REPUBLIC OF MAURITIUS

NATIONAL AUDIT OFFICE

PERFORMANCE AUDIT REPORT

COMPUTERISATION
OF PATIENT HEALTH RECORDS

Ministry of Health and Quality of Life

FEBRUARY 2017

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CONTENTS

ABBREVIATIONS AND ACRONYMS

AED	Accident and Emergency Department
AHC	Area Health Centre
CIB	Central Informatics Bureau
CISD	Central Information System Division
DBA	Database Administrator
EHR	Electronic Health Record
ICT	Information and Communications Technology
IHMPCS	Integrated Hospital Management and Patient Care System
IHMS	Integrated Hospital Management System
IPCS	Integrated Patient Care System
IT	Information Technology
JNH	Jawaharlal Nehru Hospital
MoHQL	Ministry of Health and Quality of Life
MTCI	Ministry of Technology, Communication and Innovation
NAO	National Audit Office
OPD	Outpatient Department
URTI	Upper Respiratory Tract Infection

EXECUTIVE SUMMARY

Government identified the computerisation of Ministry of Health and Quality of Life (MoHQL) as a priority area to improve the quality of health services provided to the public. Several initiatives were taken to computerise the operations of Public Health Institutions. In 1994, the Integrated Hospital Management and Patient Care System (IHMPCS) was implemented on a pilot basis at Jawaharlal Nehru Hospital (JNH). An Integrated Patient Care System (IPCS) at two Medi Clinics and five Area Health Centres (AHCs), and an Integrated Health Management System (IHMS) at the Trust Fund for Specialised Medical Care (Cardiac Centre) were also implemented.

Health records are central to all patient healthcare activities and form a key component in all computerisation initiatives. The audit objective was to assess whether initiatives taken to computerise patient health records by the Ministry were successfully implemented and the different systems developed to generate these records were used as intended.

Key Findings

IT Readiness

Most of the initiatives taken by the Ministry to move towards computerisation of patient health records were not successfully implemented and the different systems developed to generate these records were not used as intended. MoHQL was not ready and prepared to implement the different initiatives.

Computerisation System at JNH

IHMPCS had not been fully implemented or used. The main reasons advanced were insufficient planning and inadequate implementation approach, insufficient training dispensed to certain Sections and the correction of errors in the System was time consuming and often incomplete. The System was mainly used as an administrative tool.

IHMPCS had not been replicated to other Regional Hospitals as planned, and an assessment had not been made to ascertain whether the System was reliable to be replicated.

Computerised System at Cardiac Centre

As of May 2016, patient health records were predominantly paper based. Out of the 18 modules developed for the IHMS, only one module, namely the Patient Manager and Appointment Scheduling, was being used.

Computerised System at Medi Clinics and Area Health Centres

As of May 2016, the Administration and Clinic Modules at Lady Sushil Ramgoolam Medi Clinic were partially used. The Pharmacy Module was not used. This resulted in some patient health information being kept manually and others electronically. At Dr H Nakajima Medi Clinic, the System was not being used. Patient health records were kept manually. At Bel Air

and Triolet AHCs, in May 2016, no IPCS was in place. All the hardware that supported the System was stacked in the store of the AHCs.

Policy on Patient Health Records

The Ministry did not have a Retention Policy on patient health records to ensure that records which were no longer needed or were of no value were discarded at the proper time.

Conclusion

Over the past 23 years, most of the initiatives taken by MoHQL towards the computerisation of patient health records have not been successfully implemented and the different systems developed so far to generate these records have not been used as intended.

Key Recommendations

MoHQL should carry out an IT readiness assessment to ensure that it is ready and adequately prepared before undertaking a large scale computerisation project in the future.

For any initiative to computerise patient health records, once the project is fully implemented, MoHQL should set up a post implementation monitoring mechanism to ensure that the different systems developed to generate these records are being used as intended. It should also have a support service to provide continuity in operations.

As MoHQL has invested significantly on the initiatives to computerise patient health records, it is important to evaluate them. The evaluation will help the Ministry to identify issues and learn from constraints and challenges which prevented the different systems developed to be used as intended.

MoHQL should develop a retention policy that provides for the retention and destruction of patient health records. This will help the Ministry to avoid storing records longer than needed and save costs directly related to storing them.

Summary of Ministry's Reply

The Health Records, Physiotherapy and Radiology Departments were the main users of the IHMPCS. The project did not start at some Departments or was later dropped because of lack of staff commitment.

IHMS was not functioning from the very start mainly because of camouflaged low user acceptability and readiness, lack of commitment, and inadequate IT support.

IPCS was not functioning mainly because of lack of leaders to drive the project, user resistance, insufficient training, and hardware and software problems.

The Ministry was working on a Health Information Act which would take into account the retention periods of all paper documents used by our health institutions.

CHAPTER ONE

INTRODUCTION

1.1 Background

The Ministry of Health and Quality of Life (MoHQL) provides free health services to the population of Mauritius, and its aim is to continuously improve the quality of healthcare delivery. In 1988, Government identified the computerisation of MoHQL as a priority area to improve the quality of health services provided to the public. An Information Plan was prepared laying down the needs on how Information and Communications Technology (ICT) could be used to meet the information requirements. Several initiatives were subsequently taken to computerise the Public Health Institutions.

Health records are central to all patient healthcare activities and form a key component in all computerisation initiatives. The main benefits expected to be achieved by the computerisation of the patient health records were less waiting time for registration and appointment of patients and availability of their health records and previous treatments at any main point of treatment all around the island.

Since 1990, more than Rs 115 million have been invested on computerised systems in the health sector. In addition, some Rs 17 million had been spent on consultancy services for the e-Health Project from 2009 to 2014.

