Impact of universal health insurance scheme on health information systems and health information technology

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Universal Coverage Scheme Assessment of the first 10 years: Impact on health systems
Impact of universal health insurance scheme on health information systems and health information technology

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Impact of universal health insurance scheme (UCS) on health information systems (HIS) and health information technology (HIT)

Abstract

Background Thailand has implemented universal health insurance scheme (UCS) for a decade. The implementation has changed country’s health systems including her health information systems.

Objective: This study aims to explore the impact of the UCS on the country’s health information systems and health IT.

Method: The qualitative method including literature review and in-depth interview of key informants were employed in this study.

Results: The health insurance beneficiary registration system managed and maintained by national health security office (NHSO) helps improve providers’ service workflow and the country vital statistics quality. Implementation of diagnosis related group system (DRG system) stimulates health providers to improve their HIS and HIT capacity, data and medical record quality and increase the adoption of health national administrative data standards. The disease management information systems increase the fragmentation of health information systems and increase burden on data management to providers. Out patient individual records initiative provide the large amount of budget on the data quality project. The financial incentive enhance the providers’ HIS and HIT investment and also induce the data fraudulence tendency of some providers.

Conclusions: Implementation of UCS has largely brought favorable impact on the country HIS and HIT development. However, the unfavorable effects are also evidences.
List of abbreviations and acronyms

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>BRA</td>
<td>Bureau of Registration Administration</td>
</tr>
<tr>
<td>CHI</td>
<td>Central Office of Healthcare Information</td>
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<td>CSMBS</td>
<td>Civil Service Medical Beneficiary Scheme</td>
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<td>DMIS</td>
<td>Disease Management Information Systems</td>
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<tr>
<td>DRG</td>
<td>Diagnosis Related Group</td>
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<tr>
<td>HIS</td>
<td>Health Information Systems</td>
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<td>HIT</td>
<td>Health Information Technology</td>
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<tr>
<td>ICD</td>
<td>International Classification of Diseases</td>
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<tr>
<td>MOI</td>
<td>Ministry of Interior</td>
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<tr>
<td>MOPH</td>
<td>Ministry of Public Health</td>
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<tr>
<td>NHSO</td>
<td>National Health Security Office</td>
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<tr>
<td>OP</td>
<td>Out Patient</td>
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<tr>
<td>SSS</td>
<td>Social Security Scheme</td>
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<tr>
<td>UCS</td>
<td>Universal health Insurance Scheme</td>
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<tr>
<td>UNICEF</td>
<td>The United Nations Children’s Fund</td>
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</table>
Introduction

UCS implementation has changed country’s health care services system. Providers and payers have to adapt to align with the reform. The UCS not only changes many health care business rules but also the operation of people who work at the point of services. New financial rules and regulations impose to healthcare providers by the UCS has made them improve their health information management capability. (Siamwalla 2002) Casemix system, specifically Diagnosis Related Group (DRG), has been used as a financial tool for reimbursement of inpatient (Pannarunothai et al. 2002; Pannarunothai 2002; Pannarunothai et al. 2000) and disease management programs with new reimbursement processes have been implemented. Health information technology (HIT) and health information systems (HIS) which is needed for supporting the business and operation of the systems has enabled the implementation of the UCS and also been affected by it. Health information systems in general, healthcare information system in particular is impacted by the UCS business process and the new relationship between Ministry of Public Health and the National Health Security Office.

Objective:

This study aims to review and synthesize both positive, negative and the extend effect of UCS on the country HIS and HIT development. We hypothesize that

1. UCS beneficiaries registration system helps country complete beneficiaries rosters of UCS, CSMBS and SSS health insurance scheme
2. Case-mix system increase providers compliancy to national health administrative data set standards, and ICD coding,

3. UCSs’ disease management funds created non-integrated multiple vertical information systems and

4. UCS’ healthcare activities information demands stimulate the development of provincial health and hospital information systems

Conceptual framework

- **UCS**
  - Health Beneficiary Registration system
  - Casemix information system
  - Disease Management Information Systems
  - OP individual record initiative

- **HIS & HIT**
  - Health information demand
  - Health IT infrastructure
  - Health data standards
  - Health data quality

