

Integrated National Health Information System of HIV/AIDS in Thailand: Case of NAP application

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Abstract:

After a decade of exercise the decision of the Thai National AIDS committee to introduce the ART for HIV/AIDS to the UCS benefit package since 2005, HIV/AIDS situation has been dramatically improved not only in health epidemiology but also health information and management. Integrated health information system has played a key role in promoting evidence-based policy decision. The National AIDS Program (NAP) application has a great share of providing the integrated health service of HIV/AIDS in Thailand. Achievement in NAP application were possible because of a great support and participation of stakeholders from various sectors, as well as lesson

learned from the National access to ARV for People with HIV/AIDS (NAPHA) project of the ministry of public health (MOPH) of Thailand. This article describes and discusses integrated processes and experiences in implementing the NAP application from our experiences at the National Health Security Office (NHSO) since the Antiretroviral Therapy (ART) was introduced to benefit package of the universal coverage scheme (UCS) in 2005.

Keywords: National Health Information, HIV/AIDS, Thailand, NAP, NAPHA,

Received 5 July 2015; Accepted 25 November 2015

Background:

Thailand is an example of a developing country where public health policy has been effective in preventing the transmission of HIV on a national scale since 1990s.¹ Prevalence of HIV among adults aged 15 to 49 in Thailand has been reduced from 1.8% in 2001 to 1.4% in 2005, 1.2% in 2009, and 1.1% in 2013, respectively.² Since HIV/AIDS was first reported in Thailand in 1984, HIV/AIDS situation in Thailand has been improved dramatically not only in declining the number of new HIV infections, HIV related deaths, and people living with HIV (PLHIV)³ but also in increasing level of health information exchange for monitoring and evaluation.

Interoperability has been a challenging issue in fragmented health information system especially in developing countries including Thailand. Fragmentation and duplication in data collection and data management have caused burdens on administrative workloads to health workers. In Thailand, there are many web applications provided by many central institutes, including the National Health Security Office (NHSO), for healthcare facilities to submit data for different purposes such as reporting, claims and reimbursements. Efforts from stakeholders to improve central interoperability among the systems have continued to increase. The National AIDS Program (NAP) application has been a successful software application in term of improving interoperability and health information exchange at national level. Service data of both HIV/AIDS patients and the risk groups under every main public health

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insurance scheme have been submitted for claim through the NAP application. The data have been shared and used among stakeholders for other purposes including research studies, monitoring and evaluation, while also keeping people privacy and confidentiality.

This article describes and discusses integrated processes and experiences in implementing the NAP application since the Antiretroviral Therapy (ART) was introduced to benefit package of the universal coverage scheme (UCS) in 2005.

Overview of National AIDS Program (NAP) application for HIV/AIDS services

The MOPH had provided antiviral drug treatment for HIV/AIDS patients since 1992. In 2002, the National access to ARV for People with HIV/AIDS (NAPHA) project had been implemented to expand the antiviral drug nationwide, partly supported by global fund for AIDS and the MOPH. Patients could anonymously access to antiviral drug regardless on their health insurance scheme. NAPHA software application was developed in offline version and distributed to every hospital that treated AIDS. Other services such as laboratory test and capacity building also included. In 2006, antiretroviral Therapy (ART) was introduced to the benefit package of the UCS scheme. The 13-digit personal identifications from NAPHA application and additional data from other private hospitals registered to UCS scheme but did not join the NAPHA project were collected and verified. Only about 78,000 records from more than 100,000 records of registered patients were verified. The rest of data were duplicated, dead, or wrong personal identifications. The verified data were used as the registered data for NAP application of the UCS scheme. At registration, the personal identification number is required in order to verify an individual status. NAP number is then generated to replace the personal identification number and to be used later through the application; then the personal identification number is encrypted and recorded into the database system. Only the registered hospital can see the personal data of the patients. When the patient visits any health facility, NAP number will be used to search history or input

service data of the patient to the application. The current status of public health insurance scheme of the patient can also be access through the NAP application.

The NAP application allow hospitals to register and to record service data of every patient but only the patient that under UCS scheme on the service date can get reimbursement from the UCS scheme. However, services of HIV/AIDS patients under other public schemes, i.e., the Social Security Scheme (SSS) and the Civil Servant Medical Benefit Scheme (CSMBS), will be reimbursed from each of the scheme using the same source of data. Therefore, the integrated national HIV/AIDS service database have been used for surveillance, monitoring, evaluation, budget allocation and forecasting by correspondent stakeholders while keeping patients' privacy and confidentiality. A brief history of HIV/AIDS in Thailand is presented in **Table 1**.

Integrating registration data from various sources

After antiretroviral Therapy (ART) was included in the benefit package of the UCS scheme in fiscal year 2006, it was important for the scheme to at least have registration data of old patients in the system in order to continue their treatment. Patients under the NAPHA project were not only Thai citizens but also migrant workers in Thailand. The National Steering Committee on HIV/AIDS had approved to include migrants who have been on ART under NAPHA project before October 1, 2005 to continue to have the treatment under the UCS scheme.

