



HIS – CIS Strategy

2016–2020







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Foreword

The World Health Organization defines eHealth as the use of information and communication technologies for health. It supports the delivery of health services and management of health systems to become more efficient and effective. eHealth is also described as a means to ensure that the right health information is provided to the right person at the right place and time in a secure, electronic form to optimise the quality and efficiency of health care delivery, research, education and knowledge. The application of information and communication technologies in health has rapidly increased for the past years and gained significance not only in the Ministry of Health and Medical Services but in the entire health sector. MoHMS has continuously addressed the challenges and demands to further improve health care service deliveries and outcomes. Many countries have recognised the importance of adopting information and communication technology in health to optimise processes and improve data collection, processing and analysis. The adoption of ICT has provided a concrete foundation for health investments and innovations.



The application of eHealth in Fiji has continuously advanced and yielded considerable benefits to individual and public health. ICT has been used to improve the timeliness and accuracy of health reporting to facilitate monitoring and surveillance of diseases and injuries, among others. As MoHMS learned from the results of experimentation and the early adoption phase, it has moved to increasing development or building up of application or information systems, began to adopt the use of standards to address the weaknesses of experimentation and early adoption of ICT, started addressing the issues on enabling environment, and promoted increased awareness of ICT in the health sector.

There is greater demand for efficiencies and high expectation from MoHMS to deliver quality care, services and outcomes. Therefore, this strategy outlines the needed investments and resources necessary to leverage the importance of Health Information in its collection, production, analysis, dissemination and use by adopting sustainable, efficient and cost-effective ICT solutions.

A handwritten signature in black ink, consisting of several loops and a long horizontal stroke at the end.

Dr Mecuisela Tuicakau
Acting Permanent Secretary for Health and Medical Services



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Abbreviations

| | |
|-------|---|
| A&E | Accident and emergency |
| ABS | Australian Bureau of Statistics |
| BABOK | Business Analysis Body of Knowledge |
| BAG | Brisbane Accord Groups [for Pacific Vital Statistics] |
| BDM | [Registrar of] Births, Deaths and Marriages |
| CIS | Clinical information system |
| CMRIS | Consolidated Monthly Return Information System |
| CRVS | Civil registration and vital statistics |
| CSN | Clinical Services Network |
| CWMH | Colonial War Memorial Hospital |
| DHIRA | Division of Health Information, Research and Analysis |
| EMR | Electronic medical record |
| FHSSP | Fiji Health Sector Support Program |
| FIBoS | Fiji Islands Bureau of Statistics |
| GIS | Geographical information system |
| GOPD | General Outpatient Department |
| HIM | Health information management |
| HIS | Health information system |
| HIU | Health Information Unit |
| HRIS | Human Resource Information System |
| LIMS | Laboratory Information Management System |
| MCDC | Medical Cause of Death Certificate |
| MCH | Maternal and child health |
| METT | Monitoring and Evaluation Technical Team |
| MoHMS | Ministry of Health and Medical Services |
| NCD | Non-communicable disease |
| NHDD | National Health Data Dictionary |
| NHIC | National Health Information Committee |
| NHIM | National Health Information Manager |
| NHN | National Health Number |
| NNDS | National Notifiable Disease Surveillance |
| NSP | National Strategic Plan |
| PACS | Picture Archiving and Communication System |
| PAS | Patient Administration System |
| PATIS | Patient Administration Information System |
| PHIS | Public Health Information System |
| PIRS | Performance Indicator Reference Sheets |
| PMI | Person Master Index |
| RHD | Rheumatic heart disease |
| RIS | Radiology information system |

| | |
|-------|--|
| SOPD | Specialist Outpatient Department |
| SPC | Secretariat of the Pacific Community |
| TOGAF | The Open Group Architectural Framework |
| UCOD | Underlying cause of death |
| VOIP | Voice over internet protocol |

Glossary

| | |
|---------------|--|
| CanReg | Open source system to input, store, manage, and analyse Cancer Registry data. |
| Data standard | A clear statement about what data needs to be collected and why, including an unambiguous definition. |
| eHealth | The use of information and communication technologies for health. It supports the delivery of health services and management of health systems to become more efficient and effective. |
| HL7 | International standards for the exchange of clinical and administrative data between software systems. |
| IRIS | An international standard auto-coding system that assigns ICD-10 codes using free text from the cause of death fields on death certificates according to ICD coding rules. It can allocate individual cause of death codes and the overall underlying cause of death code. |
| mHealth | The use of mobile applications for health. |



Executive Summary

Overview

The Ministry of Health and Medical Services will invest in and maintain sustainable cost-effective technology, systems, and processes to ensure the right information is available to the right people at the right time to support evidence-based decision-making in both managerial and clinical settings. This applies to information systems with: routine reporting of service utilisation, such as the Consolidated Monthly Return Information System (CMRIS); patient-level records, such as the Patient Administration Information System (PATISPlus); administrative and resource data on the availability and distribution of key health system inputs, such as the Human Resource Information System (HRIS); and key surveillance systems for prompt reporting of notifiable diseases. The ministry will also collaborate with other relevant institutions, such as the office of the Registrar-General, Fiji Bureau of Statistics, and private sector health providers, to improve data sharing.

Key Features of Strategy

- This is an action-oriented five year plan that builds on our existing strengths and opportunities.
- It is aligned with the National Strategic Plan (NSP) and designed to support improved clinical care and the priority health needs of Fiji.
- It is ambitious in its scope and deliverables, but it builds on the strengths of the current systems and is structured so that individual components can be funded and implemented separately as resources and priorities allow.
- It defines a sustainable overall system, which is robust and resilient, so that individual component systems can be replaced relatively easily without disrupting the rest of the system.

Key Outcomes

- The clinical systems will:
 - Support continuity of care as patients move between major hospitals, subdivisional hospitals and health centres, and between the public and private sectors.
 - Support the ongoing care of the increasing number of patients with chronic NCDs through provision of focused tracking and treatment systems.
 - Provide access to patient details, history, and results in real-time for doctors and nurses at the point of care delivery.

- The Public Health sector will have:
 - An integrated seamless system for disease surveillance, notification, and registration, which will provide a single, timely, and accessible source of information. This will combine laboratory confirmed, radiology diagnosis, clinically detected, and notification data, and will eliminate the duplicate recording of cases.
 - Through the iterative extension of the CMRIS/PHIS system, the capability to record and report locally the complete range of program data (e.g. nutrition, oral health, environmental health).
- Managers at the national, divisional, subdivisional, and hospital level will have electronic online access to rich dashboard and scorecard data. This will provide timely, integrated, and accurate human resource, financial, asset, supply, and clinical indicator information needed to support the management of health services and resources.

Dependencies

To deliver these outcomes will require:

- Management support and the commitment of appropriate funding.
- A steady increase in the number of information management and information technology staff, and an increase in staff skills and knowledge, particularly in information management.
- A significant increase in efficiency of reporting through the removal of redundant reports and data collections, as well as the automation of routine reporting.
- Establishment and resourcing of at least two staff members at the project office to manage and implement all of the various projects. These staff members will require a mix of technical skills and health domain knowledge.
- Changes to human behaviour and organisational processes, which are always required when introducing new systems. At least as much effort and resources will need to be devoted to these aspects as to the technical aspects of the introduction of the system.
- Establishment of productive partnerships with public and private organisations within and outside Fiji.
- Ongoing support from the donor community.



Measuring our Success

The following General Objectives from the National Strategic Plan will demonstrate the success of this strategy if met:

- General Objective 6.1: Policy, planning and budgeting are based on sound evidence and include considerations of efficiency and cost-effectiveness.
- General Objective 6.2: Health information systems provide relevant, accurate information to the right people at the right time.
- General Objective 6.3: Results-based monitoring and evaluation, including population surveys and applied research, as a driver for organisational decision-making and behaviour change.



1 Introduction

1.1 Introduction and Purpose

This document sets out the five-year strategy for the development of health and clinical information and information systems for the Fiji Ministry of Health and Medical Services. It is driven by and aligns with the MoHMS National Strategic Plan 2016–2020.

While information and information systems are a fundamental underpinning for the operation, management, and planning of any modern health system, the responsibility for the implementation of this strategy lies with the Division of Health Information, Research and Analysis.

This implementation can only be successful with the commitment of senior management, as well as the adequate allocation of staffing and technical and financial resources.

1.2 Associated Documents

This document is based on the goals and objectives defined in the Fiji MoHMS National Strategic Plan 2016–2020 Priority Area 6.

The detailed plans necessary to implement this strategy are defined in the:

- MoHMS HIS – CIS Investment Plan
- MoHMS HIS – CIS Five Year Implementation/ Work Plan
- Ten year National Survey Plan
- Division of Health Information, Research and Analysis Annual Business Plan.

1.3 Twenty-year Vision

The twenty year vision is that all MoHMS policies and plans will include sound evidence-based justification for what is proposed, and health information, M&E, and research will be treated as vital indispensable tools for guiding strategic direction, monitoring, and management at all levels of the ministry, including both administrative and clinical settings.

Clinicians will use paperless clinical records to improve the quality, efficiency, and continuum of care, while patients will have electronic access to their own records, with control of how they are shared with public and private providers.

1.4 Five-year Objectives

To implement this vision the NSP defines three realistic and achievable key five-year objectives:

Clinical Information

Objective 6.2.1: Expand the coverage and functionality of electronic patient management information systems in health facilities to improve clinical management and support the continuity of care, especially for patients with chronic non-communicable diseases.