1.2 Audit Motivation

Despite significant investments made by MoHQL in the computerisation of the operations of the Public Health Institutions, the public was still not satisfied with the services provided. Several criticisms relating to incomplete/missing patient health records and the impact on the quality of service were taken up by the local media.

With the increase in the number of Patient Files, space problems were encountered in some Hospitals, whereby these files had to be stored in other places, such as unoccupied ward, and in one case, in containers.

The National Audit Office (NAO) has consistently reported on problems related to the computerised systems at several Health Institutions which have a direct incidence on service delivery.

In view of the above, NAO carried out this Performance Audit on Computerisation of Patient Health Records.

1.3 Audit Objective

The audit objective was to assess whether initiatives taken to computerise patient health records by MoHQL have been successfully implemented and the different systems developed to generate these records were used as intended.

1.4   Audit Questions

The objective was specified with the following audit questions**:**

➤ Whether the initiatives taken to computerise patient health records have been successfully implemented?

➤ Whether the different systems developed to generate these records were used as intended?

1.5   Audit Scope

The audit examined the activities, processes and procedures at MoHQL on computerisation of patient health records.

The audit focused on the computerised systems at Jawaharlal Nehru Hospital (JNH), Trust Fund for Specialised Medical Care (Cardiac Centre), Lady Sushil Ramgoolam Medi Clinic, Dr H Nakajima Medi Clinic, Bel Air Area Health Centre (AHC) and Triolet AHC.

Information relating to the above computerised systems as from 1990 was gathered to understand the audit area, and status as of May 2016 of the initiatives taken has been included in the Report.

1.6   Audit Methodology

The audit was conducted in accordance with International Standards of Supreme Audit Institutions. Different methodologies were used for the audit to understand the audit area, along with obtaining sufficient, relevant and reliable audit evidence that support the conclusions and recommendations.

1.7   Method of Data Collection

In order to carry out the study, data was mainly collected from files and documents review and interviews. Site visits were also carried out at one Regional Hospital, one specialised Hospital, two Medi Clinics and two AHCs to confirm information in files and to get acquainted with the activities carried out and to support our conclusions.

1.7.1   Documents Reviewed

Data was collected mainly through review of Ministry's documents. Information about mandate, processes, and activities related to computerisation of patient health records were collected through review of files and documents.

1.7.2 Personnel Interviewed

Interviews were carried out with staff of MoHQL at Head Office and Public Health Institutions and of the Central Information System Division (CISD) for information on computerisation of patient health records and to collect information relating to system descriptions, activities and processes.

1.7.3 Sampling

One Regional Hospital, one specialised Hospital, and two Medi Clinics were selected as they were the only one in their respective categories where the computerisation projects were undertaken. Also, of the five computerised AHCs, two of the most visited ones were chosen.

1.8 Structure of the Audit Report

The remaining part of the Report covers the following:

➢ Chapter Two presents a Description of the Audit Area

➢ Chapter Three presents the Findings

➢ Chapter Four contains the Conclusion based on audit evidence and analysis, and Recommendations based on an analysis of audit findings to address shortcomings identified in this Report.

CHAPTER TWO

DESCRIPTION OF THE AUDIT AREA

This Chapter provides background information on the Ministry's initiatives to computerise patient health records, and the roles and responsibilities of the Ministry and other stakeholders involved in their implementation. It also describes the main activities and processes in the generation of patient health records.

2.1   Ministry's Initiatives to Computerise Patient Health Records

In 1988, Government identified the computerisation of MoHQL as a priority area to improve the quality of health services provided to the public. In 1990, an Information Plan was prepared, and since that date, MoHQL has taken several initiatives towards the computerisation of patient health records. These initiatives were part of several computerisation projects undertaken (as listed in Table 1) by the Ministry.

Table 1 Computerisation Projects Undertaken by Ministry

Type	Healthcare Units	Details	Implementation Date	Initial Cost (Rs million)
Regional Hospital	Jawaharlal Nehru Hospital	Integrated Hospital Management and Patient Care System (IHMPCS)	1994	15
Specialised Hospital	Trust Fund for Specialised Medical Care	Integrated Hospital Management System (IHMS)	2007	12
Medi Clinic	Lady Sushil Ramgoolam (Belvedere) and Dr H Nakajima (L'Escalier)	Integrated Patient Care System (IPCS)	1998	3
Area Health Centre	Castel, Grand Bois, Bel Air, Dr Bouloux (Cassis) and Triolet, and two AHCs in Rodrigues	Integrated Patient Care System (IPCS)	2001	7

Source: MoHQL's Files

IHMPCS, implemented on a pilot basis at JNH, was intended to be replicated to other Regional Hospitals. Thereafter, the operations of two Medi Clinics, five AHCs and the Cardiac Centre were computerised.

Following problems encountered with the computerised systems at the different Healthcare Units, in March 2008, MoHQL prepared an e-Business Plan at a cost of Rs 5 million to help in the computerisation of Health Services. An e-Health Strategic Plan that spanned from 2009 to 2015 was prepared in August 2008. The implementation of the Plan was initially estimated at Rs 123 million, and subsequently revised to some Rs 500 million in 2012. In January 2011, an Independent Programme Manager was appointed for a period of 18 months to assist and provide advisory support to MoHQL for the implementation of e-Health Project. On 1 July 2015, a Steering Committee decided on the implementation of the e-Health Project on an incremental basis. On 23 September 2015, an Information Paper on the current status of the project and the proposed course of action to be undertaken was prepared.

2.2 Computerisation of Patient Health Records

Patient health record[1], interchangeably used as patient medical record, means a single record of all data on an individual's health status from birth to death. It has an important role in the provision of quality healthcare service. The quality of data in the health records and their availability are essential if healthcare authorities wish to maintain healthcare at optimal level. The record normally contains sufficient data to identify the patient, supports the diagnosis or reason of attendance at the healthcare facility, justifies the treatment and accurately documents the result of the treatment. It is also used to communicate between attending Doctors and other healthcare professionals providing care to the patient, for the continuing care of the patient, and the collection of health statistics.

