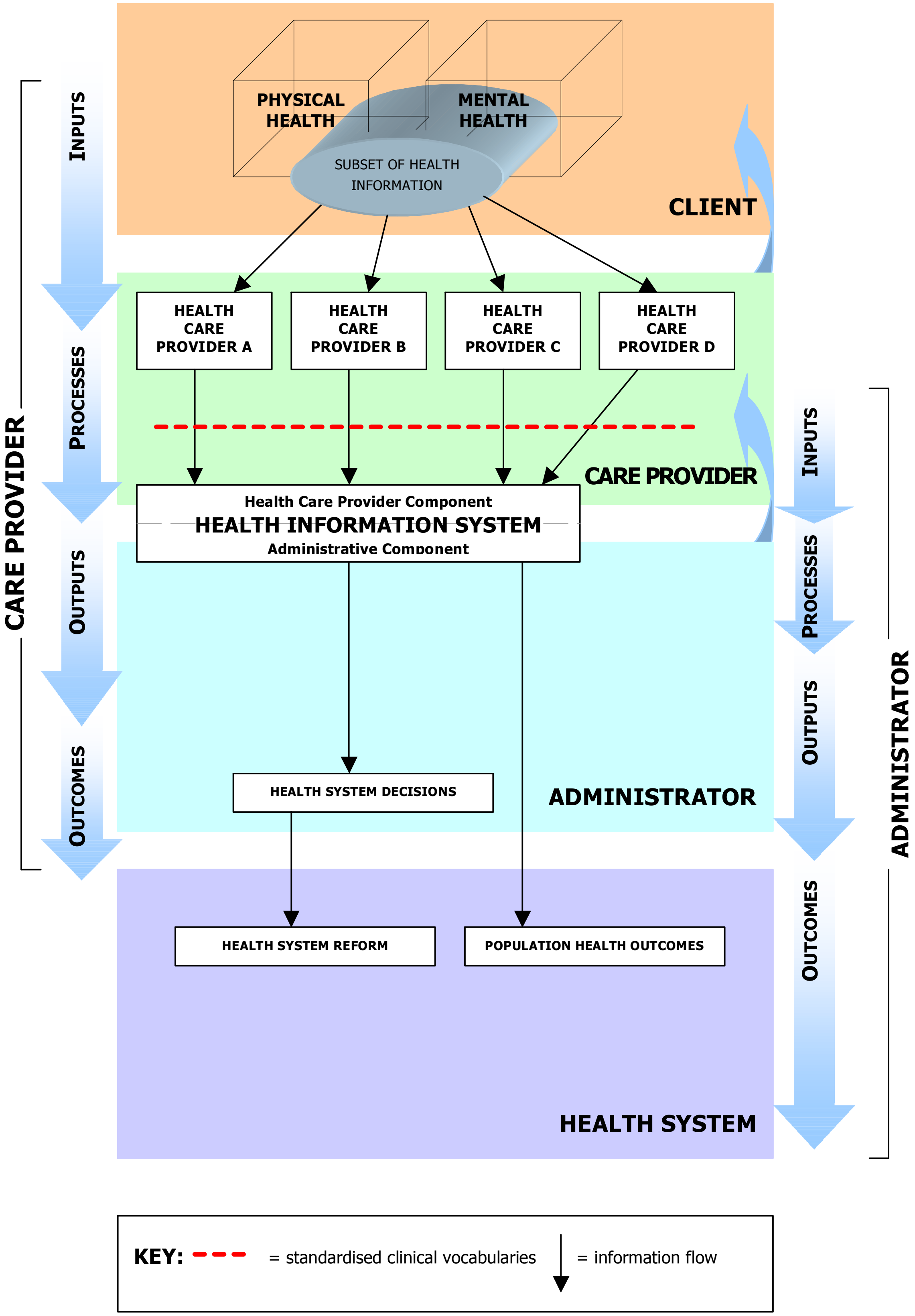
Revised Model of Mental Health Information Practice

The following model (Figure 8) illustrates a revised flow of information in mental health care. Through the use of a longitudinal health record, a history of client interactions with the health system is documented. As a result, health information that is collected by health care providers may encompass a larger expanse, including determinants of health. Collecting health information in a standardised manner and using common clinical vocabularies reduce sources of error at the data *collection* stage. By introducing a standardised format for data entry, sources of error are reduced at the data *entry* stage. Data is entered once into the electronic health record by care providers using a common language and is accessible and understood by authorised colleagues. Privacy is enhanced through reduced reliance on vulnerable paper records and the involvement of clerical staff at data entry and abstraction stages.