Disease Surveillance and Registries

Objective 6.2.2: Develop an integrated system for communicable disease surveillance, notification, registration, and reporting to improve efficiency and effectiveness of case detection and response.

Health Information

Objective 6.2.3: Establish interoperability between key MoHMS information systems to facilitate integrated reporting of multiple dimensions of health system performance, including human resources, financial management, supply chain, and service utilisation.

Objective 6.2.4: Collaborate with relevant partners (e.g. FIBoS, Registrar-General, private sector providers) to improve availability and consistency of key health data and statistics.

1.5 Structure of Strategy

To deliver the NSP objectives, the strategy is based on a strong architectural foundation, which is described in Chapter 3. The activities and investments are then divided into nine strategic areas:

1. Human and organisational capacity
2. Patient administration system
3. Clinical information systems
4. Surveillance systems and registries
5. Routine health information systems
6. Birth and mortality data systems
7. Analysis and presentation of data
8. Improvement of data quality and coding
9. Provision of appropriate technical infrastructure.

1.6 Financing of Development

The strategy outlined here is ambitious, but it is designed as a coherent overall system, so that individual projects and systems can be developed as resources allow and priorities dictate. It is sustainable and has been designed so that individual systems can be enhanced or replaced without impacting on other systems or functions.

It is expected that for the first year DHIRA will apply for and manage the funds for the development of new systems, but for the following years it is expected that there will be joint submissions from DHIRA and the business area concerned. For example, developing an oncology or diabetes patient tracking system or a nutrition-focused public health system would involve business areas such as CSN, NCD, or Nutrition.

Because of the structure of the strategy and the accompanying investment plan, discrete sections that fall within the particular interest of individual donor partners can be funded and developed by that donor, with the assurance that the result will fit within and interoperate with the overall system.



2 SWOT Analysis

This chapter provides a brief strengths, weaknesses, opportunities, and threats (risks) analysis of the Fijian health and clinical information system environment. A second analysis specifically around civil registration and vital statistics (CRVS) is given in Chapter 9.

2.1 Strengths

- Fiji has a common Patient Administration Information System (PATISPlus), which is used across the three major hospitals and to a limited extent in the specialist and subdivisional hospitals.
- This provides a common unique National Health Number (NHN) across Fiji.
- All deaths are also recorded within this system and are assigned a NHN. The resulting mortality data system is gold standard. Automated IRIS coding and integrated detection of maternal deaths and missing death records provides added functionality.
- There are skilled and dedicated staff in IT and information management (although there are few staff members).
- The Public Health Information System (PHIS) is well used, capturing complete and timely data.
- There is a common Laboratory Information Management System (LIMS) in use across two of the major hospitals, with the third to be added next year. This allows clinicians to access any pathology result from any hospital and some health centres across Fiji (via the PATISPlus system).
- There is a strong and increasing management commitment to the use of data for evidence-based decision-making.

2.2 Weaknesses

- A significant number of admissions to the major hospitals are not recorded within PATISPlus, and most inter-ward transfers are not recorded. Also, a significant number of patients who have their admissions recorded do not have their discharges entered in PATISPlus.
- A number of subdivisional hospitals that were previously using PATIS stopped using it at the time of the introduction of PATISPlus and have not recommenced.
- There are a number of program-specific siloed data collections (e.g. TB, HIV, nutrition). In these data collections there is data that overlaps, portions of

national data collections are duplicated, and the data is not available for centralised reporting.

- There are a range of data collections within the Health Information Unit that have major gaps in coverage (e.g. diabetes) and/or have serious flaws in the basic database structure (e.g. Cancer Registry).
- Many surveys and community data collections conducted by the ministry are poorly designed and are not seen as part of an overall data collection structure, which is designed to meet specific identified data information requirements.
- There are still gaps in the health network infrastructure and in the basic availability of PCs and terminals.
- The information management and information technology areas are chronically understaffed, and the information management team particularly is under-skilled.
- Overall the culture is data-rich but information-poor, with a large amount of quality data being collected, but only limited reporting and use made of that data.

2.3 Opportunities

- PATISPlus with linked records for all admissions, deaths, and potentially all births has incredible potential for analysis and epidemiology, as well as to support integrated clinical and management reporting, e.g. dashboards.
- This system also has the potential to support continuity of care across facilities, form the basis of a lifetime health record, and to enable the integration of specialist clinical systems. This is world-class infrastructure.
- Fiji has a small but effective local software industry, which can be used to provide ongoing system development and maintenance support.
- Fiji has good commercial communications infrastructure, which covers the whole country effectively.
- There is an increasing awareness of the potential for using quality information for decision-making at all levels of the health system.
- MoHMS has strong links with universities, as well as various regional organisations, such as SPC and other government departments, which have the potential for a range of partnerships and joint projects.

2.4 Threats (Risks)

- There is currently a vicious circle for data quality and completeness in PATISPlus. Staff are not using or trusting the information and reports derived from PATISPlus, and because the data is not being used there are no drivers to improve it. This is exacerbated by the failure to create medical recorder line positions, leading to major gaps in data entry and coding quality and completeness.
- Clinicians will not be willing to transition from their paper systems to electronic systems unless they trust that the electronic data is complete and timely.
- There is lack of strategic planning in systems acquisition and development. For example, Fiji has committed to the acquisition of two major systems in radiology and medicines management without consideration of the system impacts or the broader clinical benefits that could be obtained from these systems.
- There is a lack of understanding about project methodology and project-oriented staff, with the general expectation being that line staff can manage major projects in addition to their routine duties.

3 Architecture

3.1 Introduction

The overall intention is to ensure the coherent, cost-effective, and sustainable development of information systems that support the requirements of Fiji's health and medical services.

This will be achieved by following an architecture-driven, top-down approach, as illustrated in Figure 1.

The overall business needs of the Fiji health sector and its strategy are defined in the MoHMS NSP 2016–2020.

3.2 System Dimensions

An information system consists of more than just software and hardware. To have a successful, functioning, sustainable information system that delivers benefits we must build in all of the dimensions:

- human capacity
- organisational capacity
- technical capacity.

This strategy and the related work and investment plans address these dimensions.

3.3 Information Architecture

Figure 2 shows the structure of the three main types of non-administrative data collected within health.

The first type of data is associated with an individual patient. This is clinical data such as pathology results. The second type of data is utilisation count data associated with the facility or administrative areas, such as subdivisions. The third type of data is case-based data associated with a disease case. While disease registries collect data about individuals and hence should use the NHN, their primary focus is the 'disease case', e.g. a person who has two episodes of dengue in subsequent years would count as two cases.

The system and application architectures should align with this natural division in the data types. For example, systems intended to collect data on individuals should not be made to also collect facility-type summary data.

Figure 1: Architecture-driven Development

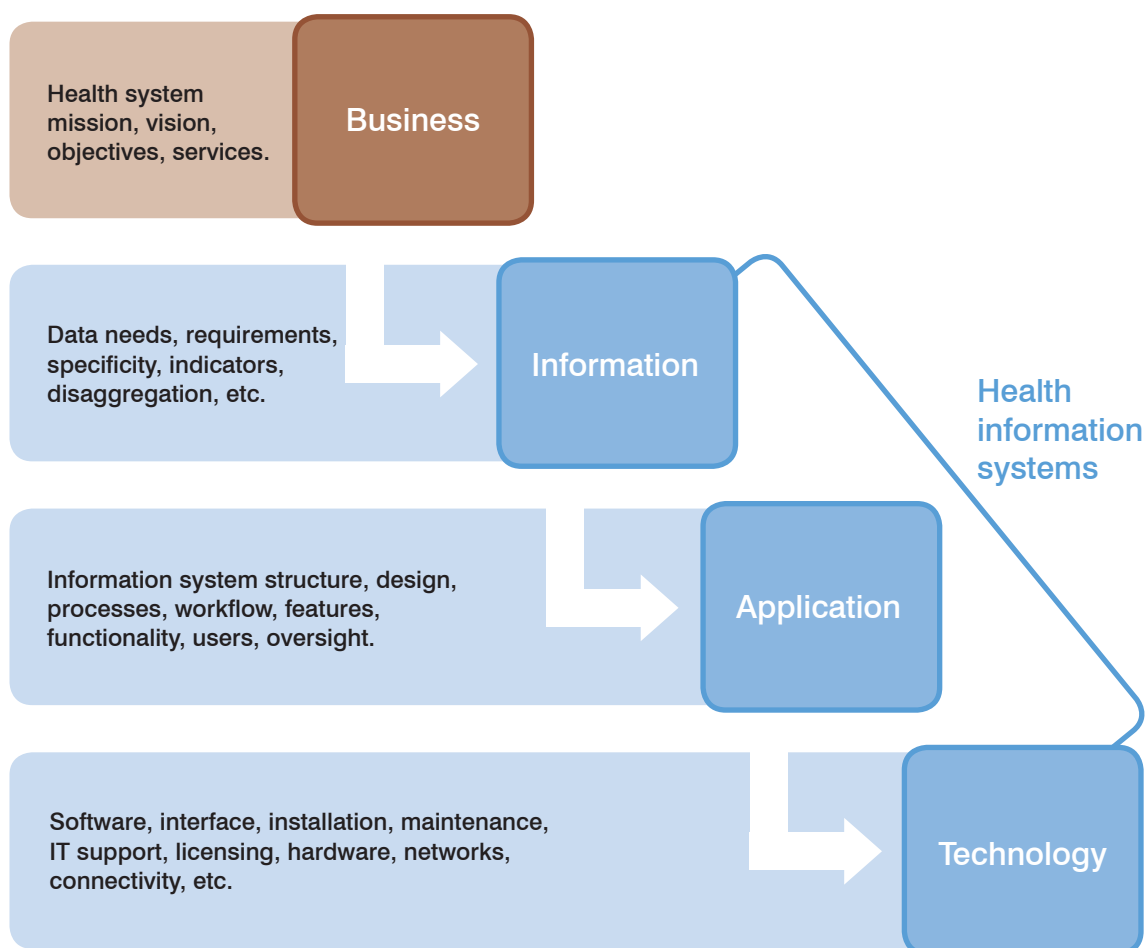
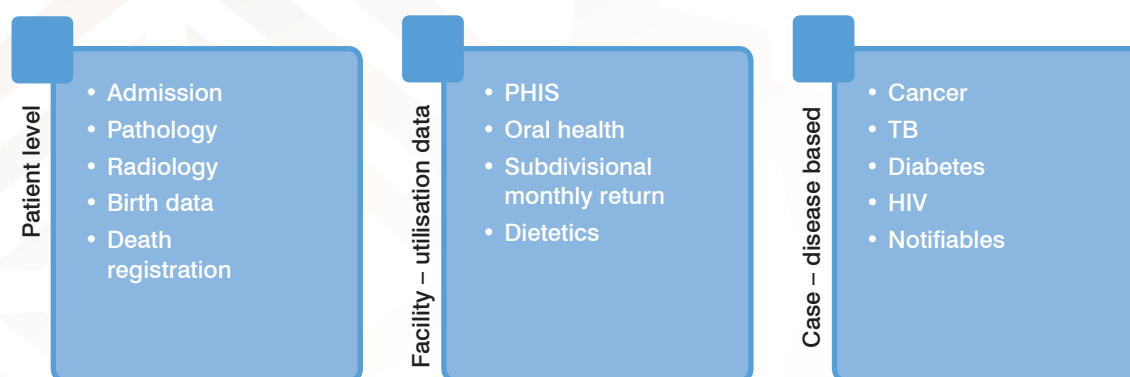