Methods

The qualitative method including literature review and in-depth interview of key informants were employed in this study. We reviewed Thai HIS & HIT and health insurance research, reports and documents related to the Thai civil/vital registration system and case mix systems. The purposive selected informants, who were considered the key stakeholders of the HIS & HIT and UCS, were interviewed. We interviewed 1) four administrators, one from National Health Security Office (NHSO), two
from Ministry of Public Health (one at provincial and one at central office) 2) three HIS and HIT experts (one from NHSO, and two from research institutes) and 3) a health financing and case mix expert. Semi-structural questionnaire were used as the guide for the interview. Emerging issues during interview related to the topics were further explored.

**Results:**

I. Health insurance beneficiary registration system

The UCS implementation needs the information of its beneficiaries. At the beginning of the USC implementation the proportion of beneficiaries who were eligible to more than one scheme is high (around 10%). The need of identifying health insurance benefit among Thai citizen (who in which insurance scheme) had forced the three health insurance schemes to establish national health insurance beneficiary registries. National Health Security Office is the focal point of the collaborative work. To have the update beneficiary’s information, NHSO had worked with the Bureau of Registration Administration (BRA), Ministry of Interior (MOI) to get all Thai citizen registries. The BRA sent entire population database to NHSO for sorting out the citizen insurance benefit entitlement. Citizen who were not entitle in CSMBS or enrolled in SSS were covered under UCS. At the time, CSMBS registry system did not have a complete roster of its beneficiaries. The Department of Comptroller General, Ministry of Finance, with the NHSO and Central Office of Healthcare Information (CHI), Health System Research Institute help, had successful developed a new CSMBS registry system and
mandated all governmental officers to register themselves and their dependents. The CSMBS roster completed within less than one year. The CSMBS beneficiary registration system had been significantly improved. The system has been computerized and the quality of data is improved. The Comptroller General office now has an up to date and accurate CSMBS beneficiaries’ information. In short, the UCS implementation had force the country to clean up the health insurance registry system.

To date, Thai citizen demographical data have been effectively exchanged between the NHSO’s beneficiary registration system and Bureau of Registration Administration (BRA), Ministry of Interior (MOI)’s civil registration system. The NHSO is the focal point of all insurance registries. CSBMS, SSS send their beneficiaries update to NHSO at least twice a month. The NHSO central registration office updates the country health insurance registries everyday using the information from BRA, CSMBS, SSS and NHSO’s regional and provincial beneficiary registration functions. The NHSO has also provided health insurance benefit verification system over the internet. Healthcare providers can access the health insurance benefit registries both online and offline. (National Health Security Office 2008) The system help improve providers’ point of service workflow significantly.

The close collaboration between NHSO and BRA has leads to other health information system works that help country improve vital registration system. The project between NHSO, BRA, MOPH and UNICEF which help every hospitals to directly and electronically send every birth information occur in the hospitals to the civil
registration in order to know babies who are not registered by their parents is the sample of the improvement. (Kijsanayotin 2011)

II. Casemix information system and the administrative data quality

UCS covers 75% of the Thai Population. Large numbers of hospitals, particularly MOPH’s hospitals, are financially dependent on the UCS’ reimbursement systems. UCS started using DRG system for in-patient reimbursement in 2003, two years after experiment the inclusive capitation-base and exclusive outpatient-inpatient split. The DRG system requires richer case-base data of patients for every admission. Although at the time of UCS implementation the DRG system had been known and used in low income scheme (the predecessor of UCS) high cost reinsurance, many hospital administrations didn’t play attention to the system because the system didn’t account for large portion of hospitals ‘revenue. However, when UCS was implemented, the hospitals and other health facilities have their finances radically changed. From being subject to budgetary allocation, almost independently of their performance or output, they have to collect data of their healthcare service output and performances. The implementation of DRG and other reimbursement model (e.g. specific disease management projects, out patient individual record initiative) have produced incentive for the hospitals to improve their hospital information systems in order to capture patient’s individual data and be able to submit the reimbursement demanded by the reimbursement models. The hospitals’ administrations increasingly aware of the important of their information system and the DRG information system. They become interested in improving their medical records, summary discharge and ICD coding
quality. Many hospitals create new office, assign and recruit inside and outside hospital personnel to work claim processes. Demand of ICD coding training courses are increasing over the years because there are not enough medical record coders working in hospitals, especially small community hospitals. Many hospitals have nurses and other hospital personnel work part time or full time as medical record coder, medical record auditors and claim processors.