Aggregate information collected in comprehensive information systems is used to inform decisions made by hospital administrators. A reduced source of error is found in health system decisions because comprehensive standardised information is placed in the system in a standardised manner, allowing health care administrators to better assess health system performance and allowing health care providers to better assess health outcomes. Finally, feedback from the care provider to the client and from the administrator to the care provider is illustrated. Accurate, concise administrative information may be used to inform care providers of performance achievements, caseload information and efficiencies (or inefficiencies) of practice. Data required by administrators would primarily consist of performance and resource utilisation indicators. Care providers may provide feedback to clients such as waitlist status, resource availability and changes in health status. Data required by care providers would primarily consist of health information and program-specific data.

Figure 8.

Health Information Process Model: Revised Model



CONCLUSIONS AND RECOMMENDATIONS

There is considerable evidence that information practices in VIHA Mental Health and Addictions Services lack efficiency and effectiveness. Information sources employed by health care administrators lack integrity and applicability. Although a great deal of health related information is collected by various parties, it is not being used to its full potential. In some instances, information systems themselves are in dire need of technological upgrade.

There is a drive towards the development and implementation of a pan-Canadian Electronic Health Record. In order for health information systems to contribute effectively to the EHR, technological standards must be recognised and adhered to. In addition, system standards must abide by existing privacy legislation.

REQUIREMENTS FOR INFORMATION PRACTICE REFORM

In order to be most effective, a new information system must be broadly deployed across the hospital and community sectors. At minimum, the system must be ready to extend into the community sector when resources permit. The system must be resilient to best meet the needs of service providers and respond effectively to change. The system must employ standards in the form of clinical vocabularies and assessments. A standard such as the Ministry of Health Services Mental Health Minimum Data Set (MH-MDS) would be a good starting point for development of clinical vocabularies. In addition, to address shortcomings of existing systems, a new information system must allow for the functional assessment of clients rather than depend solely on assigned diagnosis.

Recommendation 1:
Develop or adopt a common language (clinical vocabulary) to be used by all individuals involved with mental health and addictions clients. The language must be resilient to accommodate an evolutionary development process.

Recommendation 2:
Develop or adopt a standardised functional assessment tool deliverable through the chosen technological solution.

Common data languages are only as valuable as the practice by which they are used. Therefore it is important for the health authority to establish applicable policies and procedures for the handling of health information in an electronic environment. Standardised methods of data collection, and storage, as well as structured sharing arrangements must be agreed upon and enforced. The ability to integrate mental health programs and services depends on user adherence to guidelines (especially if extended beyond the hospital sector). Of primary importance herein is the respect for and protection of client privacy. Information systems that produce audit trails and raise flags regarding potential system misuse are valuable components of information system security.

Recommendation 3:
Develop and implement clear policies and procedures surrounding appropriate collection, use and disclosure of mental health information in an electronic environment.

Recommendation 4:

Ensure potential information systems provide system administrators with security measures such as audit trails to help ensure users are using the system properly.

Recommendation 5:

Ensure potential information systems have the capacity to permit system access based on role to protect client privacy.

Information systems that speak the same language and operate without technological incompatibilities form the basis of a well-integrated information system. Real-time integration can only be achieved when high-speed Internet (broadband) connections are available at all service delivery sites.

Recommendation 6:

Ensure technologies throughout VIHA are upgraded to industry standard (at minimum) and that all systems employ compatible operating platforms.

Recommendation 7:

Investigate Industry Canada's plans to extend broadband Internet services to remote areas in VIHA.

All programs and services within VIHA Mental Health and Addictions Services should use a single information system. The reduction from multiple systems to a single system will present significant cost savings to the health authority in terms of reduced requirements for technical maintenance and administrative efficiencies.

Recommendation 8:

Implement a single information system for all VIHA Mental Health and Addictions Services programs.

Information systems should be Internet-based and easily configured to individual user specifications. The ability for programs and services both outside and within VIHA to use a system will be enhanced using web-based technology. The ability to easily configure software to meet the specific needs of users is a necessary component of information systems expected to grow with technology and adjust to meet user demands.

Recommendation 9:

Examine the availability of web-based information systems that are easily customised to user specifications.

VIHA Mental Health and Addictions Services must show firm commitment to efforts regarding information practice reform. Financial resources must be committed to the acquisition and configuration of a universal information system, as well as the necessary technological upgrades required to ensure all programs and services have access to the system. In addition, the health authority must commit staff resources to the development of policies and procedures, definition of user requirements and implementation activities necessary to deliver a new information system throughout the three VIHA regions.

Recommendation 10:

Commit financial and human resources to health information practice reform.

Ongoing monitoring of information system performance must occur in order to ensure the system is operating optimally and that system users are satisfied with the system and are using the system properly.

Recommendation 11:

Develop and implement feedback mechanisms for system users to employ.