Figure 2: Health Information View



3.4 Application Architecture

Given the above analysis, the following application architecture is proposed:

1. All electronic systems that record person level information will use the National Health Number as their primary client identifier.
2. All such systems will be developed as separate distinct systems with tight messaging and other interfaces to PATISPlus, rather than as modules within PATISPlus. This will provide futureproofing and allow the replacement of PATISPlus without the need to replace/redevelop these systems.
3. Registry type systems that record case data will use the NHN to identify patients to help eliminate duplicate records and receive, for example, mortality notifications, but will be structured so they can provide case-based reporting as required.

4. All systems that collect activity data at the facility or administrative unit level will be developed as modules within the CMRIS.

3.5 Current State of Application Architecture

Figure 3 illustrates the current state of application architecture. It shows that for the most part systems are data silos with little connectivity and electronic sharing.

It also illustrates the limited electronic support of continuity of care, with mostly paper sharing of clinical information, often through patient carried referrals and discharge summaries.



Figure 3: Current State of Application Architecture

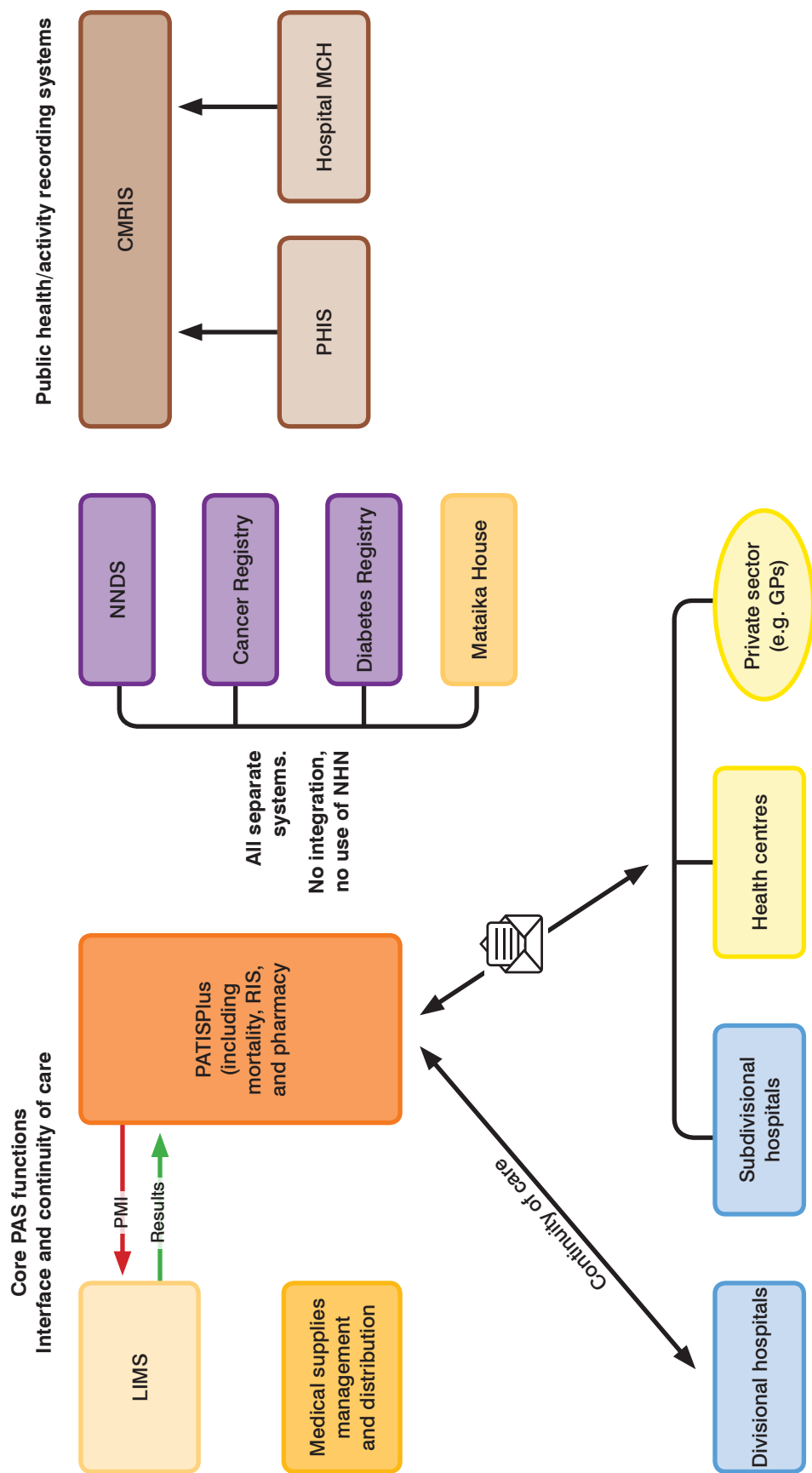
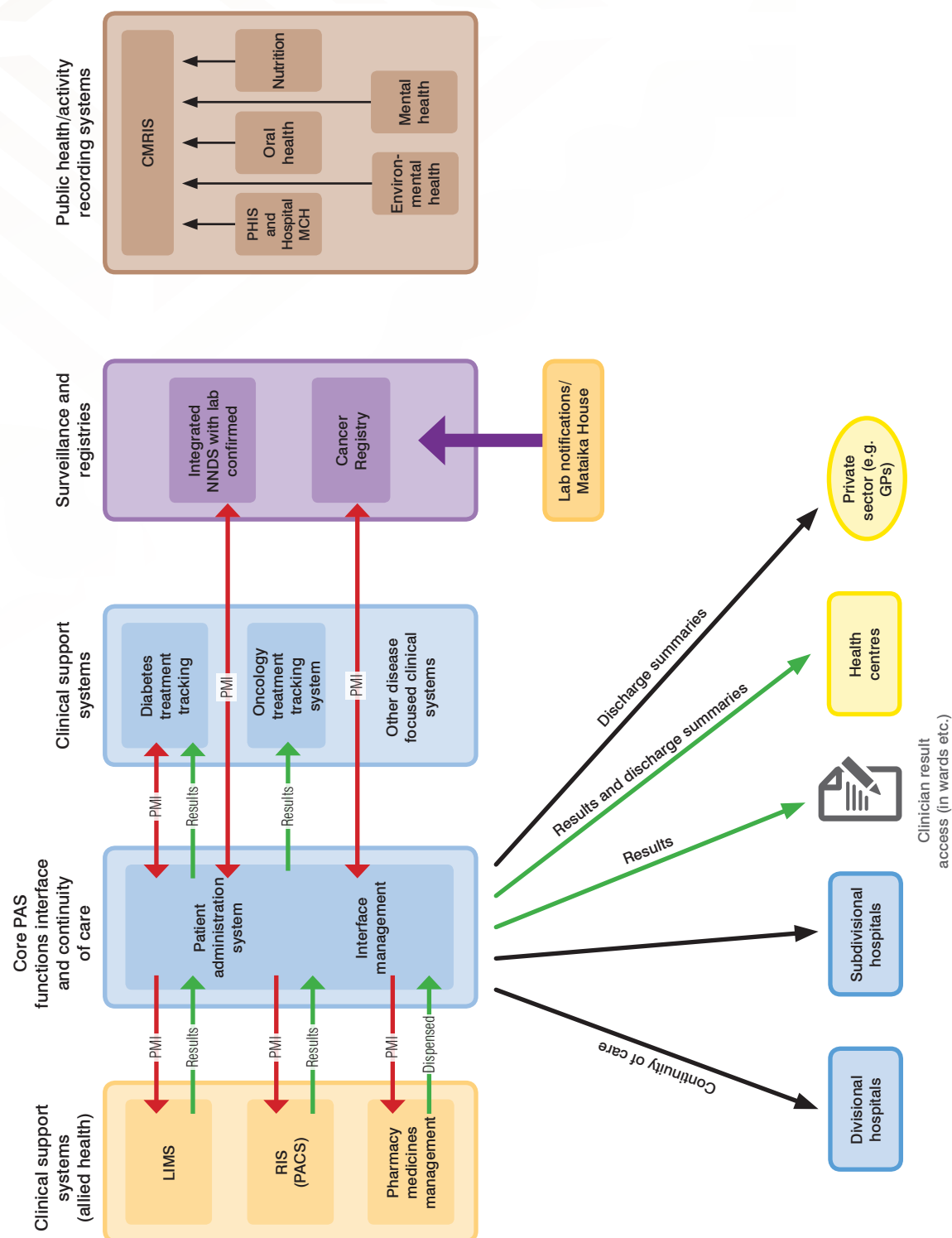


