
Health Information Systems

Alvin B. Marcelo and Julian M. Cañero

University of the Philippines Manila National Telehealth Center

Introduction

Information has been identified by the World Health Organization as one of the pillars/building blocks for strengthening health systems.¹ This is in recognition of the crucial role of information systems in supporting decision-making at many levels of the health sector. Indeed, valid and reliable information is requisite for the delivery of more effective, efficient and equitable health care.² This makes health information management one of the cornerstones of universal health care. If properly designed to address health inequities, health information systems can assure that every Filipino will have access to quality healthcare and to an effective, efficient, and sustainable health system.

History of the Philippine Health Information System

As early as the 1960s, the Department of Health (DOH) already operated a national health information system. This was revised slightly in 1984 to reflect the shift in strategy towards Primary Health Care, a policy adopted by member states of the World Health Organization, including the Philippines.²

In 1989, the Field Health Services Information System (FHSIS) was first implemented to replace the old system. It mandated field personnel working in the local Barangay Health Stations (BHS) or Rural Health Units (RHU) to collect data for the different national health programs. At the time, data collectors were burdened with submitting as many as forty different forms yearly. With the devolution of health services to the Local Government Units (LGU) in 1992, there was deterioration of the quality of management and services, poor staff morale, deteriorating infrastructure and lack of financing of operational costs and services.³ This led to the design and implementation of the Modified Field Health Services Information System (MFHSIS) in 1996 which reduced the number of forms submitted from 40 to only 7

per year. In 2001, the system further evolved into the Distributed Field Health Services Information System (DFHSIS) and was piloted in 6 different sites. However, there were multiple problems encountered with the system and was thus, not scaled nationwide.²

In 2007, the Philippine Integrated Disease Surveillance and Response (PIDSRS) Project was created to provide a framework and to propose a comprehensive approach to health information systems development. This was followed by a DOH-led Philippine Health Information Network (PHIN) in 2008 which designs and implements the Philippine Health Information System (PHIS). In terms of the implementation, the specifics and operational aspects of these programs at the field level are not yet clearly documented.

Specific Problems of the Philippine Health Information System

The management of health information in the Philippines is at best rudimentary and ministerial because data collectors perform their work as a matter of compliance without regard for the information's usefulness for decision-making at all levels. Several factors were found to have caused this.

Paper-Based and Manual Reporting Systems

Health information systems in developing countries in general are paper-based and manually driven. This is best represented by the tally sheets of cases filled up by health workers in health centers weekly and monthly. Each vertical DOH program (e.g., maternal care, expanded program on immunization, etc.) is represented by its own separate tally sheet and corresponding logbook. This results in health care workers at the grassroots level being overburdened with manually recording and computing statistics for all of these programs. In turn, delays ensue because health care workers give it low priority compared to patient care. By the time the tally sheets find their way to higher offices, several weeks or months may have already passed.⁴

All-or-none Phenomenon

As a matter of convenience, a health statistic report is considered complete only when all of its component data are accounted for. This means that unless all barangays (villages) submit their tally sheets, the municipal report cannot be labeled complete. The provincial report in turn

Corresponding author: Alvin B. Marcelo, MD, FPCS
National Telehealth Center
University of the Philippines Manila
Taft Avenue, Manila
TeleFax: +632 525-6501
Email: alvin.marcelo@telehealth.ph

cannot be completed without data from all the municipalities. Under this all-or-none scheme, the delay of a single barangay can potentially hinder the release of the much needed national health report. This phenomenon occurs all around the country which results in national statistics being delayed for more than a year.⁴ In fact, the latest national health report still dates back to 2008, as of this writing.