The British Columbia Ministry of Health Services identifies three key issues impeding the development of health information systems for health care services: (1) the capacity to ensure security and patient confidentiality; (2) the need for compatible formats, allowing information sharing practices; and (3) the need for investment (Ministry of Health Planning, 2002). The preceding recommendations take into account these three impediments.

FUTURE DIRECTIONS

To accomplish true information practice reform and take advantage of the valuable information collected and maintained in both the hospital sector and in the community, technologies and services must be integrated across the continuum of care. Plans to expand hospital information systems into the community should be examined thoroughly.

The ability to integrate information systems between the two sectors is an ambitious initiative and must be considered when making decisions regarding what types of information systems are appropriate for VIHA Mental Health and Addictions Services. The benefits of extending information practices into the community sector are profound. The assembly of valuable clinical and non-clinical information on the full spectrum of service recipients empowers health care providers and administrators while improving health outcomes.

Valuable information is currently being collected by a number of disparate sources. Technological advancements have promoted the implementation and use of EHRs in developed countries worldwide. Quality information systems built on technological standards while employing standardised clinical vocabularies compose the foundation of an electronic health record. Although no information system in itself is a panacea, the opportunity to implement a tool that will integrate the hospital and community sectors to provide better quality care to service recipients cannot be overlooked. Health care providers, administrators and clients stand to benefit from improvements to health care system and health care provision realised through information practice reform.

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APPENDICES

APPENDIX A: MAIN FINDINGS FROM THE NHS INFORMATION AUTHORITY

PRIVACY

Main findings

- There was a high level of trust in the NHS to protect patient confidentiality, but low awareness of how the NHS uses patient information.
- If given a "virtual sealed envelope" to which they controlled access, about 60% of respondents would not want to put any of their health information into it. Around a quarter would want use it for a little bit of information, and 8% would want to put a lot or all of their information into it.
- Overall, people were more concerned about who used the information and whether it was anonymous than how the information would be used.
- People on the whole were comfortable with their GP, hospital doctors and emergency services having access to their data, though they reserved the right to limit access to very sensitive information (via the "virtual sealed envelope").
- People felt that all others treating them should be allowed access to certain information at certain times, and only relevant parts of their record (ie, given information on a "need to know" basis).
- As a general rule, people felt that any information released outside of the NHS, or used inside the NHS for purposes other than treatment, should be anonymised - or patient permission sought to use identifiable data.
- Once information was anonymised, a majority in the qualitative group were happy not to be asked for consent to share it. Some would like to be informed as a courtesy.
- People differed in the qualitative and quantitative research over how their consent should be obtained for using identifiable information. The qualitative group was divided between wanting to be asked for a one-off consent, and wanting their consent to be sought each time information was used other than for treatment. By contrast, a third of the quantitative group wanted to be asked every time information was used, including for treatment. The discussion groups considered this option but rejected it as not feasible.

Source: National Health Service 2002

APPENDIX B: CANADIAN STANDARDS ASSOCIATION PRIVACY PRINCIPLES

Principle 1 - Accountability

An organization is responsible for personal information under its control and shall designate an individual or individuals who are accountable for the organization's compliance with the following principles.

Principle 2 - Identifying Purposes

The purposes for which personal information is collected shall be identified by the organization at or before the time the information is collected.

Principle 3 - Consent

The knowledge and consent of the individual are required for the collection, use, or disclosure of personal information, except where inappropriate.

Principle 4 - Limiting Collection

The collection of personal information shall be limited to that which is necessary for the purposes identified by the organization. Information shall be collected by fair and lawful means.

Principle 5 - Limiting Use, Disclosure, and Retention

Personal information shall not be used or disclosed for purposes other than those for which it was collected, except with the consent of the individual or as required by law. Personal information shall be retained only as long as necessary for the fulfilment of those purposes.

Principle 6 - Accuracy

Personal information shall be as accurate, complete, and up-to-date as is necessary for the purposes for which it is to be used.

Principle 7 - Safeguards

Personal information shall be protected by security safeguards appropriate to the sensitivity of the information.

Principle 8 - Openness

An organization shall make readily available to individuals specific information about its policies and practices relating to the management of personal information.

Principle 9 - Individual Access

Upon request, an individual shall be informed of the existence, use, and disclosure of his or her personal information and shall be given access to that information. An individual shall be able to challenge the accuracy and completeness of the information and have it amended as appropriate.

Principle 10 - Challenging Compliance

An individual shall be able to address a challenge concerning compliance with the above principles to the designated individual or individuals accountable for the organization's compliance.