DRG information system needs set of data that includes patient demography, diagnoses, procedures, length of stay and status at discharge. This set of data, call “12 file standard data set”, have been standardized in Thai health care service system before the UCS implementation. However, not every hospital was familiar and be able to submit data in the standardized format. With the use of DRG system by UCS, CSBMS and recently by SSS as their in-patient reimbursement financing tool, have forced health providers to produce their administrative data in standardized form. The data standards set enable the interoperability of the in-patient reimbursement information systems. Hospital information systems increasingly comply with the national data standards. (Braa et al. 2007) In-patient reimbursement data of all three major schemes are in the same format. There are around seven millions admission records of around five million individuals per year. The number is account for the majority of hospital admissions in the country. Aside from using data for reimbursement, they are used for DRG development, health systems research, triangulated morbidity and mortality statistics.
Medical records and ICD coding data quality also benefit from the DRG implementation. DRG system needs the ICD disease and procedure codes for group classification. Before we can encode ICD coding system, we need good quality discharge summary data which come from medical records. NHSO and CSMBS’s DRG auditing systems have facilitated the hospitals to vigilant on their medical records. (Pongpirul et al. 2011) The schemes have auditing processes that do external audit and help hospitals operate their internal medical audit system. In short, it could be said that UCS implementation of DRG reimbursement system positively affect to the quality of health administrative data.

III. Disease Management Information Systems

In the past 5 years, NHSO has created several different funds for several healthcare services activities which hospitals and providers have to submit data for reimbursement. There are many fund managerial offices for example: HIV/AIDs (Anon. 2009) and tuberculoses fund management, chronic disease fund management and prevention – promotion fund management etc. These fund management offices have created their own disease management information systems (DMIS) to operate, monitor and evaluate their fund which are mostly disease or function specific. The information systems are parallel systems, they are not integrated. Providers have to submit many similar data with different format to different funds. Many system require detail clinical data (clinical data e.g. laboratory data, drug data) for research purpose. Many DMIS funds provide web-base applications and demand providers to submit their data through the online system. Because of the funds financial power, healthcare providers have put
a lot of works and resources to accommodate the DMIS demands. A survey study showed that providers at hospital and health center level have to enter the similar patient data into at least 15 different applications demanded by NHSO and MOPH. This tremendously has increase providers’ data management workloads. One study show that, at the health center level, they reported that they have to spend average 40% of their work hours to do the data management task. (Kijsanayotin, Pannarunothai, and Speedie 2007)

NHSO’s diseases management information systems have negatively affected the country HIS and HIT.

**IV. Outpatient individual records initiative**

Start in 2009, UCS’s out-patient (OP) services fund has earmarked around 6% of its fund each year to an initiative which aims to get providers’ OP individual service records and motivate providers to improve their OP quality data. [Table 1] The ultimate goal of the initiative is to get and use the individual records for the development of new OP reimbursement model and the monitoring and evaluation of providers’ performance.

Table 1 Out patients service fund earmarked for OP individual records initiative (Anon. n.d.)