For the provision of healthcare services, Mauritius is divided into five regions, with each one having a Regional Hospital. Each of the Regional Hospitals has a number of Healthcare Units, such as District Hospitals, Specialised Hospitals, Community Hospitals, Family Health Clinics, Medi Clinics, AHCs and Community Health Centres attached to them.

In 1990, MoHQL prepared an Information Plan to computerise all the Healthcare Units. The implementation task started in 1992 and was expected to be completed in 1998. One of the main components was the IHMPCS which was developed on a pilot basis at JNH, and was to be replicated to other Regional Hospitals.

2.2.1 Objectives and Benefits of Computerisation

Healthcare is information intensive, and every day, massive volumes of data are produced. When this information is used properly, it can improve clinical practice and outcomes, guide planning and resource allocation and enhance accountability. Protection of privacy of data is enhanced by computerisation. Only in an electronic world is it possible to ensure that identifiable patient health records are accessible to providers on a need-to-know basis. Access to all or parts of an Electronic Health Record (EHR) is more stringent and can be protected by making use of access control. The identities of those who have looked at EHR can be identified through logs. Such protection is difficult to apply with paper records.

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[1] World Health Organisation Medical Records Manual : A Guide for Developing Countries (2006)

2.3   Health Records Department

At the level of each Hospital, the Health Records Department is responsible for the storage and upkeep of patients' medical history. Its main responsibilities are:

➢ Registration of patients;

➢ Maintaining the patient appointment system;

➢ Giving information to appropriate health professionals; and

➢ Classifying results of X-Ray, blood test, etc in the Patient File

The personnel of the Department is generally the first point of contact with patients attending Hospitals and Public Health Institutions and provides round the clock service. They also collect patient health data which is used to prepare daily, weekly and monthly reports for the monitoring of healthcare delivery, and to meet ad hoc requests from Health Managers and Planners. An annual report, namely "Summary of Work Performed in Hospitals" is also prepared for planning purpose.

MoHQL has taken several initiatives to move towards the computerisation of patient health records through the implementation of IHMPCS. The patient health records have an important role in the process of computerisation of healthcare services.

2.4   Other Stakeholders

Several stakeholders were involved in the Ministry's initiatives to computerise patient health records, such as the Ministry of Technology, Communication and Innovation (MTCI), the Central Informatics Bureau (CIB) and CISD. Their roles and responsibilities are described below.

2.4.1   Ministry of Technology, Communication and Innovation

MTCI has the responsibility to formulate appropriate policies and provide the necessary legal framework for the development of ICT and its optimal use across all sectors. It had funded the preparation of an e-Business Plan, whose primary objective was to define an appropriate ICT strategy to improve the work processes at MoHQL, and has either directly or indirectly been involved through its departments in the computerisation of the Public Health Institutions.

MTCI has several departments, such as CIB and CISD, under its aegis.

2.4.2   Central Informatics Bureau

The main function of CIB is to promote e-Governance through the provision of project management, consultancy and advisory services to Ministries and Departments for the successful implementation of e-Government projects on ICT matters.

It also provides technical advice with respect to computerisation and has assisted MoHQL in ICT related procurement by drawing specifications and evaluating project proposals.

2.4.3 Central Information System Division

CISD provides technical support in operating the computerised systems through secondment of personnel to MoHQL.

2.5 Process Description for Registration, Diagnosis and Monitoring of Patients

Patients attending Healthcare Units for medical treatment are channelled to the "Unsorted Patient Department" (where the general public come for treatment) or "Sorted Outpatient Department" (where patients on appointment come for specific treatment) and follow the registration, diagnosis and monitoring processes. Information generated during these processes is kept in the patient health records.

2.5.1 Process for Medical Treatment

Figure 1 shows the steps through which a patient passes during medical treatment at Healthcare Units.
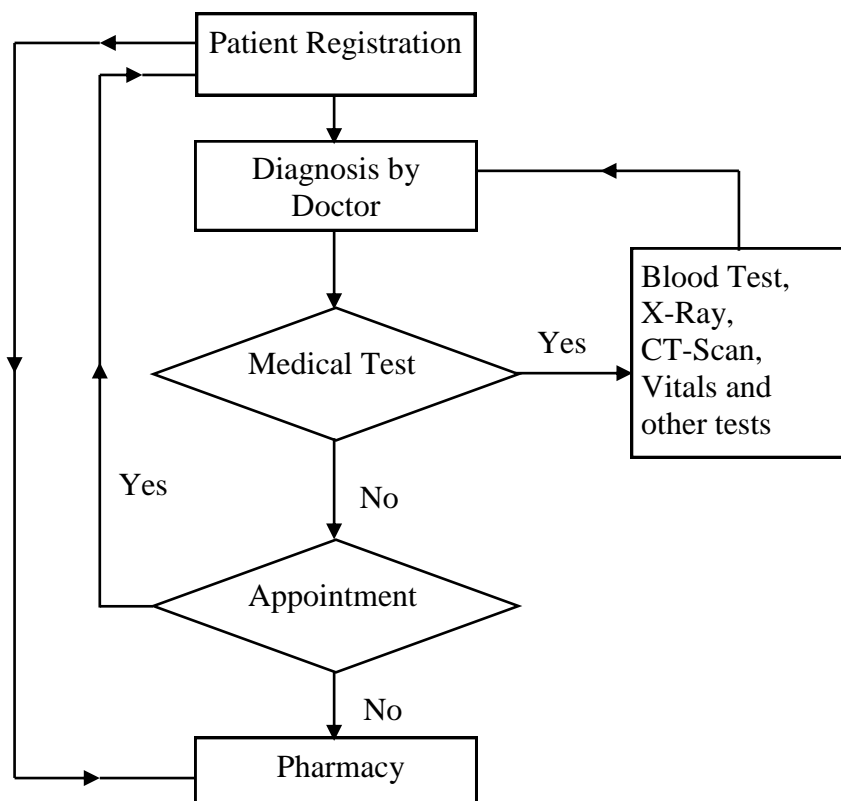

Figure 1- Process for Medical Treatment

Patient health records are kept either manually or electronically as described below.