Canadian Standards Association, 1996

APPENDIX C: HEALTH SYSTEM PERFORMANCE

Health Status			
Deaths	Health Conditions	Human Function	Well-Being
A range of age-specific (e.g., infant mortality) and condition specific (e.g., AIDS deaths) mortality rates, as well as derived indicators (e.g., life expectancy and potential years of life lost).	Alterations or attributes of the health status of an individual which may lead to distress, interference with daily activities, or contact with health services; it may be a disease (acute or chronic), disorder, injury or trauma, or reflect other health-0related states such as pregnancy, ageing, stress, congenital anomaly, or genetic predispositions.	Levels of human function are associated with the consequences of diseases, disorder, injury and other health conditions. They include body function/structure (impairment), activities (activity limitation), and participation (restrictions in participation).	Broad measures of the physical, mental, and social well being of individuals.
Non-Medical Determinants of Health			
Health Behaviours	Living and Working Conditions	Personal Resources	Environmental Factors
Aspects of personal behaviour and risk factors that epidemiological studies have shown to influence health status.	Indicators related to the socio-economic characteristics of the population, that epidemiological studies have shown to be related to health.	Measures the prevalence of factors, such as social support and life stress, that epidemiological studies have shown to be related to health.	Environmental factors with the potential to influence human health.
Health System Performance			
Acceptability	Accessibility	Appropriateness	Competence
Care/service provided meets expectations of community, providers and paying organisations, recognising that there may be conflicting, competing interests between stakeholders, and that the needs of the clients/patients are paramount.	Ability of clients / patients to obtain care / service at the right place and right time, based on respective needs.	Care / service provided is relevant to client / patient needs and based on established standards.	Individual's knowledge / skills are appropriate to care / service provided.
Continuity	Effectiveness	Efficiency	Safety
Ability to provide uninterrupted, co-ordinated care / service across programs, practitioners, organisations and levels of care / service, over time.	Care / service intervention or action achieves desired results.	Achieving desired results with most cost-effective use of resources.	Potential risks of an intervention or the environment are avoided or minimised.
Community and Health System Characteristics			
Characteristics of the community and of the health system that, while not indicators of health system performance in themselves, provide useful contextual information.			

Mheccu, 2001

APPENDIX D: EHR STAKEHOLDERS BENEFITS TABLE

The table below is an excerpt from "Toward Electronic Health Records", Office of Health and the Information Highway, Health Canada, January 2001 available at: http://www.hc-sc.gc.ca/ohih-bsi/pubs/2001_ehr_dse/ehr_dse_e.html#Benefits

EHR STAKEHOLDER BENEFITS TABLE

STAKEHOLDERS	**POTENTIAL BENEFITS**
Public	• expanded reach of effective health care • more secure information • improved sense of well-being • access to information about how the health care system works
Patients or their representatives (i.e. child representing elderly parent or parent representing child)	• improved health care and decreased risks (e.g. adverse drug reactions) • integrated health services • do not have to repeat basic information, such as name, address • increased confidence knowing that all health care professionals have access to all relevant parts of their medical history • access to their own health records helps patients to make informed decisions about their health • avoidance of duplicate, invasive and/or expensive tests • reduced waiting lists
Health professionals	• integrated view of patient data • increased access to other related and integrated patient information • improved access through a portal to related health services • improved decisions with up-to-date patient information on an as-needed basis • improved seamless care through the coordination of multi-professional and multi-agency care • improved development of decision support systems
Health administrators	• increased patient care time • access to data to support clinical governance and local planning • reduced health care costs • improved health care quality
Policymakers (including governments)	• improves effective health maintenance and education • supports medical and administrative decision-making processes • provides for improved long-term planning
Researchers (including governments)	• access to timely high-quality data for research • access to up-to-date research findings, treatment and medication options • improved data quality • to aggregate data • allows for improved trend analysis
Governments	• improved accountability • improved health resource allocation

Source: Health Canada, Office of Health and the Information Highway

APPENDIX E: INFORMATION PRACTICE IN VIHA SOUTH

Summary: A review of information practice in programs of the Capital Health Region Mental Health Services (2001).