Figure 4 illustrates the eventual goal state of application architecture in the Fijian health sector, with rich sharing of information and electronic support for continuity of care.

Figure 4: Goal State of Application Architecture



4 Human and Organisational Capacity

4.1 Introduction

This chapter considers staff in two areas:

1. Information technology, which covers hardware support and software support.
2. Data management (data review and cleaning [screening, diagnosis and editing]), analysis, and reporting.

The functions of the second area are principally covered by the Health Information Unit, although other groups such as facility records staff and clinical coders are heavily involved in local analysis and reporting.

4.2 Situational Analysis of Human Resources

Currently the information management and information technology areas are substantially understaffed across the whole Fijian health sector.

- The core information systems and technical infrastructure have inadequate staff allocated to perform basic system administration functions.
- MoHMS has no dedicated IT project management and development capability. System administration and support staff are expected to carry out development work as well as their base routine duties. This is not a sustainable operational model.
- Aside from the epidemiologist, the Health Information Unit staff who are responsible for the management and analysis of all centrally collected data are essentially administrative staff, with no staff having undergraduate degree level qualifications in statistics or data analysis.
- There are no dedicated staff members who are skilled in GIS to ensure that disease is mapped accurately to appropriate boundaries.
- The National Health Information Officer role has to date been filled by staff with nursing rather than information management or statistics backgrounds.

Despite these limitations, the dedicated staff consistently provide timely quality outputs in both routine reports and in responses to specific data information requests and ICT systems support efforts nationally.

4.3 Information Management Staffing Strategy

Health Information Unit

The vision is to transform the Health Information Unit into one that:

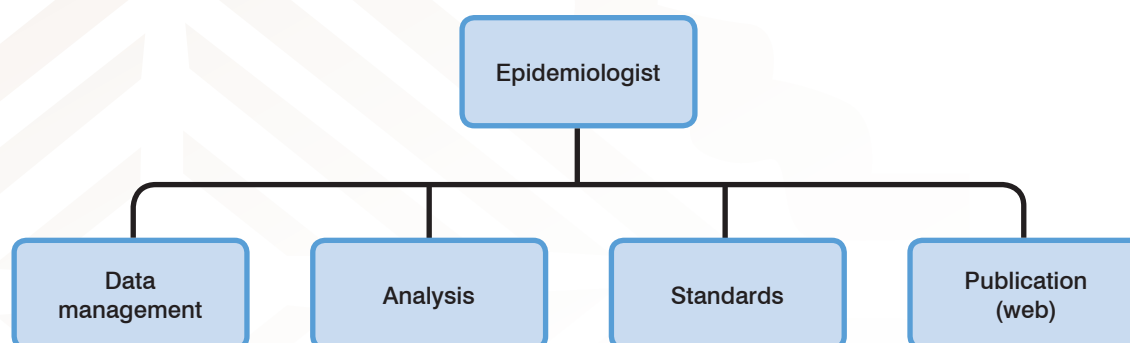
- Supports the Director Health Information Research and Analysis and Director Epidemiology in providing integrated management reporting for MoHMS senior management, combining financial, HR, logistics, disease, and activity data to provide an integrated view for management decision-making.
- Provides useful and timely reports and feedback to all those providing data, through both directed reports and routine reports generated automatically by its systems.
- Supports the Divisional Health Information Officers and national program managers.
- Provides leadership and support to the Head of Medical Records at the three major hospitals.
- Is the centre of expertise in data management and analysis for the Fiji MoHMS. It provides analysis services for the Epidemiologist, the Planning Unit, and MoHMS generally.
- Monitors the quality and completeness of data in all core MoHMS data collections, and reports regularly on this to the National Health Information Committee, with policy direction to the Permanent Secretary of Health and Medical Services, as well as the Ministers of Health and Medical Services.
- Provides training and assistance in data collection, data analysis, and information use to users of health information systems, both manual and electronic.

To achieve this vision will require a significant increase in staff skills. Figure 5 illustrates the structure of the roles and functions that need to be performed by the HIU.

Data Management

- Manage central data collections.
- Actively monitor data quality and provide feedback.
- Carry out source data audits.
- Conduct training in data collection and data quality management.
- Monitor the automatic population of the electronic data and report publishing.

Figure 5: HIU Logical Functions Structures



Analysis

- Analyse, interpret, and provide feedback on national indicator measures.
- Carry out formal statistical and epidemiological analyses as required and supply ad hoc reports as needed by senior management.
- Collaborate in analysis with partners at Fiji universities and external agencies.
- Design the automated corporate management dashboard and scorecard reports.
- Produce high quality routine publications including map (GIS), graphical, and tabular outputs.
- Manage the corporate GIS systems and repository.
- Provide training in analysis, reporting, and presentation of data.

Standards

- Manage the National Data Dictionary.
- Manage metadata for national indicators (Performance Indicator Reference Sheets).
- Manage the data standards development program.
- Provide advice on the development of data standards.
- Act as a national reference point for coding standards.
- Develop and manage the national data quality program.
- Provide training in clinical coding.
- Provide advice on data integration for the reporting warehouse.

Publication (Web)

- Manage the content of the MoHMS internet and intranet sites.
- Manage the National Data Repository.
- Work collaboratively with the Health Research Officer.

- Manage the storage and publication of the electronic library of all MoHMS publications.
- Ensure this library is complete and current, and all relevant publications (e.g. policies, reports, standards) are included.
- Act as the gateway for all internal and external information requests.

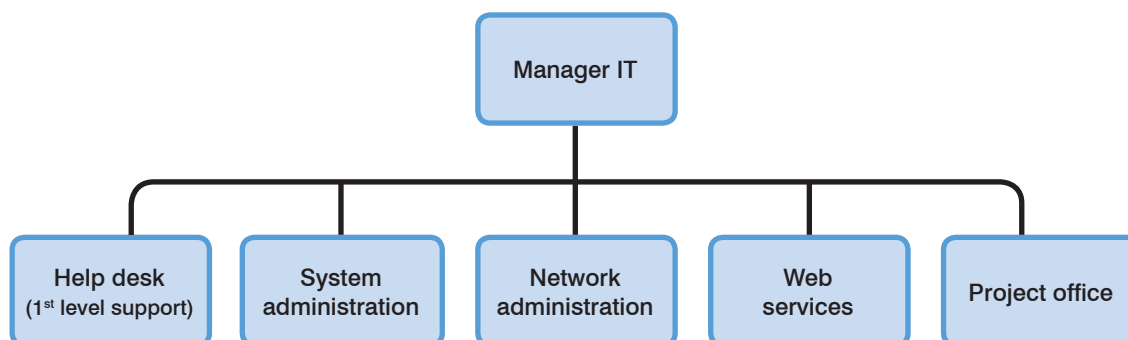
To ensure the staff have the skills and capabilities to carry out these functions the following staff capacity development strategy is proposed:

- Develop a plan documenting the set of skills required within the HIU to achieve its vision, together with a pathway to achieve that skill set.
- Replace at least one existing position, preferably two, with staff who are degree-qualified in numeric subjects and then subsequently are given health experience. This may have to be done by replacing two existing clerical positions with one technical position. This can be achieved by:
 - Simplifying the routine reporting requirements, such as the Quarterly Bulletin.
 - Automating as much as possible of the routine reporting.
 - Ensuring as much as possible of the data entry is carried out at the source, rather than at HIU.

National Health Information Manager

- This is a key role within the overall information management environment within Fiji.
- Ideally the person filling this role should have a degree in health information management, which includes such areas as data standards, health system management, clinical coding, data management, data presentation, and data quality management.

Figure 6: MoHMS IT Unit Logical Functions Structures



- It is unlikely over the next few years that a candidate with all of these skills as well as formal training will be recruited. Given this, it is essential that a formal skills and experience development program be established and funded for the appointed person. This should include one or more targeted overseas placements.

