

# Improving Medical Record Keeping

September 2018



## INTRODUCTION – THE STRATEGIC PURCHASING BRIEF SERIES

This is the sixth in a series of briefs examining practical considerations in the design and implementation of a strategic purchasing pilot project among private general practitioners (GPs) in Myanmar. This pilot aims to contribute to the broader health financing agenda by developing the important functions of, and providing valuable lessons around contracting health providers for strategic health purchasing. More specifically, the pilot is introducing a blended payment system that mixes capitation payments and performance-based incentives to reduce households’ out-of-pocket spending and incentivize providers to deliver an essential package of primary care services.

## OBJECTIVE

This brief describes how routine patient data are being collected and exchanged within the pilot. Specifically, it discusses the transition from paper to electronic medical records (EMRs), and the use of biometrics for accurate patient identification. The brief also examines other important data-related issues, such as confidentiality, data safety and portability.

## CONTEXT

Many people in Myanmar access most of their health care through the formal and informal private sector and payment for this care comes mostly out of the patient’s pocket. This can cause a significant financial burden to poor and vulnerable populations and lead to a chronic under-use of basic health services.

In response to this challenge, and in support of the Government of Myanmar’s long-term universal health coverage goal, Population Services International (PSI)/Myanmar has established a pilot project to demonstrate the capacity of private GPs in its Sun Quality Health (SQH) network to offer a basic package of primary care services to poor and vulnerable households. In this pilot, PSI is “simulating” the role of a purchaser, but expects this role to be taken over at some point by a national purchaser, as outlined in the National Health Plan (2017-2021). In the long run, the role of PSI is likely to evolve into that of an intermediary.<sup>1</sup> This intermediary role could include supporting the formation of networks of providers that are easier to integrate into health financing programs, and helping these providers meet minimum requirements through quality improvement and development of management capacity. Eventually, the package of services to be purchased from GPs, even if limited, will need to be streamlined with the basic Essential Package of Health Services that is currently being developed at the national level.

<sup>1</sup> Results for Development Institute (2016). [Intermediaries: The Missing Link in Improving Mixed Market Health Systems?](#) Washington, DC: R4D.



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Under the pilot, over 3,000 low income households in three townships<sup>2</sup>, have now been registered, screened and issued with health cards which entitle them to a defined benefit package provided by selected members of the SQH network. The pilot specifically aims to demonstrate an increase in the range of services offered by private providers, a decrease in out-of-pocket payment by the registered households, and a decrease in the time to seek treatment from the onset of health symptoms.

### NO DATA, NO STRATEGIC PURCHASING... AND VICE VERSA

Little is known about health care delivered by private providers in Myanmar. Even when patient data is being recorded in a private healthcare facility, it is rarely collected by or shared with the government. Apart from a few vertical health programs such as malaria, HIV and tuberculosis that work with a limited number of private providers in the country, the data from private providers is not usually reflected in the country's health management information system. Recordkeeping among Myanmar GPs is particularly weak. The strategic purchasing pilot implemented by PSI is trying to demonstrate that it does not need to be this way.

Reliable data is critical in the context of strategic purchasing of health services from private providers. Data pertaining to the readiness of a GP to deliver a defined package of services should inform the decision on whether or not to enter into a contractual agreement with that GP. The definition of an effective combination of provider payment mechanisms – i.e., one that elicits desired provider behaviour – relies on good data. As seen in [Brief #2](#), the calculation of the capitation payment should ideally be based on detailed service delivery statistics. Likewise, as discussed in [Brief #4](#), the design of performance-based incentives should be guided by information on actual provider behaviour (e.g. which services are being under- or over-provided, or which services do not meet minimum quality standards, etc.).

While strategic purchasing requires good data, it also prompts the provider to share that data, given that the payment can be made conditional on timely submission of agreed-upon data.

### FROM POOR RECORDS, TO STRUCTURED PAPER-BASED RECORDS... TO ELECTRONIC MEDICAL RECORDS

There is no unified method for patient record keeping across private providers in Myanmar. There exist some good practices, and in a rapid assessment carried out by PSI in Yangon, a third of GPs maintained individual written client records, and some were even providing record books to clients to carry home with them. However, for most providers a notebook with some handwritten, unstructured notes relating to selected patients is often all there is, serving as little more than a system for tallying the number of clients served in a day. The providers interviewed could see the potential advantages of using electronic records, but due to

#### Box 1 - Key Terms: EMR and CMIS

There are no standard definitions for 'EMR' or 'CMIS'. Moreover, these terms are often used interchangeably and in different ways by different organizations. The team has chosen to define them as follows.

An **Electronic Medical Record (EMR)** is a computerized version of a traditional paper medical record. Because computers are able to automate many things, in practice EMR software usually does much more than just capture data and produce reports – for example, it can assist clinical decision-making with alerts and follow-up reminders - but in an EMR, these features are all focused on clinical interactions with the client.