2.5.2 Computerised System

Unsorted Outpatient

The Medical Record Module is used to register patients at the Health Records Counter. Patients' details, such as name, address and age are recorded in the system. A patient number is generated for every new patient, whereas existing patient number is given to those who have already been registered for previous consultation. The patient is given a Casualty Card on which his name and address are recorded, and is then called for consultation. The Doctor records the diagnosis and prescription manually on the Casualty Card, and then issues a manual Prescription Form. When the patient presents his Prescription Form at the Pharmacy Counter, the Dispenser issues the prescribed medicines. Stock of medicines on the system is updated.

The Casualty Cards are returned to the Health Records Counter. An appointment date is given to the patient, if required, for his next appointment, and the date is recorded in the system. The Health Records personnel input the diagnosis and prescription in the system.

Sorted Outpatient

Patients attending the Sorted Outpatient Department (OPD) come on appointment with their Appointment Card. The Health Records personnel uses the Unit Number for tracing the Patient File. The patient is then called for treatment by the Doctor. After consultation and collection of prescribed medicines from the Pharmacy, the patient goes to the Health Records Counter where another appointment date if required, generated by the system, is given. The patient may be admitted for operation or other treatments. The Health Records personnel inputs the diagnosis made by the Doctor in the system.

2.5.3 Manual System

In the manual system, all patient information is recorded on cards and files.

CHAPTER THREE

FINDINGS

This Chapter presents the findings on whether MoHQL had successfully implemented initiatives taken towards computerisation of patient health records and whether the different systems developed to generate these records were used as intended.

3.1 IT Readiness Assessment

Good practices and experiences in e-Government projects highlight the importance for Governmental Organisations to be ready and adequately prepared to successfully implement those projects.

Over the past 23 years, MoHQL took several initiatives as described in the paragraphs below to move towards electronic health records. However, the different systems were not successfully implemented and not used as intended. Errors in the systems, insufficient training, absence of a monitoring mechanism and support service and inappropriate hardware were some of causes advanced to explain this situation. This indicated that MoHQL was not ready and adequately prepared to implement and use the systems.

3.2 Status of Initiatives taken to Computerise Patient Health Records

Initiatives taken by MoHQL towards the computerisation of the patient health records of the different Public Health Institutions did not bring the expected benefits. The different systems implemented were either not being used or partially used. This situation has resulted in the Public Health Institutions continuing to use paper based health records. The status of the different initiatives as of December 2015 is given in Table 2.

Table 2 Status of Computerised Health Records Systems as of December 2015

Public Health Institution	Status of Computerised System	Health Records System
Jawaharlal Nehru Hospital	Only three out of nine modules were used at varying degrees.	System was used to record patient personal data and diagnoses. Other patient health information was kept manually.
Lady Sushil Ramgoolam Medi Clinic (Belvedere)	Administration and Clinic Modules were partially used and Pharmacy Module not being used.	Some of the health information for unsorted patients was kept electronically. Health information for sorted patients was manually kept.
Dr H Nakajima Medi Clinic (L'Escalier)	All three modules were not being used.	Patient health information was kept manually.
Castel, Grand Bois, Bel Air, Dr Bouloux (Cassis) and Triolet AHCs	All three modules were not being used.	Patient health information was kept manually.
Cardiac Centre	Out of 18 modules, only the Patient Manager and Scheduling Module was being used for recording patient's personal data.	Patient health records were still predominantly paper based.

Source: Site Visits and MoHQL's Files

The main reasons put forward to explain this status of the computerised system and health records system are presented in the paragraphs below.

3.3   Computerisation of JNH

IHMPCS at JNH was developed by a private company in 1994. It comprised nine modules that allowed a number of transactions as detailed in Table 3.

Table 3 Modules Developed under IHMPCS

Module	Transactions
Patient Medical Record	Registration, batch entry for diagnosis, operation (surgery), waiting list, creation and confirmation of appointments, tracing of files, etc.
Ward Management	Admission, diet request, operation, drug prescription, discharge, etc.
Catering Services	Daily summary of diet, diet supplied, etc.
Laboratory and Blood Bank	Request and test result, donor details etc.
Drug Store Inventory	Receipt and issue of drugs
X-ray, Occupational and Physiotherapy	Request and result, treatment and assessment, etc.
Personnel Information	Human resource
General Stores Inventory	Receipt and issue of store items
Financial Accounting	Finance

Source: MoHQL's File

IHMPCS aimed to provide the following benefits:

➢ Shorter patient waiting time (for registration and appointment);

➢ Online access to up-to-date information on patient including medical history;

➢ Test results and reports available in a short time;

➢ Expected patient load (based on appointments) known in advance;

➢ Decision support regarding drug indenting and monitoring of expiry dates;

➢ Ability to plan cost-effective quality service; and

➢ Generation of statistical and other reports in a short time.

One feature of IHMPCS was the keeping of both electronic and paper records. According to its User Manual, Visit Sheets for Unsorted OPD and Accident and Emergency Department (AED) had to be printed at the counter (following electronic registration of patients) and submitted to Doctors to enter details of their medical consultations. These Visits Sheets were not printed, but pre-printed Casualty Cards with basic patients' personal data manually inserted by Health Records personnel were used. Patients' past medical history was not available thereon. After medical examinations, batch entry of diagnoses from the Cards had to be done by Health Records personnel.