During the first year of the implementation under the UCS scheme, antiviral drug management was continued to manage using the prior channel of management of the NAPHA project. Preparation processes of management related to information system development organized during the time was included the following:

- **Patient registration data**

Patients under NAPHA project were HIV infected people on ART at government hospitals. In order to have more completed registration data, it was important to integrate data from other hospitals registered to the UCS.

Table 1 Brief History of HIV/AIDS in Thailand*

1984	HIV/AIDS was first reported in Thailand
1992	Antiviral drug treatment for AIDS in Thailand
2002 – 2005	National Access to ARV for People with HIV/AIDS (NAPHA) project
2006 – present	Antiviral drug treatment for AIDS was included in health benefit package of the National Universal Coverage policy.
Oct. 2006 – Mar. 2007	Integration of HIV/AIDS database from NAPHA and other providers under the UC scheme was prepared.
Dec. 2006 – present	HIV/AIDS Fund management team was established.
Apr. 2007 – present	National AIDS Program (NAP) application was introduced.
Dec. 2007 – present	NAP database was used for M&E and planning
2009 – present	Information of PMTCT service was included in the NAP application
2013 – present	Service data of HIV/AIDS patients submitted through the NAP application have been integrated and can be reimbursed from the other schemes, i.e., the SSS scheme and the CSMBS scheme

Note: Summarized from related documents of the National Health Security Office

■ **Hospital registration in new dimensions**

Registered hospitals under the UCS include both government and private hospitals; they are hospitals providing health services to UCS beneficiaries. Hospitals under the NAPHA project were not included private hospitals. Furthermore, classification of the registered hospitals cannot identify if the hospitals can be able to provide laboratory tests or ART care for HIV/AIDS. Not every hospital can provide ART care for HIV/AIDS; and, places providing laboratory tests for HIV/AIDS are not always be hospitals. Laboratory test providers can be institutes under department of medical sciences of the ministry of public health.

Additionally, laboratory tests included in the benefit package are Blood chemistry test, Anti HIV test, PCR test, CD4 test, Viral Load test, and Drug Resistance test. Not all laboratory providers can provide all laboratory tests in the benefit package. Therefore, it is important to have additional information on hospital registration that can include providers other than hospitals and can be able to identify hospital functions for ART or laboratory tests.

■ **Specialist who can authorize second line formula of ART**

Prescribing antiviral drug regimen (or we call ARV drug formula) to HIV/AIDS is an important issue to prolong life and reduce risk from opportunistic infections. Prescribing the second line of the drug formula requires approval from specialists identified by related medical association. Therefore, it is important to have a list of specialists who can provide consultant in each area.

■ **HIV coordinators and other health staffs who can access to service data of the patients**

Since the NAP application will be an online version for every hospital registered to HIV/AIDS services under the UCS scheme, it is important to identify not only work location but also job functions of the users. Each user can only access to personal data in the registration data of their patients. Each type of users can access to service data at different level depending on their job functions in the facilities.

■ Supply chain management on antiviral drugs

There are many type of reimbursements for HIV/AIDS services. For example, capitation for general services, fee per item list for laboratory test, drug reimbursement for ARV drug. Regular channel of reimbursement of the UCS scheme can be used for financial reimbursement. However, it was required a new channel to manage and delivery ARV drugs to hospitals according to their usage on HIV/AIDS patients under the UCS scheme.

Workshops, training sessions, and channels of collaboration and management have been set up in order to fulfill the requirements. The most important and more difficult to complete both in term of complexity and quantity was the patient registration database. After the government announced the new benefit package on ART for HIV/AIDS, a temporary application called DMIS-AIDS had been developed and implemented to be a channel for health facilities to submit registration data of their HIV/AIDS patients. The patient registration data had not only been integrated successfully but also been updated continuously after launching the NAP application in March 2007. The share of new registration data from the migrated registration data had been increased from 16.64% in the first month, to 100% in one year, and to almost three times in four years, as shown in **Table 2**. During the first year of launching the NAP application, an average registration data both the old and new cases recorded to the application had been increased almost five thousand cases per month as shown in **Table 3**.

Developing process of NAP

Achievement in developing and implementing the NAP application for HIV/AIDS services in Thailand was a result from extensive collaboration and commitment of stakeholders from government agencies, private organizations and networks, as well as civil society and patient networks. Technical competency and investment in information technology alone could not

induce the great achievement. However, details on technical issues are explained in this section.