4.4 IT Staffing Strategy

Figure 6 illustrates the structure of the roles and functions that need to be performed by the MoHMS IT Unit.

Within this structure the Manager IT would have responsibility for the establishment and implementation of appropriate standards.

It is recognised that large increases in the number of IT staff are unlikely to be approved over the next few years. Hence, the IT staffing strategy will need to build on three strategic arms:

- Use of outsourcing from Fiji IT companies to provide development and maintenance service. (An implication from this is that all software developed for MoHMS must have the ongoing maintenance costs incorporated as part of the whole-of-life costing.) The Project Manager will evaluate what should be outsourced.
- Retention of core skills and knowledge within MoHMS regarding the technical business interface and requirements of all systems – you ‘don’t outsource your brains’.
- Development of a small (two to three person) project office with staff who have skills in business analysis, design, project management, and testing, as well as a detailed understanding of clinical and health processes in Fiji. In the first instance this group should be employed for three years to manage the development of projects detailed in this strategy.

To perform the roles and functions that must be retained in-house it will be essential to build and retain staff with the appropriate skill sets. To achieve this will require:

- Development of a skills plan that identifies the set of skills needed by MoHMS IT staff over the next five years and explicitly schedules and funds the training necessary to develop and retain those skills.
- The following core skill set, as a minimum, which is recommended to be included within the plan:
 - TOGAF architecture qualified (one or preferably two staff qualified).
 - HL7 basics, PMI, and results interfaces (at least two staff certified).
 - Project management (Prince 2 and Project Management Institute qualified).
 - Certified Data Quality Professional (one IT staff member plus the NHIM).
 - Certified Business Analysis Professional (at least one staff member fully conversant with BABOK).
 - Certified Network Analyst (at least one staff fully equipped with Network Management).
 - Certified Information Systems Auditor (at least one staff certified to carry out internal audits to ensure compliance).

5 Patient Administration Information System (PATISPlus)

Deliverables summary

- 2016 Completion of rectification of issues in the remaining modules of PATISPlus.
- 2016–2018 Extension of PATISPlus to all subdivisional hospitals and selected health centres.
- 2016 Development of an interfacing ‘middle layer’.
- 2017 Development of a bed management capability.
- 2019 Development of tender documentation and specifications for PATISPlus replacement.

5.1 Introduction

PATISPlus provides a common system that is in use across all three major hospitals and a few of the subdivisional hospitals.

The system contains the basic functionality to be expected in a hospital patient administration system, that is:

- Patient Master Index
- Management of bookings for clinics, dental, theatre, and radiology
- Admission, transfer, and discharge of admitted patients
- Coding of discharge records
- Recording of attendance details for GOPD, SOPD, and A&E clinics
- Recording of some key information for inpatient episodes
- Management of operating theatre usage
- Recording of detailed data on hospitals births.

PATISPlus also includes:

- A linked mortality module that records the details of all deaths in Fiji
- A full pharmacy management and dispensing module
- A radiology management module
- Capacity to display pathology and radiology results.

Over the past 18 months a project has been addressing functionality and usability issues in many of the modules. A major ongoing risk is the gaps in recording of basic admission, transfer, and discharge data at the three major divisional hospitals.

PATISPlus uses a unique common National Health Number (NHN) and provides the fundamental infrastructure for the support of continuity of care within and between facilities and between the public and private sectors.


5.2 Strategy

1. The existing PATISPlus will form the core of the patient administration and clinical information system architecture for the next four to six years.
2. All electronic systems that record person level information will use the National Health Number as their primary client identifier and hence will be interfaced to or integrated with PATISPlus.
3. All new clinical and registry systems will be developed as separate distinct systems with tight messaging and other interfaces to PATISPlus, rather than as modules within PATISPlus. This will provide futureproofing and allow the replacement of PATISPlus without the need to replace/redevelop these systems.
4. We will explicitly use PATISPlus as a learning platform to develop skills within the IT staff and to trial ideas with clinicians regarding possibilities for future electronic medical records systems within Fiji.
5. The current PATISPlus project will complete the remediation of the remaining and other necessary work during 2016.
6. Following this remediation, modifications and extensions to PATISPlus beyond this remediation will be limited to core patient administration functions, plus those additions needed to support reporting and clinical usage.
7. By 2018 MoHMS will commence scoping and planning for a replacement system, with the intention of having tender documentation completed in 2019.

5.3 Investments and Activities

The following investments and activities are planned for the next five years:

- Full implementation of PATISPlus at all subdivisional hospitals and specialist hospitals.

- 
- Implementation of the clinical enquiry and pharmacy functions at the larger health centres to support continuity of care between facilities.
 - Ongoing support to the three major hospitals for the complete recording of all admissions, discharges, and births.
 - Improved supply, access, and use of information to manage patient throughput and reduce bed-block. (For example, CWMH is operating almost continually at near 100% bed occupancy.)
 - Provision of SMS messaging to remind patients of booked appointments, together with enhanced capability to alert clinicians regarding missed key appointments.
 - Improved theatre management capabilities, either through enhancement of the existing module within PATISPlus or adoption of a linked third party theatre system.
 - Development of a common interfacing strategy and tools to allow a range of third party and new systems to 'plug-in' to PATISPlus to access the PMI and receive targeted messages such as results and mortality notifications.

5.4 Replacement of PATISPlus

The current hospital patient administration system, PATISPlus, was implemented in 2012, but was based functionally on an earlier system (PATIS), which was introduced in 2002.

By the end of this five-year planning cycle, the replacement for PATISPlus should be scoped and the acquisition planned. This will most likely be a commercial product rather than a locally developed system. The system should be planned to increasingly support a patient electronic medical record and shared health record.

6 Clinical Information Systems

Deliverables Summary

- 2016–2017 Delivery of clinical information (results, patient history, and targeted lists) to bedside via tablets at the three major hospitals.
- 2016–2018 Deployment of functionality to support continuity of care to all subdivisional hospitals and major health centres.
- 2016–2020 Development of clinically focused patient treatment tracking systems for oncology, diabetes, RHD, and mental health.
- 2017–2030 Development and deployment of continuity of care with the private sector through improved referrals and electronic discharge summaries.

6.1 Introduction

As described in the previous two chapters, clinical and case-based registry systems will in general be developed as discrete systems that interface with PATISPlus and access PATISPlus data in a variety of ways. This approach is designed to reduce the cost and complexity of later replacing PATISPlus.

6.2 Strategy – Medium Term

The aim over the next five years is to extend the use of the electronic information systems for clinical purposes, focusing on:

- Supporting the improvement of the continuity of care between facilities, between visits with facilities, and between the public and private sectors.
- Increasing provision of information to clinicians at the point of care to improve efficiency and quality of patient care.
- Supporting the treatment of patients with long-term chronic non-communicable disease conditions, including mental health conditions, diabetes, and cancer.
- Developing knowledge and skills of IT staff and their understanding of the clinical requirements and environment.
- Extending the role of the current PATISPlus steering committee to coordinate the development and application of all clinical related systems.

- Further extending the use of the systems to support clinicians and patient treatment. An indicative sequence is the:

- Upload and storage of clinical documents
- Delivery of results at the point of care in major hospitals
- Distribution of electronic discharge summaries to private providers
- Online ordering of discharge medications
- Entry of clinical notes online in selected areas.


6.3 Strategy – Longer Term

There will be an explicit process of building capacity (human and technical) with the goal of moving eventually towards an electronic medical record (EMR) system. It is expected that the full implementation of such a system will take place over twenty years. In this process we will aim to build staff skills, our understanding of clinical requirements, and the technical building blocks.

6.4 Investments and Activities

The following investments and activities are planned for the next five years to support these goals:

- Full implementation of PATISPlus at all subdivisional hospitals and specialist hospitals to enable continuity of care.
- Implementation of the clinical enquiry and pharmacy functions at the larger health centres to support continuity of care between facilities. (The clinical enquiry functions include the capacity to access patient histories, discharge summaries, and radiology and pathology results.)
- Deployment of tablet devices so that clinicians can view pathology and radiology results at the point of care and access key clinical documents and protocols.
- Electronic ordering of discharge medications as the first learning step in developing an online ordering capacity.
- Electronic interactive patient lists, which are customised for consultants (teams), disciplines, and wards to support patient management and handover.
- Generation and transmission of electronic discharge summaries, including the incorporation of pathology results and medications.
- Cancer treatment tracking and reminder system for chemotherapy patients. This system will be linked to the Cancer Registry.

- 
- Integrated diabetes treatment, recall, and reminder system for the management of all high risk diabetes patients. This system will be linked to the Diabetes Registry.
 - Integrated mental health treatment, recall, and reminder system for the management of all mental health patients.
 - Replace the medicines management, pathology results, and radiology functions within PATISPlus with standalone systems interfaced to PATISPlus. (This is partially completed for the pathology results management and reporting functions.)

7 Surveillance and Registries

Deliverables Summary

- 2015–2016 Replace the existing Microsoft Access Cancer Registry with CanReg5, migrating all old cancer data from a range of legacy systems.
- 2016 Develop a new system to record all clinically notified diseases that are required to be notified under the Public Health Act.
- 2016 Develop a new RHD registry and clinical system.
- 2017 Develop a new cancer registry system linked to the new clinical cancer treatment tracking system.
- 2018 Develop a new registry system for diabetes.
- 2018–2019 Develop a new fully integrated disease surveillance system that builds on the system developed to record clinically notifiable diseases and integrates laboratory data.