At the Sorted OPD, Visit Sheets for new cases and Continuation Sheets for follow-up cases had to be printed for use by Doctors, but pre-printed sheets were used. Similarly, results of X-Rays and laboratory tests needed to be printed. X-Ray reports were prepared, and tests

results were filled in on pre-printed sheets. The various cards, sheets, X-Ray films, scans and reports thereon and tests results make up the patient health records. At Ward level, Admission Sheets had to be printed at the counter. The System was not used in Wards.

Over the 23 years of its use, it has cost the Ministry some Rs 29 million for software development, hardware acquisition and installation, upgrading and maintenance. As of December 2015, only three out of the nine modules were used at varying degrees. The "Patient Medical Record" Module was used. Only the component relating to X-Rays in the "X-Ray, Occupational and Physiotherapy" Module was put into use, while the "Drug Store Inventory" Module was used for controlled drugs only. Only the modules in operation were maintained.

IHMPCS had not been fully implemented or used. The main reasons advanced included:

➢ Insufficient planning and inadequate implementation approach;

➢ Insufficient training dispensed to certain Sections;

➢ Correction of errors by the software developer was time consuming and often incomplete. One amendment created new errors in other programmes; and

➢ The System at Ward level was not used because of the workload that it entailed, and the terminals were subsequently reallocated to other Sections. The keeping of both electronic and paper records implied time consuming duplication of tasks.

The Ministry had not carried out an assessment of the System to ascertain whether the benefits stated above had been achieved. These benefits can only be reaped if it provides reliable, complete and accurate patient health information.

IHMPCS was mainly used as an administrative tool for registering patients, setting appointments and distribution of patient load to Doctors. These, together with diagnoses recorded, help in the generation of periodic statistics.

The statistics relating to attendances, admissions, discharges and disease diagnosis at various Departments produced for December 2015 were analysed. Figures for X-Rays and five selected investigations effected by the X-Ray Department for the same month were also checked. Shortcomings noted included the following:

➢ At AED, double entries were noted for six patients on the same dates and times. For each registration, a sequential serial number is generated. While one would expect the serial number to increase by one for the duplicate entry made, this happened for one patient only, and not for the others as detailed in Table 4.

Table 4 Serial Numbers not Sequentially Generated at the Same Time

Date and Time in Seconds		Patient Number	Serial Number 1	Serial Number 2	Gap
2015/12/02	65,880*	477,969	AE/132067/15	AE/132085/15	17
2015/12/11	79,980	333,602	AE/135199/15	AE/135254/15	54
2015/12/14	60,120	227,960	AE/136148/15	AE/136162/15	13
2015/12/19	51,120	353,146	AE/137767/15	AE/137833/15	65
2015/12/21	27,660	93	AE/138362/15	AE/138410/15	47
2015/12/29	39,240	19,027	AE/141186/15	AE/141187/15	None

Source: Integrated Health Management and Patient Care System (IHMPCS) Database Analysis

*The system records time in seconds. An hour is made up of 3,600 seconds. Therefore, "65880" translates into 18h18mn.

Moreover, for 1,399 out of 10,453 (after correction for duplicates) registrations made, diagnosis and how the patients were "disposed of" were not recorded. This was explained mainly by:

➢ Some Casualty Cards were not returned to the Registration Counter for input after medical examination and/or health treatment. A patient may, also, leave AED with the Card without receiving health treatment.

➢ Cards available, but entries not made (for example Patient 49965/ser. no. AE/131801/15 on 1 December 2015).

➢ Only the latest disposal posted to the first registration of a patient who visited AED multiple times on the same day, leaving the other registrations "open" (for example Patient 315715/ser. no. AE/132802/15 on 5 December 2015 and Patient 162586/ser. no. AE/133326/15 on 6 December 2015).

For 1,240 (out of 3,926) registrations made at the Unsorted OPD, diagnosis and how the patients were disposed of were not entered. Reasons for this were almost the same as at AED.

Since mid 2015, provision was made for the recording of attendance of patients coming for their appointment at the Sorted OPD. However, this facility was not used. Attendances for December 2015 which were manually counted totalled 10,081.

Of the 10,081 patients who attended the Sorted OPD, diagnosis and disposal were input for 6,469 patients only, resulting in a backlog of 3,612 cases.

No entry for diagnoses from cards and files, mentioned above, implied an understatement in the number of cases for diseases treated in December 2015.

➢ As for admissions, there were double entries for 36 patients, and one had three entries. The extra entries for these patients were made on the same dates and times. Moreover, 10

patients were transferred between Wards during their stay at the Hospital and each transfer was considered as an admission. For example, admission to Ward 0-5 and transfer to Ward 0-2 of Patient 19652 on 2 December 2015 was counted as two admissions on that day. While it is correct to state two admissions Ward-wise, it is more meaningful to reckon one admission as only one patient was involved.

In 99 cases of admissions made during 2005 to 2015, the patients' lengths of stay were abnormally high[2] ranging from 201 days to more than six years. Some of them were admitted for different pains and injuries, normal delivery, and vomiting, among others.

When processing disposal, diagnosis and discharge for an admitted patient, the System shows the first "open" admission for the patient. If the correct admission date is not identified (through serial number and date), the discharge date may not be entered against its corresponding admission date. For example, for Patient 179507 admitted on 25 December 2010 for pain in foot (swelling) and discharged on 30 December 2010, the discharge date was not entered in the System. The same patient was admitted several years later, on 2 November 2015, and was discharged on 7 November 2015. This last date had been entered as discharge date for the December 2010 admission.