Program/Service	Systems Used (MHDb, ADT)	Own Database	Tracking	Notes
Emergency Response and Stabilization	MHDb ADT (rarely)	RAI – Resident Assessment Instrument, a minimum data set (not in operation)	Offers a functional description, not just a diagnostic. Problem is tracking identifies # of contacts, not # of clients	Need measure-ment standards
USTAT	MHDb ADT	USTAT Triage Log (Access Db?)	Demographics, referral and contact information, clinician workload	Clinician workload data is manually tracked
Island Mental Health Support Team	ADT	Access Db Not effective or reliable	Track contact information, diagnostic info (DSM), medication and caseworker info	Uses CPIM for data input to the provincial database
Psychotherapy and Psychoeducation	MHDb ADT	Files are kept in paper format	Attempt to keep a log with diagnostic info, referral info, LOS and service admin-istration. Record patient visits in 10-minute blocks WoT	
Facilities and Tertiary Care		Excel Db Lists people in service, demographics, etc.	Track waitlists,	Data sometimes shared with case managers.
Seven Oaks	ADT by April 1, 2001	Excel Db Lists people in service, demographics, etc	Track LOS, unusual occurrences, behaviours, goals, treatments, satisfaction	
Projects and Resource Management		Mental health is moving towards adoption of the CERNER system		ADT is criticised for being highly unreliable
Psychosocial Education	MHDb (to be used shortly)	Most information is recorded manually	Quarterly reports from various services, Plan to track rehab plans on MHDb. Attendance reports are submitted.	Would like to know hospital use indicators
Acute and Continuing Treatment	MHDb ADT	Moving towards own database in Access	Utilization data from inpatient units is being collected.	

Program/Service	**Systems Used** **(MHDb, ADT)**	**Own Database**	**Tracking**	**Notes**
Mood Disorders Service	Neither MHDb or ADT are useful	In process of getting own Access database	Will track demographics, medications, treatment plans, diagnosis,	Would like to have a client satisfaction questionnaire
General Psychiatry Service	MHDb ADT	Case managers track caseloads on an Excel Db.	Most info tracked manually, demographic info could be more extensive, would like to track diagnostic info.	Currently have troubles tracking who is in the service.
Schizophrenia Service	MHDb	Access Db is used and collects all information deemed valuable.	Medication information is most valuable for tracking; Data entry is a full-time job. (has promised to supply a sample form of data collected)	Database not shared, but some info may be useful to others
Dual Diagnosis		No database, simply maintain records of consultation forms	Demographics, addresses. Do not track diagnostic information.	Does not share information with any other service
Acute Home Treatment	MHDb	Getting their own Access Db.	Demographics, psych tests, LOS, admission/discharge dates	
Day Hospital	MHDb (maybe) ADT (likely)	At the time of this review the Day Hospital was a new program, information practices and requirements had yet to be firmly established.		
Clinical Nurse Specialist	MHDb ADT	Has SPSS software, but no time to set it up. Almost all data collected is hand written.	Currently track demographics, diagnosis, target symptoms, evaluations,	Available data is not sufficient.

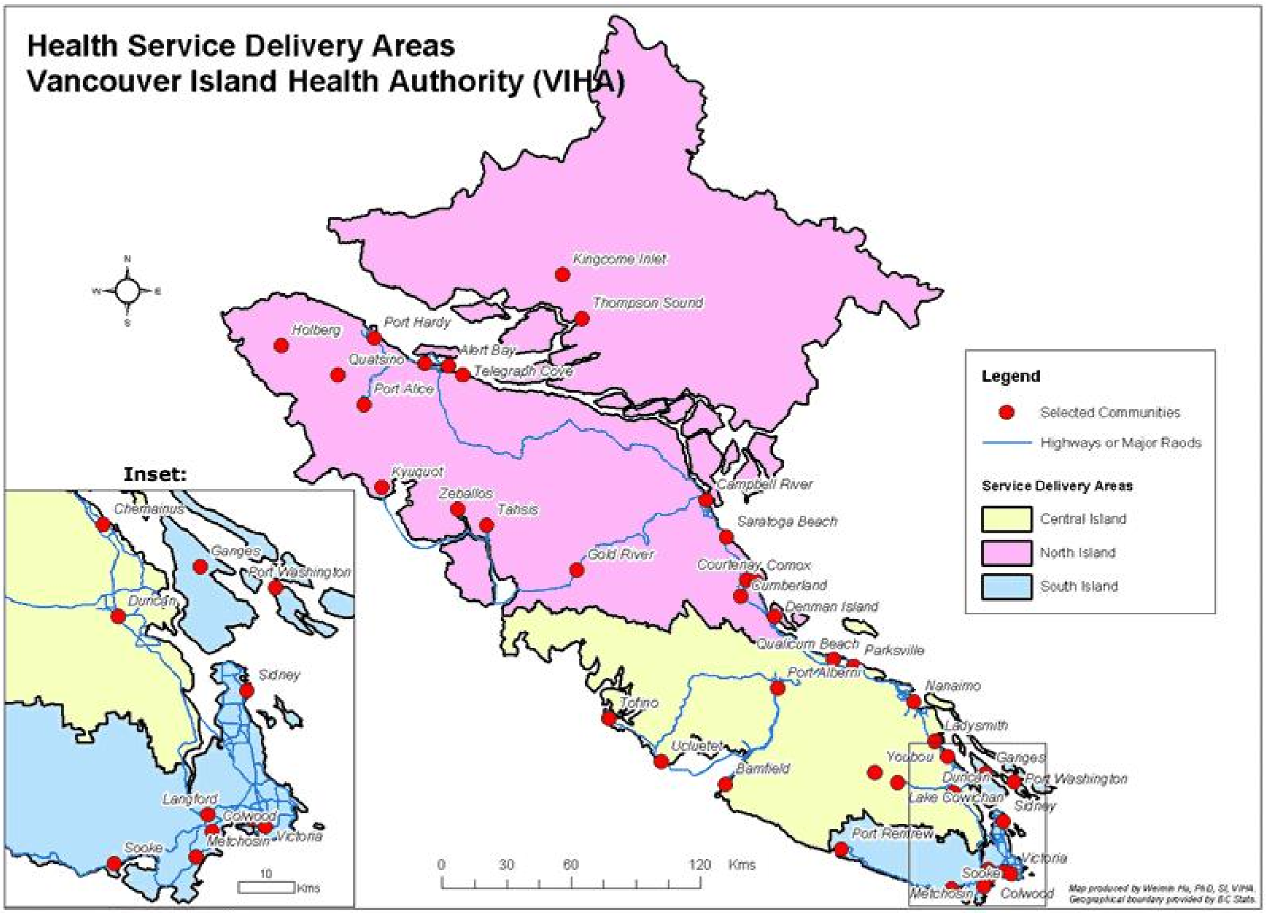
Source: Vancouver Island Health Authority

