

Pacific Health Information Network

Strengthening Health Information Systems and Digital Health

INFORMATION DOCUMENT: 3.3 Tonga's experience in implementing national digital health.

1. BACKGROUND

It has become evident not only in the developed but also the developing countries, that the adoption of Information and Communication Technologies (ICT) in the healthcare industry has significantly contributed to the delivery of quality, efficient, effective, and safe healthcare services. In Tonga prior to 2000, patients' medical records and their episode of care through the healthcare facilities were captured in either patient medical charts or workbooks. Given these conventional practices were carried out manually, it was labor intensive, time consuming, and fraught with human errors, which in turns impacts effective and safe service delivery. In efforts to address these challenges, the Ministry of Health, Tonga (MOH) introduced several health information systems to electronically record, store, manage, coordinate, and report patient related information. These health information systems included, Patient Administration System (Tonga Hospital Information System (THIS)), Radiology Information System (RIS/PACS), Pharmacy Information System (mSupply), Cancer Registry (CanReg5), and multiple standalone databases.

Despite these positive efforts, these disparate health information systems only catered for a fraction of the demands of the healthcare system – resulting in the MOH coping with the ongoing challenges, to name a few:

- inability of the health information systems to exchange health information with one another, which resulted in data fragmentation and poor patient coordination;
- lack of structured clinical templates (discharge summary, ICD codes), which led to poor clinical documentation and incomplete patient medical records;
- inability of the health information systems to generate user-specified statistical reports, which hampered robust policy development, planning, researches, and decision making.

Fortunately, the MOH received a substantial grant in 2019 to implement a National Health Information System (NHIS) that leverages the existing health information systems through seamless integration, in efforts to address the aforementioned challenges and more.

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2. ACTION TAKEN

In early February 2020, the MOH commenced the implementation of the NHIS. The NHIS is centralized at the national referral hospital in Tongatapu to allow seamless access from all the other healthcare facilities by leveraging the existing fibre optic cables and the satellites (microwave).

In addition, the NHIS is designed and customized to cater for the delivery of primary, secondary, and tertiary healthcare services, which are delivered in 4 hospitals, 14 community health centres, and over 15 maternal health clinics across the country.

For the hospitals, the complete suite of the system is enabled to match the healthcare services they can deliver. This complete suite includes the following modules:

- **Outpatient**
- **Inpatient**
- **Accident and Emergency**
- **Allied Health (Physiotherapy)**
- **Vaccination**
- **Appointments**
- **Operating Theatre**
- **Inventory**
- **Pharmacy**
- **Radiology**
- **Laboratory**
- **Billing**
- **Auditing**
- **Medical Records**

On the other hand, a further customized version of the system is enabled for the health centres and maternal health clinics to match the minimal healthcare services they can deliver.

- **Outpatient**
- **Pharmacy**
- **Vaccination**
- **Appointments**
- **Medical Records**

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The table below outlines key milestones that have been achieved thus far:

Milestone	Dates
Vaiola Hospital Go-Live (Tongatapu)	December 2021
Data Migration from Legacy System (THIS)	December 2021
Niu'eiki Hospital ('Eua)	August 2022
7 Health Centers (Tongatapu)	September 2022
System Integration	
- RIS/PACS (Radiology System)	October 2022
- mSupply (Pharmacy System)	September 2022
- Lab Worklist (Lab System)	February 2023
- Lab Analyzers (XN-1000, C311, e411)	February 2023

The table below outlines the upcoming key milestones to be completed before end of July 2023:

Milestone	Target Dates
Prince Wellington Ngu Hospital Go-Live (Vava'u)	April 2023
Health Centers and Maternal Health Clinics (Vava'u)	April 2023
Princess Fusipala Hospital (Ha'apai)	May 2023
Health Centers and Maternal Health Clinics (Ha'apai)	May 2023
System Integration	
- DHIS2	June 2023
- CanReg	July 2023
- Lab Analyzers (XN-550, Gene Expert, C111, CA500)	July 2023
Maternal Health Clinics (Tongatapu)	June 2023

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In addition, robust security countermeasures are also implemented as part of this solution to withstand the rapid evolution of cyberattacks; and necessary legislation and policies are in development to support and enforce data privacy and confidentiality. The table below outlines Key Areas of focus for the policy suite:

Policy	Description
Data Use	Governs the creation, access and use of health data, specifically Personal Health Information (PHI).
Data Confidentiality	Provides guidance on how health data can be made private, including guidance for substitute decision makers.
Data Security & Audit	How to secure data in rest, in transit and in process, role, record or field level access and recording access to PHI.
Person Identity Management	Policies that govern the unique identification of all persons (patients or clients) that receive healthcare services.
Practitioner Identity Management	Policies that govern the identification, use and management of practitioners that provide healthcare services.
User Identity Management	Policies that govern the unique identification of all individuals, as users, that access PHI via any number of IT solutions.

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3. CHALLENGES

Like any other system implementation, challenges are inevitable. In our case, the following challenges are the apparent ones.

Key Challenges	Description
Mode of Delivery	<p>With great enthusiasm and high hopes for success, the MOH commenced the implementation in early February 2020. Unfortunately, the Government of Tonga later ordered all borders to be closed in late March due to the COVID-19 pandemic. This subsequently forced the implementation team (vendor) to return to their respective countries – Austria, Kosovo, Malaysia, and the Philippines.</p> <p>With the borders closed, none of the members of our Project Management Unit (PMU) could travel to Tonga. This PMU is comprised of a Project Supervisor, Legal Specialist, Gender Specialist, and a Project Coordinator. These members resided in Canada, Australia, Fiji, and the Philippines.</p> <p>The MOH had to make a tough decision between delaying the implementation indefinitely until COVID-19 pandemic ends, or continue with the implementation with an option to allow the implementation team and the PMU to deliver remotely. The MOH decided on the latter.</p> <p>Delivery of this implementation was purely done remotely, which constantly threatens the quality of the implementation due to the following:</p> <ul style="list-style-type: none"> - key players not on-site - operating in different time zones - consultations, meetings, training, testing, configuration, management (to name a few) were/are done in different time-zones
Natural Disasters and COVID-19 Pandemic/Outbreak	<p>The COVID-19 pandemic impacted the mobilisation of our implementation team and PMU to Tonga (as mentioned above), as well as adapting to the new priorities of the Government as follows:</p> <ul style="list-style-type: none"> - rollout of the COVID-19 vaccines in April 2021; - containment of the COVID-19 outbreak due to the large-scale community outbreak of COVID19 declared in February 2022. <p>The known twin disasters occurring on the 15 January 2022 (Hunga-Tonga-Hunga-Ha’apai volcanic eruption and tsunami), severed the international and domestic fibre optic cables, which disconnected all communications.</p> <p>The above resulted in multiple revisions and delays of the implementation plan and timeline.</p>

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Key Challenges	Description
<p>Local Workforce</p>	<p>In an ideal setting, the client should have a well-rounded team in place to support both the implementation team and the PMU during the implementation phase. A team that have sufficient members to cover key areas of the implementation such as the following (to name a few):</p> <ul style="list-style-type: none"> - Project Management - Change Management - Quality Management - Integration - Infrastructure - Data Migration - Process Mapping - Training - Technical Requirements - Business Requirements <p>Unfortunately, the MOH lacked in many areas, which resulted in exhausting the limited MOH staff available. These staff had to put on multiple hats in order to provide support to the implementation team and PMU.</p>
<p>Change Management</p>	<p>Change Management is one of the key components to a successful implementation, which in most times overlooked. For our case, moving from using paper-based records to an electronic system is considered an immense change. Therefore, it was imperative to ensure that any form of resistance is managed in an effective manner. This required continuous training and engagement with our healthcare professionals in different levels.</p> <p>Unfortunately, the aforementioned events and challenges caused major constraints towards the implementation of our change management plans. As a result, a small percentage of the healthcare professionals are still reluctant to use the NHIS.</p>
<p>System Capability</p>	<p>Despite the comprehensive functionality and modules the NHIS provides, there are still several key areas that requires further customization to meet our requirements. These key areas include the following:</p> <ul style="list-style-type: none"> • Flexibility of the reporting function/module to accommodate complex and ad-hoc reports • Implementation of the complete suite of ICD coding • Masking of selected portion of patient records for privacy reasons • Offline and Synchronization capabilities