7.1 Introduction

This section considers both notifiable disease systems and single disease registries. The disease registries form part of the overall surveillance system, but are also part of the clinical system environment. Hence, they are discussed both here and in Chapter 6.

7.2 Strategy

In the development of the National Strategic Plan there was strong desire from many business areas for a single ‘source of truth’ for disease notification data, i.e. a source that combined both clinically notified and laboratory confirmed cases.

The long-term strategy has two broad themes:

- Ensuring that any registry that records details at the individual person level uses the NHN as its primary identifier and is interfaced to PATISPlus.
- Incremental development of an integrated disease notification registration system.

7.3 Investments and Activities

The following investments and activities are planned:

- Make essential improvements to the existing HIU systems and then replace with new systems over the next two years.
- Develop a range of new single disease registry systems, each employing the same basic design. Each system will be interfaced with PATISPlus and use the National Health Number as its patient identifier.
- All such registry systems will receive auto-notifications of appropriate cases for discharge, as well as mortality data and potentially laboratory data.
- Develop a core notification and surveillance system that integrates laboratory confirmed and clinical notifications to provide a single, timely source of disease notifications without duplication. This will be done in two phases:
 1. Develop a system to replace the current National Notifiable Disease Surveillance (NNDS) system in HIU to record all clinically notified cases. This system will be able to be linked to PATISPlus, so all cases will have a NHN.
 2. Incorporate directly the laboratory results from Mataika House and auto-notifications of PATISPlus discharges and from LIMS.

8 Routine Health Information Systems (CMRIS)

Deliverables summary

- 2016–2017 Develop new reporting interface with dashboards and profiles incorporating data from multiple collections into single presentations.
- 2016–2020 Incorporate new routine data collection into the CMRIS, commencing with the hospital monthly return in 2016. This would be extended to include mental health, oral health, nutrition, and environmental health over the period.

8.1 Introduction

Routine Health Information Systems collect activity data at the facility or service delivery point level. For example, they might collect data about the number of immunisations given by a Zone Nurse, or the number of births in a subdivisional hospital. This type of data is primarily used for management and monitoring, e.g. for the calculation of performance indicators. As discussed in Chapter 3, all data of this type will be collected and managed through additions to the current Consolidated Monthly Return Information System (CMRIS).

Because the basic database structure and reporting tools have been established, adding new modules to the CMRIS is relatively low cost. The major cost and effort will be in the definition of the indicators and their calculation, the related data items, and then the subsequent training and support.

8.2 Strategy

There are a range of business areas with corresponding data that have expressed requirements for the collection, management, and reporting of this type of routine data. These include:

- Subdivisional Hospital Monthly Return (until PATISPlus is deployed to all subdivisional hospitals).
- Mental Health.
- Oral and Dental Health.
- Nutrition and Dietetics.
- Environmental Health.

These will be incorporated into the CMRIS over the years 2016 to 2020, as approximately one new collection will be incorporated per year. The order of incorporation will depend on MoHMS priorities and the readiness of the area for incorporation.

With all of the areas, it is expected that the technical issues will be relatively easy to resolve. The major effort will be:

1. Developing the indicators and data collection instruments.
2. Implementing the data flows and processes to ensure that all data is collected, but there is no duplication of collection or overlap between systems.

8.3 Investment and Activities

Currently each module within CMRIS has a set of reports that are accessed from within the module itself, although the reports display data from both data collections. The reporting interface will be redeveloped as follows:

- A single reporting interface where all reports can be accessed. (This is to improve the user experience and make the technical maintenance of the system easier.)
- Reports to be regrouped into more user friendly and intuitive groupings.
- Inclusion of a range of dashboard, profile, and thematic map reports that combine and display data from the multiple contributing collections.

9 Birth and Mortality Data (CRVS)

Deliverables Summary

- From 2016, a mortality data project officer will be employed to follow up intent and maternal mortality and to pursue missing data.
- From 2016, HIU will produce a detailed yearly mortality report in addition to the briefer data reported in the Quarterly Bulletin and Annual Report.
- From 2017, community births captured through the PHIS system will be automatically incorporated into the appropriate birth count reports.
- From 2017, community deaths captured through the PHIS system will be automatically checked against the death registry within PATISPlus.
- From 2017, MoHMS will have established formal ongoing linkages with external organisations, both within and outside of Fiji, to routinely cooperatively analyse both mortality and birth data and trends.

9.1 Introduction

The accurate recording of all births and deaths provides the essential base data for health statistics and the reporting of health. Counts of births provide the denominators for a wide range of indicators, with low birth weight and stillbirth rates being important indicators in their own right. Reducing population mortality rates is the fundamental goal of any health system. The National Strategic Plan includes the following related objective:

- Objective 6.2.4: Collaborate with relevant partners (e.g. FIBoS, Registrar-General, private sector providers) to improve availability and consistency of key health data and statistics.

Section 9.2 following provides a CRVS specific SWOT analysis. The overall strategy for this strategic area is to build on the strengths and opportunities identified and to reduce the weaknesses. This will principally be through two approaches:

- Use of dedicated project staff to improve data quality and timeliness.

- Improved partnership with other government and non-government agencies.

9.2 Review of Current State

Strengths

- The current mortality system is near gold standard. It has very good completeness, electronic standardised coding of underlying cause of death (UCOD), linkage of mortality data to hospital data, and in-built reporting to help detect maternal mortality.
- By the end of 2016 MoHMS will have fully coded data back to at least 2011, and potentially back to 2003. This provides an unrivalled data set for research and policy development.
- MoHMS has a very good relationship with the Registrar of Births, Deaths and Marriages.

Weaknesses

- Currently using short-term volunteer staff funded by a donor agency to handle data entry and management. This is not sustainable in the long-term.
- Recording of intent on the Medical Cause of Death Certificate (MCD) is very poor. This is common in many countries, but in Fiji it seems to be particularly poor.
- Drowning and similar deaths are under-reported. The tight schedule for the Annual Report limits time to follow-up and investigate these types of cases and maternal deaths.
- Given the richness and potential of the data, only limited use is made of it. This is partly related to the tight annual reporting schedule mentioned above. At present the reporting does not include:
 - Age standardised or age/cause specific mortality rates.
 - Geographic analysis of data.
- Do not have population denominators for many of the most useful analyses, including:
 - Ethnicity breakdown after 2007.
 - Single year age–sex projections after 2014.
 - Projections by health administrative areas.

Opportunities

- There is large potential for the analysis and use of mortality and birth-related data to drive long-term policy formulation for the Government of Fiji, both within the health sector and more broadly.

- As over 99% of births in Fiji occur in hospital, with the bulk of these occurring in one of the three major hospitals, there is the potential for great efficiency and data quality benefits through having a single hospital-based birth recording system that meets clinical needs, MoHMS statistical data requirements, and the needs of the Registry of Births, Deaths and Marriages.
- By being able to provide fully coded mortality records to other government agencies and researchers we should greatly strengthen our relationships with these organisations.
- Have opportunity to form partnerships with external organisations/researchers to carry out extensive and sophisticated analyses of our rich data.
- From 2016, MoHMS will employ a project officer for three years to support the mortality team. The principal role of this project officer will be to investigate intent, missing deaths, and maternal deaths. The project officer will also carry out routine data management and data entry duties as time allows.
- MoHMS will partner with other organisations in Fiji for the joint analysis of mortality data.
- From 2016, the annual report will include preliminary basic count death data. Around September each year, the HIU will release a definitive yearly mortality report after all investigations are finalised and the analysis is completed. HIU will require support in the production of this report. This support could be provided by the partners mentioned above or by SPC.

9.3 Investment and Activities

- From 2016, DHIRA will accelerate the activities of the Regional Action Framework on Asia Pacific Decade of CRVS through the National CRVS Steering Committee.
- From 2016, MoHMS will commence more formal linking of community deaths notified through PHIS with the mortality register. By 2017 this linkage, which will enable identification of unrecorded deaths, will be automated.
- Will provide yearly training to clinicians on the completion of Medical Cause of Death Certificates. Over the five-year period will develop the staff and resource capability to deliver this training in-house as part of in-service training.
- By 2017, will develop a training package for the correct ICD-10 coding for delivery episodes.
- For three years from 2016, MoHMS will fund two clerical project positions to clear the backlog of data entry and management back to the year 2002 and enter the current year's data to allow the mortality statistical officer to concentrate on coding, reporting, and other higher level tasks.
- From 2016, will be electronically capturing community births through the PHIS system and combining hospital birth data to provide a complete and automatic count of live and stillbirths in Fiji.
- From 2018, will explore with BDM and FIBoS the options for having a single electronic record capture for every birth, which will provide the information requirements of each organisation.

10 Analysis and Presentation

Deliverables Summary

- 2017 Incorporate basic thematic maps of key indicators in routine HIU publications.
- 2016–2019 Provide ongoing training on the use of data for management, monitoring, and planning for middle and senior managers.
- 2019 First stage of Fiji Health Data Warehouse.

10.1 Introduction

This chapter defines the goals, systems, and information products for the analysis and presentation of information derived from the health and clinical information systems.