APPENDIX F: SIX DIMENSIONS OF INFORMATION QUALITY

Relevance	The ***relevance*** of statistical information reflects the degree to which it meets the real needs of clients. It is concerned with whether the available information sheds light on the issues of most importance to users. Assessing relevance is a subjective matter dependent upon the varying needs of users. The Agency's challenge is to weigh and balance the conflicting needs of current and potential users to produce a program that goes as far as possible in satisfying the most important needs within given resource constraints.
Accuracy	The ***accuracy*** of statistical information is the degree to which the information correctly describes the phenomena it was designed to measure. It is usually characterized in terms of error in statistical estimates and is traditionally decomposed into bias (systematic error) and variance (random error) components. It may also be described in terms of the major sources of error that potentially cause inaccuracy (*e.g.*, coverage, sampling, nonresponse, response).
Timeliness	The ***timeliness*** of statistical information refers to the delay between the reference point (or the end of the reference period) to which the information pertains, and the date on which the information becomes available. It is typically involved in a trade-off against *accuracy*. The *timeliness* of information will influence its *relevance*.
Accessibility	The ***accessibility*** of statistical information refers to the ease with which it can be obtained from the Agency. This includes the ease with which the existence of information can be ascertained, as well as the suitability of the form or medium through which the information can be accessed. The cost of the information may also be an aspect of *accessibility* for some users.
Interpretability	The ***interpretability*** of statistical information reflects the availability of the supplementary information and metadata necessary to interpret and utilize it appropriately. This information normally covers the underlying concepts, variables and classifications used, the methodology of data collection and processing, and indications of the accuracy of the statistical information.
Coherence	The ***coherence*** of statistical information reflects the degree to which it can be successfully brought together with other statistical information within a broad analytic framework and over time. The use of standard concepts, classifications and target populations promotes coherence, as does the use of common methodology across surveys. *Coherence* does not necessarily imply full numerical consistency.

Source: Statistics Canada 2002

APPENDIX G: REGIONAL MAP OF VANCOUVER ISLAND



Source: Vancouver Island Health Authority

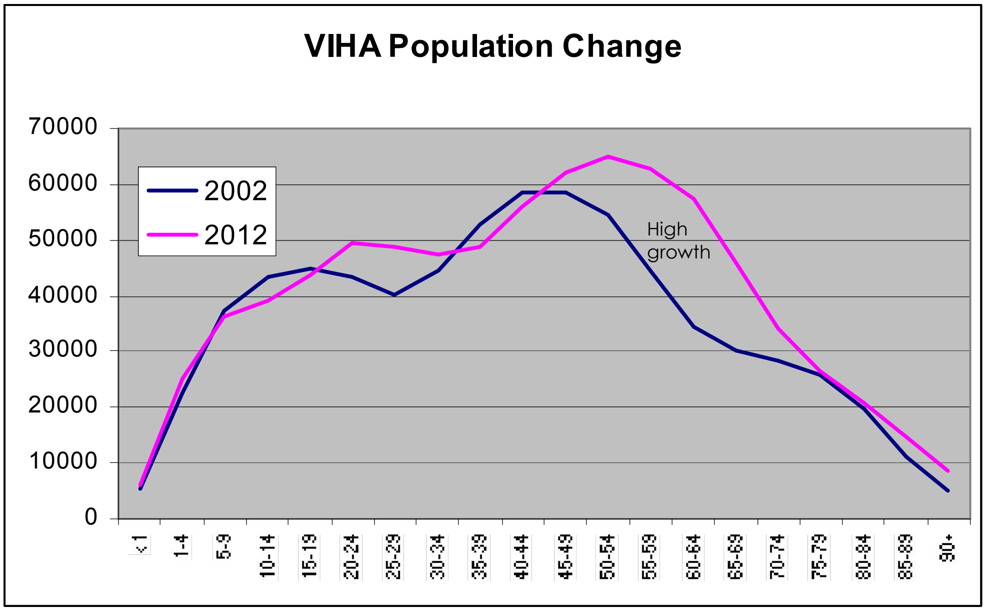
Map has been resized to fit this page. Full map available on the World Wide Web at:

http://www.viha.ca/images/viha_sd_areas.gif

APPENDIX H: VIHA POPULATION

VIHA Region	Age Range	1997		2002		2007		2012		% Change 1997-2012
North	Under 15	25 954	*21.7%*	22 420	*18.7%*	20 978	*16.5%*	21 121	*15.6%*	-18.6 %
	15 through 69	85 253	*71.4%*	87 892	*73.2%*	95 133	*74.6%*	101 439	*74.8%*	20.0 %
	70 and over	8 202	*6.9%*	9 794	*8.2%*	11 445	*9.0%*	12 975	*9.6%*	58.2 %
	Total	**119 409**		**120 106**		**127 556**		**135 535**		**13.5 %**
Central	Under 15	46 826	*19.6%*	42 755	*17.1%*	41 504	*15.4%*	43 044	*14.6%*	-8.1 %
	15 through 69	166 566	*69.6%*	176 127	*70.6%*	194 179	*71.8%*	212 939	*72.3%*	27.8 %
	70 and over	26 002	*10.9%*	30 672	*12.3%*	34 661	*12.8%*	38 478	*13.1%*	48.0 %
	Total	**239 394**		**249 554**		**270 344**		**294 461**		**23.0 %**
South	Under 15	54 154	*16.2%*	50 177	*14.9%*	48 572	*13.8%*	47 803	*12.9%*	-11.7 %
	15 through 69	234 927	*70.2%*	240 049	*71.3%*	256 866	*73.0%*	273 599	*73.9%*	16.5 %
	70 and over	45 498	*13.6%*	46 457	*13.8%*	46 660	*13.3%*	48 748	*13.2%*	7.1 %
	Total	**334 579**		**336 683**		**352 098**		**370 150**		**10.6 %**
VIHA	Under 15	126 934	*18.3%*	115 352	*16.3%*	111 054	*14.8%*	111 968	*14.0%*	-11.8 %
	15 through 69	486 746	*70.2%*	504 068	*71.4%*	546 178	*72.8%*	587 977	*73.5%*	20.8 %
	70 and over	79 702	*11.5%*	86 923	*12.3%*	92 766	*12.4%*	100 201	*12.5%*	25.7 %
	Total	**693 382**		**706 343**		**749 998**		**800 146**		**15.4 %**
BC	Under 15	757 018	*19.1%*	720 603	*17.4%*	706 461	*15.9%*	714 904	*15.0%*	-5.6 %
	15 through 69	2 853 666	*72.1%*	3 027 683	*73.1%*	3 305 215	*74.3%*	3 583 050	*74.9%*	25.6 %
	70 and over	349 014	*8.8%*	396 027	*9.6%*	435 714	*9.8%*	483 913	*10.1%*	38.7 %
	Total	**3 959 698**		**4 144 313**		**4 447 390**		**4 781 867**		**20.8 %**