Furthermore, as of 31 December 2015, as per the System, 196 patients admitted before 15 June 2015[3] had not yet been discharged. Dates of admissions went as far back as 16 September 2005. The reasons for the long stay were similar to those for admissions with abnormal lengths mentioned above. These patients have long been discharged, but entries have not been made (for example Patient 170409 admitted on 24 February 2015 discharged two days later).

➢ As for statistics for the three diseases regularly requested by the Ministry, there were differences between figures of IHMPCS database and the Medical Records Office for Gastroenteritis and Upper Respiratory Tract Infection (URTI) as shown in Table 5.

Table 5 Selected Diseases Diagnosed (December 2015)

| Disease | AED | | | Unsorted OPD | | | Wards (In-Patients) | | |
| | Number of Cases as per | | | Number of Cases as per | | | Number of Cases as per | | |
	Medical Records	System	Dif	Medical Records	System	Dif	Medical Records	System	Dif
Gastroenteritis	186	186	0	45	54	9	41	60	19
Conjunctivitis	50	50	0	32	32	0	-	-	-
URTI	310	377	67	124	187	63	31	35	4

Source: JNH Medical Records Office and IHMPCS Database Analysis

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[2] From discussions, we were informed that admitted patients have stayed up to six months (180 days) at the Hospital. For our analysis, we took a higher limit of 200 days.
[3] Date is 200th day before 31 December 2015

➤ With regard to X-Rays taken and the five selected investigations made, there were also differences between IHMPCS Database and the statistics generated in both the Main X-Ray Department and the X-Ray Unit attached to AED as can be noted in Tables 6 and 7.

Table 6 X-Rays Taken

X- Rays Taken	JNH Figure	System	Difference
Main X-Ray Dept	1,556	1,561	5
Casualty (AED) X-Ray			
Normal Working Hours	1,495	1,458	-37
After normal working hours	2,482	2,629	147

Source: JNH X-Ray Department and IHMPCS Database Analysis

Table 7 Investigations Carried Out

| Investigations | Main X-Ray Department | | | AED | | |
	JNH Figure	System	Difference	JNH Figure	System	Difference
Chest	453	454	1	977	967	-10
Extremities	361	361	0	1,782	1,839	57
Skull	92	91	-1	509	525	16
Spine	186	186	0	402	408	6
Abdomen	139	139	0	323	341	18

Source: JNH X-Ray Department and IHMPCS Database Analysis

3.3.1 IHMPCS and Other Systems

Under the System originally designed for JNH, there was no requirement for Doctors to electronically input details of their consultations. This is evidenced by the absence of IT facilities (including cabling) in medical examination rooms. According to the few Doctors interviewed, who have worked at JNH since the early days of IHMPCS, no terminal or computer has ever been installed in the cubicles. Paper based records have always been kept for Doctors to deliver health services. This arrangement does not allow Doctors to have on line access to patient health records as mentioned in the Information Plan for the Computerisation of the Ministry.

Following the implementation of IHMPCS at JNH, other systems were developed by the private company at Medi Clinics and AHCs. These newer systems require Doctors to enter diagnosis and treatment of patients via a Clinic Module. Prescription of drugs can also be

electronically made. In the new Systems, data can be captured or recorded on a real time basis.

The Ministry had not considered upgrading the existing software (for example by including a Clinic Module) and hardware at JNH for the delivery of a better health service. With a greater involvement of Medical Staff, Doctors and Nursing Officers in the use of IT facilities, the time consuming duplication of tasks (batch entries from cards and files) and extensive use of paper based records, and their related costs would have been avoided. An added advantage would have been JNH serving as a training ground for a larger number of Medical personnel in the use of IT facilities. These possibilities for JNH were not explored by the Ministry.

Ministry's Reply

At present, Health Records, Physiotherapy and Radiology Departments are the main users of the System. The project did not start at some Departments or was later dropped because of lack of staff commitment.

3.4   Cardiac Centre

MoHQL took another initiative to computerise patient health records at the Cardiac Centre in 2002. It was part of a whole project to computerise the activities at the Centre. In February 2007, the Ministry awarded a contract for the sum of some Rs 12 million for the development of an Integrated Hospital Management System (IHMS) of 18 modules that integrates all the clinical, administrative and support functions. The objectives of the project were to improve productivity and effectiveness of staff and provide better service to the public.   The System was designed to enable the sharing of information for more effective planning and optimal utilisation of resources to improve healthcare services. According to the contract documents, the supplier was required to provide formal training to enable end users to be fully conversant with the System.

Patient health information generated from the different modules and integrated into the "Patient Manager and Appointment Scheduling" Module is of paramount importance in the achievement of the above objectives.

As of May 2016, patient health records were still predominantly paper based at the Centre. Out of the 18 modules developed, only the Patient Manager and Appointment Scheduling Module was actually being used. The use of the Module was however, limited to inputting basic patients' details, such as name, address, age and National Identity Card number. The System has integrated modules. A fully functional electronic health records depends on the operations of the other modules. This could not be achieved as the other modules were not used. This was attributed to the following:

➢ *Problems in the IHMS*

The System is based on a comprehensive patient database. It aims at capturing data and providing information/reports from the time an emergency patient or a patient with a scheduled operation is brought in until discharged, and from the moment an outpatient comes for a visit until he goes back home. The Centre encountered several problems with the use of the software, such as screen freezing, no linkage among the modules,

insufficient space to input all the information and slow connectivity. The supplier was requested to address these problems, but they had remained unattended.

➤ *Insufficient Training*

The training approach used by the supplier was to train the personnel on the module relevant to where they were posted. Some 72 members of the staff of the Cardiac Centre were trained over a period of two weeks in August 2007. Only a few of them were trained on the whole IHMS. It is a policy of the Centre to regularly rotate Nursing Staff to other Sections, for example from Operation Theatre to the Intensive Care Unit. Those initially trained in a particular module and later transferred to other Sections were not conversant with the modules used in those Sections. No additional training was provided. Over time, the personnel gradually ceased to use the different modules of IHMS.