The overall goal is to provide the right information, at the right time, in the right format, to the right person. This will often mean that data from multiple sources and systems must be integrated. For example, to know the number of discharges from a hospital is interesting, and to know the cost of operating the hospital is interesting, but to know the cost per patient day across hospitals provides powerful information for management decisions related to efficiency.

The provision of this information may be through specific information requests and reports, website publications, routinely produced reports such as the Quarterly Bulletin, or audience specific reports such as management dashboards and scorecards.

10.2 Information Products

Table 1 lists the routine information products that are or will be produced by the Health Information Unit.

Table 1: HIU Data Products

| Information Product | Key Audience | Purpose and Content |
|--|---|--|
| HIU Quarterly Bulletin | Principal audience is middle management staff who are the data suppliers, but also broader MoHMS audience. | Principally for information and to provide feedback to the data providers. Contains a broad range of information from all routine data collections. Also forms basis of reporting for divisional planning meetings. |
| Management Performance Reports | Management of MoHMS. | For senior and middle management to monitor performance and identify potential issues or opportunities. Integrated management reports (e.g. dashboards and scorecards) with rich map and graphical presentation. |
| Annual Report | Principally externally-focused audience. | Comprehensive report detailing the activities of a preceding year, including comparative trend analysis, financial performance, and overall health performance outcomes in programmatic and health systems areas. |
| Annual Statistical Report | Principally externally-focused audience, including research organisations, general public and media, and MoHMS partner organisations. | Contains more detailed statistical analysis of mortality and morbidity data, with multi-year time trends and international comparisons. For example: <ul style="list-style-type: none"> • Age-standardised disease or mortality rates • Rural–urban comparison of disease incidence. |
| MoHMS Statistical Portal (intranet/extranet) | Intranet – MoHMS management and clinical staff. Extranet – as above. | Provides both static reports and the capacity to query, drill down, and extract from detailed record level data in pre-processed structures to ensure easier use and interpretation. |
| NNDS Monthly Report | Principal audience are the data suppliers, but also broader MoHMS audience, particularly across the public health area. | Principally for information and to provide feedback to the data providers. Displays short and long-term trends. Over time it will include integrated presentation of all disease surveillance type data collected. |

10.3 Strategy

Introduction

The overall responsibility for oversight of the analysis and reporting strategy will rest with the METT Analysis and Reporting Group.

The overall approach is to:

- Automate routine reporting as much possible.
- Provide routine management reports in pre-integrated, clear structures, such as dashboards and scorecards, incorporating tabular, graphical, and GIS (map) presentations.
- Provide end users with powerful flexible tools to interrogate and report with and to.
- Provide ongoing training and support in the use of the reporting tools, as well as the use and interpretation of the resulting reports. This will be provided in part by various METT groups.

Figure 7 illustrates the data flow and reporting tools used to manage, analyse, and present data. A key aspect of this is the publication of information via a web portal on the health intranet and the public health website.

Data Warehouse

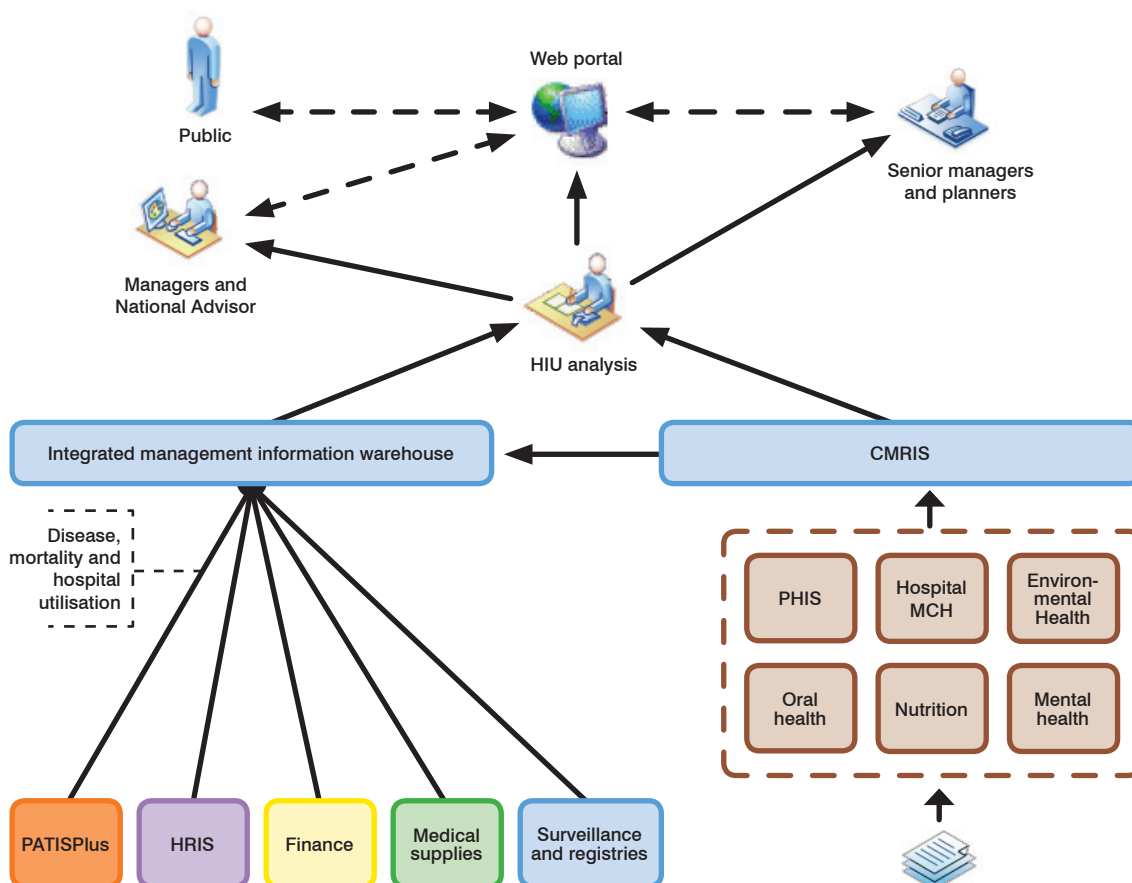
The aim of a data warehouse is to provide data integrated from multiple sources in structures that are simple to understand and use, and are optimised for reporting. For example, a data warehouse could contain linked data on the number of trained midwives, antenatal clinic attendance, the number of births, and the stillbirth rate, so one could report on the stillbirth rate vs. the early booking rate and midwife coverage.

MoHMS has already deployed a number of precursor mini data warehouses. These include the dashboard tools inside the CMRIS that combine MCH data from both the public and acute settings, and the reporting tool in PATISPlus that allows users to build their own flexible reports over a formal warehouse data structure that combines PATISPlus and non-PATISPlus hospital data.

The major issues and barriers in any data warehouse project are related to data rather than technology. These include:

- Defining the categories that will be used to group and report data. (This is a data standards task and will be partially handled through the strengthening of MoHMS capacity in this area.)

Figure 7: Structure of the Reporting System



- Cleaning the data prior to the initial load and establishing an ongoing process for cleaning and loading the data.
- Ensuring common entities are used across the various business areas. For example, ensuring that facilities referred to in the medicines supply system are the same as facilities used in the patient administration system and that wards have the same definition across hospitals. Again, this is a data standards task.

The aim is to have the first stage of the MoHMS data warehouse implemented in 2019. This will include financial, hospital utilisation, morbidity, mortality, birth, population, public health, medicine usage, and staffing data. It will have a rich range of predefined reports as well as a flexible reporting capacity, providing tabular, graphical, and mapping presentations.

From 2016 to 2018, the major effort will be expended in the necessary data preparation across all of the source systems.

GIS Capability

Over the past years MoHMS has made a variety of attempts to introduce a GIS capability. This has principally involved having various staff trained in a number of different GIS and mapping software systems.

Despite these efforts, MoHMS still does not have any GIS or mapping presentation capacity. This is principally due to three factors:

- Lack of commitment of resources from senior management (e.g. dedicated GIS position).
- Non-alignment between the administrative boundaries used by MoHMS and the boundaries used by all other government departments. This means that MoHMS can't simply reuse the maps developed by other agencies.
- While a broad strategic direction has been defined, there is a lack of an implementation plan detailing the specific tasks required.

The aim of the GIS stream of work is to develop the following GIS/mapping capacities within MoHMS:

- Ability to display data through thematic maps at the divisional and subdivisional levels. Initially these would be simple static maps, but over time they would be multi-factor maps and dynamic maps.
- Alignment of MoHMS administrative boundaries with whole-of-government boundaries.

- Ability to plot the location of disease cases compared with the location of significant environmental factors and to later analyse patterns.

The first step in developing this capability will be to seek donor partner support for a medium-term adviser to develop a detailed implementation work plan. Alternatively, this support may be sourced using local expertise available from the University of the South Pacific. In parallel with this, DHIRA will continue to seek the creation of a permanent dedicated staff position.

10.4 Supporting the Use of Information

Users of information, such as the divisional planning meetings will be supported by:

- Being given access to data analysis and reporting tools, as well as training in their use. Initially this will be done through access to the PATISPlus reporting module and the CMRIS dashboards and reporting module, with alternative access through a more integrated web portal, which includes graphical and mapping presentation capabilities.
- Being provided with templates and guidance on the use and presentation of this data.
- Ongoing guidance from the METT Analysis and Reporting Group.