Key information technology issues in the first year of implementation

- Switching from NAPHA offline application to NAP online application
- Migrating registration data from different sources
- Revising hospital registration system that can be classified providers served in HIV/AIDS
- Application's user administration
- Setting up new data administration flow to the NHSO
- New channel of management for Laboratory and Antiviral drug administration
- Training users nationwide

Table 2 NAP registration data after first launching in March 2007*

Mar. 2007	Migrated registration data from NAPHA and DMIS-AIDS
Apr. 2007 (1 month)	16.64%
Jun. 2007 (3 months)	45.66%
Sep. 2007 6 months)	79.92%
Mar. 2008 (1 year)	108.16%
Mar. 2011 (4 years)	292.19%

Note: Summarized from related documents of the National Health Security Office

Table 3 Progress on average registration per month from April 2007 to February 2008*

	Average per month	minimum	Maximum
Total registration	4,707	2,894	6,820
UCS	4,153	2,537	6,202
non UCS	555	357	869
Adults	4,449	2,767	6,355
Children	258	127	465
without ARV	3,736	2,634	4,567
with ARV	971	270	2,252
Anti HIV test result is available in NAP	624	345	746
Anti HIV test result is not available	4,084	2,353	6,475
Number of Deaths	596	374	755

Note: Summarized from related documents of the National Health Security Office

General requirements

- Integrated existing registration and service data from **NAPHA** project and other hospitals.
- Ability to link to Vendor-managed inventory (VMI) system of the Government Pharmaceutical Office (GPO)
- Ability to manage **laboratory requests and antiviral drugs**
- Ability to hide personal data of the risk group and the patients (**privacy**)
- Ability to **refer** patients to other hospitals and the patients do not have to register again.
- Provincial and national officers are able to access **data and report** without breaking patient's privacy.
- NAP application must be deployed **by Apr. 2007**. (the final request was confirmed in Dec. 2006)
- **System availability:** 24 hrs./7 days
- **Note:**
The number of users in June 2011: hospitals, provincial health offices (PHO), regional and central officers
 - o total 5,487 users;
 - o hospital users: 4,800 users

Technical concepts

- Programming Language: JAVA technology
- DBMS: Oracle
- Three-tier client-server architecture design
- Failover & Load Balancing mechanism

Challenges and Limitations

Although HIV/AIDS service information has been successfully shared and used among stakeholders for monitoring and evaluation in order to improve both quality of care and quality of life of the people, challenges and limitations during the early phase of implementing the NAP application were mounted and complicated.

- Shifting of supply chain and management processes at national level
- Migrating service data from NAPHA project and other hospitals

- Migrating of users from DMIS-AIDS registration system
- Security and privacy of HIV/AIDS personal data
- Complicated work processes
- Lacking of coverage of high-speed internet providers in remote areas
- Lacking of ICT maintenance budget after deploying the application
- Lacking of integration with other applications and other health insurance schemes

During the first year of implementation the offline version of NAP had also been implemented in order to support remote areas where internet networks were slow. However, the offline version was abandoned in the second year of implementation. The reasons to stop using the offline version were not only improvement of internet networks in the country but also limitation of offline functions as described below.

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- 1. VCT** ■ **Using local database, require to get VCT ID from online**
 - 2. Registration** ■ Using local database, require to enter some basic data (not automate from database), and get NAP number from online
 - 3. FU,Counseling** ■ Require to have follow up history in offline version and submit "request to change ARV formula" to online system.
 - 4. Lab** ■ Require to submit lab request online
 - 5. System** ■ Back up is done by the user.
- Administration**
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Although challenges and limitations during the early phase of implementing the NAP application were mounted and complicated, the implementation has shown a good example of integrated health information system at national level. The great achievement has become feasible because of great support and collaboration from stakeholders from various sectors including government, private, and civil society.

Key success factors from its implementation can be summarized as follow:

- Lessons learned from **NAPHA**
- Strong provider and patient **networks** at hospitals, provincial, and national levels
- Strong **leadership** of the first fund management manager and the **pioneer team**.
- Strong support from **policy makers** both at national and institutional levels
- **ICT investment** in preliminary phase
- Lessons learned on disease management information system (**DMIS**) development of the NHSO

Current situations and Moving Forwards

After a decade of exercise the decision of the Thai National AIDS committee to introduce the ART for HIV/AIDS to the UCS benefit package since 2005, HIV/AIDS situation has been dramatically improved not only in health epidemiology but also health information and management. HIV/AIDS services of beneficiaries under the three main government health insurance schemes, i.e., Civil Servant Medical Benefit Scheme (CSMBS) of the government employees and their dependents, Social Security Scheme (SSS) of the private formal employees, and the Universal Coverage Scheme (UCS) of the rest of Thai citizens who do not cover by other government schemes, have been submitted through the NAP application. Therefore, health provider burdens on submitting health service data of the patients has been reduced; they do not have to send the data separately. Furthermore, HIV/AIDS service data including general follow-up data, laboratory tests and results, and ART formula are integrated at national level while privacy and confidentiality of the patients can also be protected. Financial and quality reporting, monitoring and evaluation are possible at any level from facility-level, to provincial and national level.

Integrated national health information system of HIV/AIDS in Thailand has been achieved through implementing the NAP application. However, there are spaces for improvement in data quality, data usage

and sharing that require support and participation among stakeholders.

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