Hierarchical Flow

Health data is first observed and compiled at the barangay level then submitted to the Municipal Health Officer before it is compiled yet again and submitted to the Provincial Health Officer. This system was meant to allow local health officers to detect local anomalies and trigger them to take immediate action. This system however, deprives higher health offices the timely data they need in order to effect national health policy changes. Furthermore, as data passes through each level, it becomes susceptible to consolidation errors as well as deliberate mishandling of data. This results in higher level data becoming poorer in quality.⁴

Target-based Reporting

Health care workers at the grassroots level are generally aware of targets of national health programs and are expected to meet them. For example, a national target for a program may set an arbitrary 80% coverage for the current year. Some indifferent health care workers may report immunization coverage statistics that match their target even if their actual data is lower. Setting targets for data reports is both counter-productive and manipulative. It explicitly suggests to health workers what numbers are expected while the paper-based reporting implicitly provides them with the freedom to edit their results without accountability. This results in poor quality data which are used for decision-making like procure medical supplies. These also become basis for national policy decisions.⁴ In some cases, poor quality data has resulted in over-procurement of vaccines that were essentially wasted because the drugs exceeded the number of children to immunize.

Mixing Good with Bad Data

While some health care workers at the grassroots level (such as those described earlier) are indifferent about data quality, others are diligent. But when these two sources (good and bad quality data) are combined, the consolidated result becomes questionable and even useless. Furthermore, health workers who are meticulous about their work become demoralized when they learn that their hard work has been rendered practically useless by colleagues who are known to fabricate their reports.⁴

Disintegrated and Paradoxical Vertical Programs

The Department of Health delivers various vertical programs such as maternal care, child care, family planning, TB, malaria, leprosy, and many others. Each of these programs has its own reportorial requirements, own sets of forms and logbooks for the use by the health care workers. A patient may be recorded in more than one logbook if he presents with several conditions (e.g., a pregnant woman under treatment for TB). This can result in bloating the number of patients in the center's census if the number of records in the logbook is used to count the number of patients served.

Some programs contradict each other's objectives. In the maternal care program, an increase in the number of pregnant women is expected (given the rise in population growth). On the other hand, the family planning program also expects an increase in the number of women using contraceptives. However, we know for a fact that an increase in the use of contraception should result in a decrease in the number of pregnancies. When these targets are not met, some health care workers are compelled to just invent numbers to fit the program's expectations.⁴

Data Cemeteries

At present, a typical health center is like a data cemetery, that is, it has piles of logbooks and paper records gathering dust over the years. These logbooks once archived are forgotten and not used for planning or for analysis. Without easy access to their census, health care workers in the health center are not aware of the incidence and prevalence of diseases in their communities.⁴

Lack of Computerized Health Information Standards

While the DOH and Philhealth maintain their respective computerized health information systems, they are not standards-based and cannot easily exchange data with each other. There is also lack of a roadmap and leadership as to who should build and manage the national health information system.

What is e-Health?

E-health is a relatively new term for an emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies.⁵ The World Health Organization defines it as a cost-effective and secure use of information and communications technologies in support of health and health-related fields, including health-care services, health surveillance, health literature, and health education, knowledge and research. It currently encompasses several fields:

- Electronic Medical Record – a computerized legal medical record used within a facility

- Electronic Health Record – a collection of electronic medical records which refer to a single patient
- Patient Health Records – a patient controlled electronic medical record (i.e. Google Health)
- Telemedicine – the delivery of health care to a remote site through the use of telecommunications technologies
- Telehealth – the delivery of health services (not limited to clinical care) through the use of telecommunications technologies
- Health Informatics – resources, devices and methods required to optimize the collection, storage, retrieval and use of health information
- Consumer Health Informatics – analysis, study and implementation of methods for making health information accessible to consumers / patients⁶
- E-learning – provision of educational materials and virtual classroom interaction through telecommunications technologies

Due to the rapid development of the field, these are only a few examples of the sub-domains which comprise the general term e-Health.

e-Health as part of the 6 building blocks of the WHO framework for improving health systems

The WHO proposed framework for improving health systems consists of 6 building blocks: service delivery; health workforce; information; medical products, vaccines and technologies; financing and leadership and governance. Furthermore, it characterizes a well-functioning health information system as one that ensures the production, analysis, dissemination and use of reliable and timely information on health determinants, health system performance and health status.¹