➤ *Absence of Computer Support Services*

When the computerised system was implemented in 2007, a Database Administrator (DBA) posted at MoHQL provided support services to the Centre only once a week to look into the day to day computer related problems. These problems could not be addressed promptly leading to users reverting back to the manual system. Since July 2014, the services of DBA have been discontinued.

➤ *Inflexibility*

After the System went live, several Medical and Health Officers reported that it did not allow them to input additional information. For example, it was difficult to input all diagnosis data about a patient in the limited space available in the System, and it did not allow for additional option. If there was an urgency, and the patient had to undergo an angiography, it was not possible for the Doctor to input the patient's report in the System midway as he was not registered in the System initially.

3.4.1   Assessment of IHMS

On 10 May 2013, during a meeting held at the Centre, it was decided that a full audit of the processes and flows to be conducted to identify the reasons as to why IHMS installed was not optimally used. A decision on the future course of action would be taken after assessing the feasibility of all the structural changes in the whole system.

On 5 May 2015, the Board of the Trust Fund decided to seek the services of a technical person from MoHQL to conduct a survey and to report on how to improve the computerised system. There was no follow up on this issue. On 10 August 2015, the Centre requested MoHQL to implement a strongly reliable computerised system as IHMS was reported not to be user friendly. Subsequently, on 12 November 2015, MoHQL requested the Centre to conduct an in depth survey of their requirements and prepare a project proposal that meets their needs.

As of end of December 2015, no survey was actually conducted by the Centre.

Despite an investment of some Rs 12 million, only one out of 18 modules was in operation as of December 2015.

The System was not functioning from the very start mainly because of camouflaged low user acceptability and readiness, lack of commitment, and inadequate IT support.

3.5 Computerisation of Medi Clinics

The operations of the two Medi Clinics at Belvedere and L'Escalier were computerised since 1998. The main areas computerised were the patient registration, Medical Practitioners' diagnostic, treatment, drug prescription and issue of drugs by Pharmacy. The following paragraphs highlight problems encountered with computerisation of patient health records at Medi Clinics.

3.5.1 Lady Sushil Ramgoolam Medi Clinic (Belvedere)

IPCS consisted of Administration, Clinic and Pharmacy Modules.

Modules Used

As of May 2016, the Administration and Clinic Modules were partially used. Out of the 12 components in the Administration Module, only seven were actually being used. As for the Clinical Module, three of the 16 components were used. The Pharmacy Module was not used. One of the reasons put forward was that the label printer was out of order.

This resulted in some patient health information being kept manually and others electronically. For unsorted patients, information, such as prescription and issue of drugs and patients' vitals were recorded on Prescription Forms and not in the System. Health information for Sorted OPD was kept manually.

IPCS database for the years 1998 to 2015 was analysed. Of the 378,254 records, 340,658 (some 90 per cent) had moved to either "Consultations" or "Pharmacy" status. This would indicate that the System was used in health service delivery.

The System was used on a regular basis up to 2003. Since 2004, there had been no continuity in the use of IPCS. During the 12 year period 2004 to 2015 (4,380 days), IPCS had not been used on 3,452 days (some 9.5 years), representing some 79 per cent of the number of days. The main reasons advanced were replacement of trained personnel with those not conversant with the System, and the System was slow.

Backup

There are several ways files can be lost. This may be due to computer crash, virus infection, hard drive failure, physical computer damage or theft. It is a good practice to back up the most important information in a remote location.

Back up of important information at the Medi Clinic was not done regularly. When done, the internal storage of the server was used for back up, instead of an external storage in a remote location.

3.5.2   Dr H Nakajima Medi Clinic (L'Escalier)

As of May 2016, IPCS at the Dr H Nakajima Medi Clinic was not being used. All the operations were performed manually and patient health records were kept in manual files.

IPCS database for the period February 2006 to December 2015 was analysed. Out of 227,228 patient registrations made during the period, 197,327 (87 per cent) were still on "Waiting" status, while the remaining had moved to either "Pharmacy", "Consultations", or "Vitals". The System had mainly been used for registration of patients.

During 2015, the System had not been used for a total of 340 days.

This situation at both Medi Clinics was due to an absence of post implementation monitoring mechanism and follow-up over the proper use of the Computerised System, and also the non availability of a proper support service.

It was only in June 2014 that MoHQL set up two committees to monitor the functioning of the computerised systems at both Medi Clinics and to report on their status on a monthly basis. The Ministry took more than 15 years from the date of computerisation to set up a monitoring mechanism. As of December 2015, the terms of reference of the committees were not yet defined.

3.6   Computerisation of Area Health Centres

In 2001, the Ministry initiated the computerisation of seven AHCs as per Information Plan, and IPCS at these Centres was implemented. The System was designed to keep track of the medical history of patients together with their personal information for treatment purposes.

As of May 2016 at Bel Air and Triolet AHCs, there was no IPCS in place. All the hardware that supported the System was stacked in the Store of the AHCs. Shortly after the implementation of the System, it was reported that users were experiencing problems with it mainly due to electrical issues, hard disk crashes and absence of training for those transferred to AHCs. This led users to gradually ceasing using the System. This was also observed by CISD during a survey of the Systems in 2009.

Ministry's Reply

The System is not functioning mainly because of lack of leaders to drive the project, user resistance, insufficient training, and hardware and software problems.

3.7   Other Initiatives

3.7.1   Replication of IHMPCS

According to the Information Plan, IHMPCS implemented on a pilot basis at JNH would be replicated to other Regional Hospitals by 1998. Neither IHMPCS has been replicated to other Hospitals as planned nor any assessment been made to know whether the System was reliable to be replicated.