<table>
<thead>
<tr>
<th>Fiscal Years</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCS beneficiaries (Millions)</td>
<td>47.51</td>
<td>46.71</td>
<td>46.84</td>
<td>47.27</td>
<td>46.84</td>
<td>48.00</td>
</tr>
<tr>
<td>UCS fund (Baht/capita)</td>
<td>1,659.20</td>
<td>1,899.69</td>
<td>2,100.00</td>
<td>2,202.00</td>
<td>2,401.33</td>
<td>2,546.48</td>
</tr>
<tr>
<td>OP service fund (Baht/capita)</td>
<td>582.80</td>
<td>645.52</td>
<td>645.52</td>
<td>666.96</td>
<td>754.63</td>
<td>795.39</td>
</tr>
<tr>
<td>OP individual records initiative (Baht/capita)</td>
<td>49.32</td>
<td>46.00</td>
<td>38.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OP individual records initiative (Million baht)</td>
<td>2,331.26</td>
<td>2,154.52</td>
<td>1,823.87</td>
<td></td>
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<td></td>
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Note: UCS = Universal Coverage Scheme, OP = Outpatient
The current OP service reimbursement practice pays providers on the capitation basis base on population in their catchment area adjusted with age. In order to address other factors e.g. intensity and type of OP services into the OP reimbursement model, the NHSO hope that OP individual records would be good data source for effective fund management and alternative reimbursement model development. Although the health insurance standards data set (12 file standards data set) and health center service report standards data set (18 file standards data set) (Kijsanayotin 2008) contain data elements related to OP services, health providers did not have motivation to complete and send the data. Therefore the OP services data are incomplete and in poor quality. The initiative mandates providers to send individual OP service records in 12 and 18 file standards data format to get additional reimbursement on-top of the population-based capitation. Providers are paid according to number of records which pass a certain data quality criteria. This approximately 2000 million baht per year budget is the largest budget the country ever invest on the health data quality.

The initiative has both positive and negative impact on providers’ health information systems. For the positive effect, many hospitals and health provincial offices have increase their material and human resources allocation to improve their ability to comply with the requirement in order to get the high reimbursement. The data quality in terms of completeness, timeliness and accuracy of the standards data set are the focus of the HIS improvement. The standards data sets are widely adopted. ICD coding knowledge expand to primary care level staffs at health center through the increase number of ICD training courses provided by the MOPH in the respond to hospitals and
provincial health office requests. For the negative effect, the financial motivation for the number of records sent has created the motivation for the fraudulence of the submitted data. Many providers are too focus on getting as much money as possible, so they submit large number of factitious records that aim to escape the data quality validation of the NHSO’s data quality checking software.
Conclusions:

Implementation of UCS has brought both favorable and unfavorable effects to the country HIS and HIT development. The health insurance beneficiary registration system which manages and maintains by NHSO helps improve providers’ service workflow and the country vital statistics quality. Implementation of DRG system stimulates health providers to improve their HIS and HIT capacity, data and medical record quality and increase the adoption of health national administrative data standards. The creation of NHSO’s disease management information systems increase the fragmentation of health information systems and increase burden on data management to providers. OP individual records initiative provide the large amount of budget on the data quality project. The financial incentive enhance the providers’ HIS and HIT investment and also induce the data fraudulence tendency of some providers.
Reference


## Appendix

### Summary of UCS impact on Health Information System and Health IT

<table>
<thead>
<tr>
<th>UCS features</th>
<th>Favorable impact</th>
<th>Unfavorable impact</th>
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| Health insurance beneficiary registration system  | - Establishment of online country’s health insurance beneficiary registration system  
- Facilitate CSMBS improve completeness of its beneficiary registration system  
- Close collaboration between NHSO, MOPH and MOI enhance completeness of birth registration | -                                                                                                                                                           |
| DRG information system                            | - Hospitals increase HIS and HIT investment  
- Stimulate the improvement of in-patient medical records  
- Enhance 12 file standards data set and ICD coding adoption  
- Availability of administrative data for secondary uses e.g. research | -                                                                                                                                                           |
| Disease management information systems             | -                                                                                                                                                                                                                 | - Increase fragmentation of health information systems  
- health providers burdened by multiple information management workloads |
| OP individual records initiative                   | - Providers increase HIS and HIT interest and investment  
- Largest investment in health data quality country ever have  
- Increase completeness and timeliness of 18 file standards data set  
- IT and ICD training expand to primary care level service | - Financial incentive induce data fraudulence tendency among providers |

*Note: UCS = Universal Coverage Scheme, CSMBS = Civil Servant Medical Benefit Scheme, NHSO = Nation Health Security Office, MOPH = Ministry of Public Health, MOI = Ministry of Interior, ICD = International Classification of Disease, IT = Information Technology, 12 file standards data set = Health insurance standards data set, 18 file data set = health center service report standards data set*