11 Quality, Coding, and Standards

Deliverables Summary

- 2016 Contract a consultancy to consider options for migration from ICD-10-AM as Fiji's morbidity coding system.
- 2016 Develop a data quality and associated skills improvement plan.
- 2017 Migrate from ICD-10-AM to the new coding system, including system changes.

11.1 Introduction

What is Data Quality?

Quality data is data that is fit for use. This does not mean that data must be perfect, but does mean that the data must be of adequate timeliness, completeness, and accuracy for valid conclusions and decisions to be drawn from the data.

11.2 Approach to Data Quality

Data quality is achieved through a simple four-step cyclical process:

1. Data standards, which are clear statements about what data needs to be collected and why, including unambiguous definitions.
2. Establishment and implementation of processes to collect and manage the data, with clear roles and responsibilities.
3. A routine feedback process to monitor data quality and completeness in a timely manner to provide feedback to the collectors.
4. Periodic audits or reviews – the results of which will provide feedback to the management in charge of the data collection processes.

11.3 National Health Information Manager

It is proposed that the NHIM role be made formally responsible for the management of data standards, including coding standards within the Fiji MoHMS. This role would also be responsible for the oversight and guidance of data quality management and monitoring within Fiji MoHMS. The development of capacity in this role is discussed in Chapter 4.

Responsibility for data quality and implementing data quality processes and monitoring activities should rest with the business areas that collect and manage the data.

11.4 Investment and Activities – Data Quality

The following approach will be followed to improve data quality across the range of collections:

- Develop a plan for building capacity and skills in the area of data quality and data standards, and establish a clear governance responsibility for data quality and data standards.
- In the area of data standards and definitions:
 - Complete the process of developing and documenting the Fiji standards registry for storing and managing the Fiji NHDD.
 - Establish clear operational responsibility for managing the NHDD registry and for the development of definitions.
 - Establish a process for identifying and prioritising data elements that require definitions to be developed. This will include the standardisation of value domains.
- Identify a number of data areas for the initial focus of data quality improvement activities, with a clear plan for its improvement and sustainability.

11.5 Analysis of Coding Capacity

The current situation is:

- Fiji uses Edition 4 of ICD-10-AM. This is an unsupported and very out-of-date version of ICD-10-AM.
- It currently does not have a licence for this product, although it could most likely be licenced for free. Medical records staff at the major hospitals are unable to code all of the discharges currently recorded within PATISPlus and will be totally unable to handle the increased load if all discharges are recorded.
- There is essentially no capacity within Fiji to carry out extended training of coders, and no overall training strategy or standards.
- There is currently only one trained and experienced mortality coder in Fiji.

11.6 Investments and Activities – Coding

To address these issues the following strategy will be followed:

- Engage an external consultant (through donor support or directly) to review all aspects of coding in Fiji and provide recommendations on:

- The feasibility of migrating from ICD-10-AM to ICD-10 with clinical (procedures) extension. This must include software implications.
- The requirements and standards for coders at hospitals and HIU (numbers, skills, and training) to support the use of ICD-10 to code all records on an ongoing basis.
- Options for providing ongoing training and quality review of coding in Fiji.
- Following this, engage a consultant to:
 - Conduct training of coders and trainers in the new coding system.
 - Develop a training package and plan, which can then be administered in Fiji, possibly with limited remote support.
- Address the shortfall in coding capacity by:
 - Assigning responsibility for addressing this shortfall to the NHIM.
 - MoHMS recruiting two volunteers who are experienced health information managers/ ICD-10-AM coders for two years to address the gap while long-term measures are being put in place.
 - Developing a long-term coder capacity development plan and investigating options for auto-coding as part of the consultancies above.
 - Training a second HIU staff member in all aspects of mortality coding, including the use of IRIS. This staff member will work at least part-time on the routine coding of mortality data to ensure their experience is current.
 - Aiming to have yearly visits from the BAG to monitor and advise on coding quality, and aiming to ensure both mortality coders have experience with the ABS mortality coding section.



12 Infrastructure

Deliverables Summary

- By 2017, have established a formal technical standards, approval, and governance function.
- By 2019, high-quality high-speed networking available at all facilities that are health centre level C and above.
- By 2018, Picture Archiving and Communication System (PACS) implemented across all subdivisional hospitals.
- By 2019, all Nursing Stations connected for faster and easier communications.

12.1 Introduction

The delivery of the systems and information products described in the previous chapters depends totally on having a solid, reliable, and speedy supporting infrastructure.

This infrastructure must be managed by suitably skilled technical staff operating within well-structured formal governance arrangements.

The intention is that, where appropriate, basic support functions will be outsourced to either ITC or the private sector, but core health related knowledge will and must remain in-house.

12.2 Strategy

The vision for Health ICT is to provide an infrastructure that is accessible, highly available, sustainable over time, and scalable as the system demands and the population grows.

This infrastructure will need to support:

- The remote delivery of services, including video conferencing and interactive training.
- Rapidly increasing storage and communications demands for digital imaging.
- Use of mobile applications (mHealth) to provide both clinical care and for real-time public health data capture.
- Increased demand from customers and private healthcare providers for electronic access to services such as appointment bookings and referrals.

12.3 Investments and Activities

- Establish an eHealth standards and regulatory function.
- Provide support for enough hardware that will ensure high use of digital data for patient/facility management and evidence-based reporting.
- Develop and implement secure messaging standards, including the use of HL7 for clinical messaging.
- Provide mHealth infrastructure, which can be used easily by a range of clinical, public health, and private partners.
- Provide wireless access as needed within hospitals to ensure mobile use of digital data.
- Implement lower cost communications using VOIP or similar technology, including video where required.
- Provide the best fit for user interface devices (e.g. PCs, tablets, voice recognition) to all clinical staff to support patient care.
- Improve data backup and disaster recovery processes and technology with the use of virtual hosting and green infrastructure.
- Ensure high quality, high speed networking is provided to all facilities that are health centre level C and above.
- Provide high speed, secured, sustainable, and accessible infrastructure for digital imaging on internal network and secured external network.
- Implement cost-effective, innovative storage regimes that will ensure patient confidentiality as well as high availability of data.





ANNEXES



ANNEX 1: HIU Data Collections

Existing HIU Data Collection Systems

| Collection | Data Flow, HIU Collection, and Output | Issues Analysis | Proposed Way Forward |
|--------------------|--|--|---|
| Notifiable Disease | <ul style="list-style-type: none"> Weekly notifications from medical officers. Entered into a Microsoft Access database within HIU. One database per year. Individual record data and summary count data held in same table. All reports are basic aggregated counts. | <ul style="list-style-type: none"> No in-built reports in database. Structure prevents easy time series reporting. Structure makes detailed analysis (e.g. age–sex) very difficult. No reports produced with population denominators. | <ul style="list-style-type: none"> Replace with new system linked to PATISPlus as phase 1 of integrated system. |
| Cancer Registry | <ul style="list-style-type: none"> HIU notified of cancers from multiple sources. Prior to 2005 the CanReg4 software was used. Cancer cases are now entered into a simple Microsoft Access database with one database per year. Database has no reporting capability and no searching or matching capability. Database does not record National Health Numbers. No linkage to mortality data. New cancer case counts are reported quarterly. Analysis done by exporting data to Microsoft Excel. CanReg5 has been obtained but not used. | <ul style="list-style-type: none"> The CanReg4 data is not currently easily accessible. Almost impossible to do time trend analysis. Searching to see if a notification is for a new case, or if it has already been registered, is done manually only in the current year. No capacity to look at such things as survival or treatment rates. | <ul style="list-style-type: none"> Initially implement CanReg5 and migrate all old data. Subsequently replace with new system linked to PATISPlus and LIMS. |
| Diabetes Registry | <ul style="list-style-type: none"> Notifications of (presumed) new diabetes cases by Medical Officers. Data entered into a simple Microsoft Access database with one database per year. Database has no reporting capability and no searching or matching capability. | <ul style="list-style-type: none"> Database structure means it is almost impossible to do time trend analysis. Searching to see if a notification is for a new case, or if it has already been registered, is done only in the current year and possibly one or two earlier years. | <ul style="list-style-type: none"> Replace with new system linked to PATISPlus and LIMS. |

| | | | |
|--|--|--|--|
| Hospital Discharge Data (Manual Tear Offs) | <ul style="list-style-type: none"> Hospitals without PATISPlus send copies of their discharge registers to the HIU. These are patient level registers. These are coded by HIU staff and entered into a Microsoft Access database. There is one database for each year. The data from PATISPlus is extracted and merged with the non-PATISPlus site data to produce a single analysis file. | | <ul style="list-style-type: none"> This system will continue until PATISPlus is rolled out to all subdivisional hospitals. The new reporting function in PATISPlus includes the upload and reporting of this data. |
| Subdivisional Monthly Return | <ul style="list-style-type: none"> Entered in spreadsheets, essentially one spreadsheet for each paper form. This data is used for all reporting on bed occupancy and length of stay for subdivisional hospitals. | <ul style="list-style-type: none"> Data is in spreadsheets that have the exact look of the paper form. This means that it is almost impossible to automate the analysis of combining data. Significant discrepancies between this data and the individual record discharge data. | <ul style="list-style-type: none"> The data collection will be reviewed and modified. Then the revised data collection will be incorporated as a module of CMRIS and be in use until PATISPlus is in use at all subdivisional hospitals. |