3.7.2 E-Business Plan

MoHQL prepared an E-Business Plan at a cost of Rs 5 million with the objective to define an appropriate ICT strategy to improve its work processes and those of its Departments, as well as relevant health agencies with emphasis on improving productivity, quality and service delivery. The Plan would be implemented with projects phased into four waves, namely:

i   Clinical Information Systems - systems that make for efficient running and extension of services by all healthcare establishments

ii Portal Information Systems - coming up with a National e-Health Portal that will serve as the single most preferred point of reference for all information related to the health in the region

iii Administrative Information Systems - transactional systems that will facilitate efficiency and effectiveness through capturing all non-clinical data and transactions

iv Decision Support Systems - that will serve as a management dashboard for top level healthcare policy makers that will give them an understanding of not just the current healthcare problems, but will also apprise them of emerging healthcare trends in the country.

All the Systems which have an impact on patient health information were scheduled to be implemented over a six year period (2009-2015). As of December 2015, none of the Systems have yet been implemented.

3.8   Policy on Patient Health Records

The Health Records Department plays an important role in the storage and upkeep of patients' medical history. It is responsible for maintaining health records of patients in a standardised, and confidential manner while, at the same time, promoting quality patient care by providing records that are timely, meaningful, authentic, and properly describe the patient's clinical condition. It requires adequate policies and procedures on management of health records. For example, it is a practice for Health Institutions around the world to have a retention policy on patient health records. The purpose of the policy is to ensure that necessary health records are adequately protected and maintained, and those records that are no longer needed or are of no value are discarded at the proper time.

At MoHQL, patient health records were kept indefinitely. The records that were no longer needed were not discarded. Over time, large volumes of these records were kept in limited space. It was reported that staff were having difficulties in filing and retrieving them. This situation resulted in files being misplaced. For example, due to an acute problem of space at JNH, Health Records personnel was facing difficulties in tracing the Patient Files. The tracking of these Files was tedious and time consuming.

Ministry's Reply

The Ministry is presently working on a Health Information Act which will take into account the retention periods of all paper documents used by our health institutions.

CHAPTER FOUR

CONCLUSION AND RECOMMENDATIONS

Conclusion

MoHQL has recognised the importance of using ICT to continuously improve the quality of healthcare delivery. Over the years, the Ministry took several initiatives to computerise the operations of Public Health Institutions. Patient health record is a key component in all computerisation initiatives. However, most of the initiatives taken towards the computerisation of patient health records have not been successfully implemented and the different systems developed to generate these records have not been used as intended.

The computerised system at JNH is used as an administrative tool. Creation of paper based records using data available on the system for use by Doctors, and batch entries from the paper records into the system imply duplication of tasks and lots of paperwork. Medical staff use more the paper based files than the digital ones. Discrepancies noted in the statistics generated from the system raised concern on their reliability.

IHMS developed for the Cardiac Centre, and IPCS for Medi Clinics and AHCs are integrated systems. Some modules are partially used or not used at all, and this deprives both the Public Health Institutions and patients from enjoying the full benefit of the Systems.

Insufficient training to staff on computerised systems is one of the main reasons advanced that has gradually led to users ceasing to use the Systems. Training was provided to personnel without considering the transfer policy of the MoHQL.

The difficulties faced by MoHQL during implementation and use of the different computerised systems indicate insufficient IT readiness assessment by the Ministry prior to undertaking large scale computerisation projects.

Recommendations

In the light of the audit findings and conclusion, hereunder are the recommendations

IT Readiness Assessment

MoHQL should ensure that it is ready and adequately prepared before undertaking a large scale computerisation project. It is more so important as it intends to go for e-Health. This can be done through an IT readiness assessment. The aim of the assessment is to evaluate preparedness of the Ministry to undertake large computerisation projects. This process will lead to making informed decisions based on existing realities and constraints of the Ministry and increase the likelihood of success of the projects.

Post Implementation Monitoring Mechanism and Support Service

For any initiative to computerise patient health records, once the project is fully implemented, MoHQL should set up a post implementation monitoring mechanism to ensure that the

different systems developed to generate these records are being used as intended. It should also have a support service to provide continuity in operations.

This will require identifying problems faced by users and bringing changes or modifications to the system that may be needed. The support service will ensure continuity in the operations of the computerised systems.

Evaluation of the Current Computerised Systems

As some Rs 115 million were invested on computerised systems of Public Health Institutions, it is important to evaluate them. The evaluation may include the following:

➢ Changes if required to improve the system;

➢ Assessment of anticipated benefits and costs projected during planning phase;

➢ An evaluation of the achievement of the objectives set;

➢ Assessment of controls to improve the reliability of the systems; and

➢ The level of user satisfaction.

The evaluation will help the Ministry to identify issues which prevented the computerised systems implemented to be used as intended. As the Ministry intends to embark on e-Health Project, it should learn from constraints and challenges faced in its past computerisation initiatives and take appropriate actions.

Training

Training is an important component that ensures the proper functioning of a system. MoHQL should adopt a training approach taking into consideration the transfer policy of personnel. The Ministry could identify a pool of personnel conversant with the different systems to act as trainers. These trainers will train other personnel in using the systems.

Retention Policy of Patient Health Records

MoHQL should develop a retention policy that provides for the retention and destruction of patient health records. The formulation of a retention policy along with the computerisation of patient health records will help the Ministry to avoid storing them longer than needed and save costs directly related to the storage of these records.

National Audit Office
Air Mauritius Building, John Kennedy Street, Port Louis, Mauritius
Tel: (230) 212 2096 Fax: (230) 211 0880 Web: http://nao.govmu.org