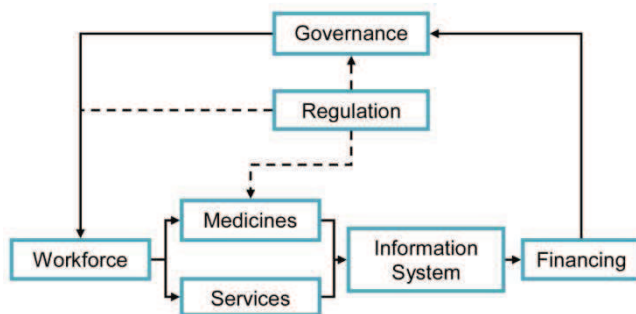


Figure 1. Interactions of the 6 building blocks for improving health systems

e-Health as part of the solution to the problems of the Philippine Health Information System

A health information system (HIS) is an integrated set of components that work together to provide support for decision making in healthcare. Because of the multi-user,

multi-level perspectives of HIS, designing and implementing them are challenging. Literature is rich with documented failed HIS implementations.⁷

In general, most failed HIS reveal unfilled gaps in the knowledge and skills of all stakeholders of the health system. A poorly designed HIS will be unable to provide support for the decision making of public health managers, clinicians, and patients whereas an effective one clearly creates value for all of these stakeholders. An effective HIS is built through a process that starts with understanding what decisions need to be made by these various players and be able to deconstruct them into the data elements for collection. For purposes of Universal Health Care therefore, a deep understanding of decisions that pertain to guaranteeing the comprehensiveness of healthcare must be defined clearly at the outset so that appropriate health information systems can be built that can deliver this promise. Figure 2 shows how responsive health information systems should be designed: starting from knowing what decisions or actions are to be made and deconstructing these sequentially into knowledge and further into its information and data components. Following this deconstruct paradigm, the resulting health information systems are more able to address the needs of decision makers at different levels of the system.



Figure 2. The Construct-Deconstruct Paradigm

Deconstructing Healthcare: Information at the Point-of-Care

The collection of health information begins with an encounter at the point of care. Although these encounters come in many forms (in clinical settings or in household surveys), those that have most impact to the universality of healthcare are those that document services at the point-of-care. For example, a health care worker will interview patients about their symptoms, perform a physical exam as well as request for some necessary laboratory tests. Every data collected from the patient contributes to his health record and helps the health worker take appropriate actions or make decisions about the level of care to provide. The health record becomes the fiduciary tool to document the services (and their quality) delivered to a person. The concept of universal health care is hinged on documentation of quality services received by patients from their providers as depicted in their health records.

Constructing the Public Health Information System from Point-of-Care Data

Health information systems do not end at the point-of-care. When several patient records are combined and analyzed in a facility, they can provide information on the performance of the institution. While the collection process may have ended for the clinician and the patient, focus then shifts to the public health professional who will consolidate these individual data to find patterns that may be emerging from a population. The public health information system is then built from point-of-care data. Although designed and collected separately, individual level data in the clinics and facilities become the building blocks that form the larger public health information system. It is this multi-purpose, multi-stakeholder nature of health information (individual at one level yet public at another) that makes health information systems complex and difficult. The varying needs and agendas of clinical and public health stakeholders, if not properly addressed, can result into disintegration and information silos in different parts of the health system.

Telemedicine: Providing Access to Health Services

The World Medical Association defines “telemedicine” as: “the practice of medicine over a distance, in which interventions, diagnostic and treatment decisions and recommendations are based on data, documents and other information transmitted through telecommunication systems.”⁸ It is a thoroughly studied discipline that dates back to the initiatives of the National Aeronautics and Space Administration (NASA) to monitor vital signs of astronauts in space. It has since evolved into a myriad of applications ranging from telemetry to telesurgery. Evidence shows substantial benefits from telemedicine for patients in remote hard to reach areas.⁹

If universal health care means being able to connect every citizen to the health system, then *access* becomes a fundamental principle that is needed to guarantee that universality.

A Reference Information Model for Healthcare

The complexity of modeling health information challenges designers and architects of health information systems. While most transactions will be done by local health workers, more sophisticated analysis will be made by higher level experts. A standard dataset is necessary to guide both field workers and central epidemiologists in the way they manage their information.