Source: Ministry of Health Services PURRFECT Database



Source: Ministry of Health Services PURRFECT Database

APPENDIX I: PREVALENCE ESTIMATES

		Population 18 and over			
		271 284	*193 122*	*90 508*	*554 914*
Disorders	**1-Year Prevalence Rate**	**South**	**Central**	**North**	**VIHA**
Any DIS ADM disorder	**28.1**	*** 76 200**	**54 300**	**25 400**	**155 900**
Any DIS disorder except alcohol or drug	**22.1**	**60 000**	**42 700**	**20 000**	**122 700**
Any mental disorder with comorbid substance abuse	**3.3**	**9 000**	**6 400**	**3 000**	**18 400**
Any substance use disorder	**9.5**	**25 800**	**18 300**	**8 600**	**52 700**
Any alcohol disorder	7.4	20 100	14 300	6 700	41 100
Any drug disorder	3.1	8 400	6 000	2 800	17 200
Schizophrenic/schizophreniform disorders	**1.1**	**3 000**	**2 100**	**1 000**	**6 100**
Affective disorders	**9.5**	**25 800**	**18 300**	**8 600**	**52 700**
Any bipolar	1.2	3 300	2 300	1 100	6 700
Unipolar major depression	5.0	13 600	9 700	4 500	27 800
Dysthymia	5.4	14 600	10 400	4 900	29 900
Anxiety disorders	**12.6**	**34 200**	**24 300**	**11 400**	**69 900**
Phobia	10.9	29 600	21 100	9 900	60 600
Panic disorder	1.3	3 500	2 500	1 200	7 200
Obsessive-compulsive disorder	2.1	5 700	4 100	1 900	11 700
Somatization disorder	**0.2**	**500**	**400**	**200**	**1 100**
Antisocial personality disorder	**1.5**	**4 100**	**2 900**	**1 400**	**8 400**
Cognitive impairment (severe)	**2.7**	**7 300**	**5 200**	**2 400**	**14 900**

* Figures rounded to nearest hundred

Source: Regier et al., 1993 and Ministry of Health Services PURRFECT Database

APPENDIX J: HEALTH INDICATORS

	BC	North[6]	Central	South
Low Income (total pop.) 1995	19.6%	15.2%	**17.4%**	15.4%
EI Beneficiaries (19-64) 1999	2.8%	3.4%	**2.9%**	2.1%
BC Benefits Recipients (1999) Pop less than 65 years	6.2%	7.9%	**9.4%**	5.8%
Housing (owning)	65.0%	72.1%	**73.5%**	62.6%
Housing (renting)	35.0%	27.9%	**26.5%**	37.4%
Households Spending 30% or more of Income on Shelter	28.8%	16.8%	**29.8%**	26.8%
Avg. Value of owner-occupied dwelling	$239,745	$166,125	**$179,476**	$245,427

Source: BC Stats, Ministry of Management Services

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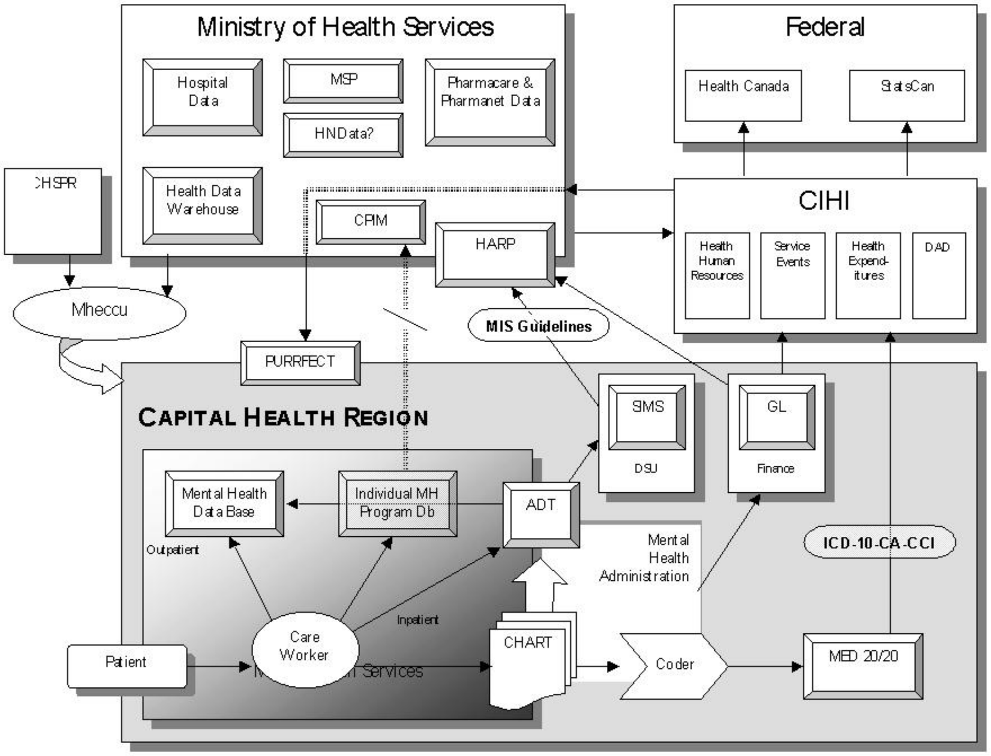
[6] Figures include Central Coast

APPENDIX K: INFORMATION FLOW IN THE CAPITAL HEALTH REGION



Information flow diagram created October, 2001. Steve Atkinson.