The minimum data set to document service provided (which we may call the “service data atom”) are the following:

1. Patient
2. Provider
3. Service provided

4. Time
5. Location

These five data elements, having been found to be fundamental to documenting health care and universal access, should then advise government of the health informatics standards that are needed to create interoperable information systems, to wit:

1. **Client registry:** a master list of all patients and their identifiers
2. **Provider registry:** a master list of all providers and their identifiers
3. **Terminology registry:** a list of all attributes relevant to documenting healthcare. This terminology registry will contain the canonical codes and names for the main services rendered by providers to patients (*e.g.* antenatal care, BCG vaccination, measles vaccination).
4. **Standard date and time formats**
5. **Standard geographic codes** down to the barangay level; and if available, to the latitude and longitude using a standard base map

Summary

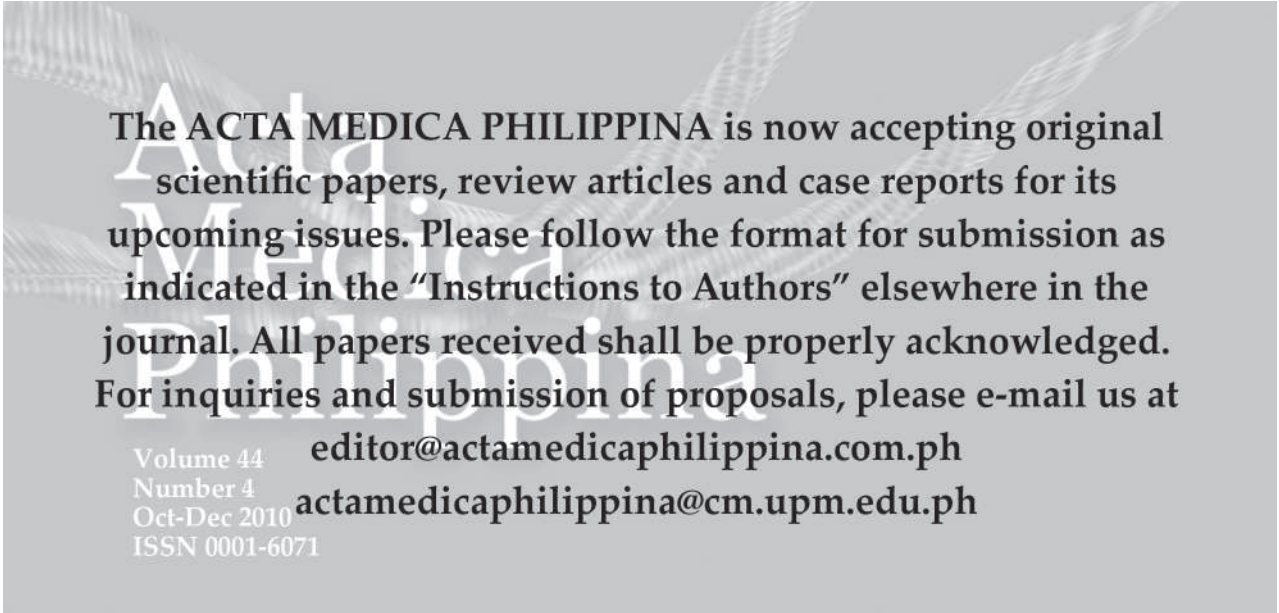
The current national health information system leaves much to be desired. Despite substantial internal and external investments, health information systems are still disintegrated and non-interoperable. Lacking access to a blueprint or enterprise architecture, implementers are left to their own designs and build systems that will not be able to communicate with each other. The Department of Health must prioritize the creation of the enterprise architecture to enable the participation of a larger group of implementers in both the public and private sector.

With this blueprint, the Department of Health then needs to define the health informatics standards that will meet the requirements of the enterprise architecture. With these standards, implementers will be constrained to operate within a clear set of rules which, if fully complied, will guarantee inter-operability with similarly compliant systems. These standards must be promulgated at the soonest possible time by DOH even if it would mean letting go of their current implementations that do not meet these new benchmarks.

Lacking the enterprise architecture and standards, implementers are best advised to store the minimum dataset, the service atom, which contains the five data elements: patient identifier, provider identifier, service identifier, location identifier and date/time.

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