A **Clinic Management Information System (CMIS)** is a system that, like an EMR, collects and manages client records, but it is more widely focused on the overall management of a clinic, and may not include as much clinical data about interactions with patients. Depending on the software, CMIS features might include: registering clients and recording visits; inventory management and stock ordering; billing, receipting, invoicing and expense tracking; and monitoring & evaluation.

<sup>2</sup> Townships in Myanmar are comparable to what many other countries call districts. On average, a Township has a population of around 150,000.

the small nature of their operations they did not immediately see the value of more complex services you would find in a CMIS such as inventory or billing.

At the same time, the assessment found that clients thought it important that the provider keep their medical history documented in order to help reduce the time required for the consultation, and those who carried the booklet themselves found it useful when visiting other doctors or specialists. This latter point showed they understood and appreciated the portability of their record.

**Introduction of paper records:** PSI recognised that the introduction of an EMR would take a considerable amount of time, and therefore developed a simple paper-based recording system (see figure 1) at the start of the pilot. PSI already had a comprehensive paper-based recording system for its existing, vertical public health programs such as TB, HIV, malaria and family planning, but the new requirement for this pilot was to collect data for each individual beneficiary and for each and every service within the benefit package they would access, without creating too heavy a data recording burden on the provider.

This trade-off between comprehensiveness and ease of recording meant there were several limitations in the paper-based system: the absence of a code for specific diseases or health services made linking patient records to routine public health reports burdensome, and entering prescription details was not an option. Nor did the system make it easy to track patient progress for services requiring regular follow-up such as antenatal care or hypertension management. The general illness category attracted a high volume of service utilization (see [Brief #5](#)) but was too broad for useful analysis.

Data validation for the reports generated was a manual process, with individual records having to be verified against a database of beneficiaries using the unique patient ID (see the section below on unique identifier codes). Using this data, PSI was able to produce a monthly dashboard with key indicators for monitoring project performance, some of which were used to calculate the performance-based incentives described in [Brief #4](#). All of these functions would need to be automated under the new EMR.

Figure 1. Paper-based record form

**Considerations for EMR development**

**for private GPs:** Globally, PSI has considerable experience supporting comprehensive EMR systems designed for multi-purpose clinics, with multiple users including doctors, nurses, receptionists, pharmacists and laboratory staff. The CMIS or EMR (see box 1) is used by the management team of the clinic to monitor and control business elements such as patient records, clinical management, stock and revenue earned. Users may see the system as an administrative burden, but are obliged to use it as part of their day to day duties.

In contrast the private GPs PSI engages with in Myanmar are typically an individual provider supported by one or two low level clinic assistants, and the provider is the owner and operator of the practice. Both the decision to use the EMR and much of the burden of its use falls on the provider. Therefore, it was important that the EMR offers enough value to the providers to make them choose to use it in lieu of their existing, weak paper-based systems.

PSI conducted interviews with providers and made a series of clinic observations in order to develop a set of requirements for what kind of EMR could be implemented at the clinic-level. These included:

- The system must run on low-cost devices (ideally on Android tablet devices)
- PSI must be able to bulk-upload patient registrations, and assign patients to one or more clinics
- Providers must be able to register new patients to their clinic (including capturing biometric data) while both offline and online
- Providers must be able to search for an existing patient in their clinic while both offline and online, using either biometric data, a barcode scanner, demographics, or client ID
- Once retrieved, the provider must be able to see the patient's history and known conditions, access historic visit details, and update and edit after new visits, including clinical observations (e.g. blood pressure, glucose), one or more diagnoses from a drop-down list, and services and medications provided
- The EMR must be able to automate data aggregation needed for submitting reports to donors and to the MoHS, reducing any additional burden on the provider or PSI field staff

Very few systems that are developed will eventually meet all the hoped-for criteria due to a practical combination of technical, operations and budget limitations, and PSI aimed to maximise the functionality with the least number of compromises being needed.

**EMR Selection and roll out:** PSI conducted a scan of existing EMRs to determine what systems already exist on the market, including comprehensive systems used by PSI elsewhere, and whether they would meet the relatively simple requirements of GPs in Myanmar. Most EMR software was found to be either built for the American private health insurance system or developed for larger multi-purpose clinics that have installed computer networks. Of the over 50 platforms that were explored, only five had the potential to meet this initial set of technical requirements and warranted further investigation. PSI eventually selected a local IT social enterprise, Koe Koe Tech, to develop the EMR application based on the firm's ability to meet PSI's requirements, its prior experience with health IT in Myanmar (having already developed a hospital management information system for the Yangon General Hospital), a commitment to a user-centred design process, and value for money.

Figure 2. A participating GP using Sun EMR



PSI worked with Koe Koe Tech to conceive a system that would be easy to use, add value to the clinical user, and include the monitoring/control element as a secondary function. PSI also wanted the new EMR system to be a tool that providers would adopt for ALL their patients, not just those covered under the strategic purchasing pilot, so the benefits would be felt more widely.

In addition, there is no long-term donor for this project who might be willing to pay for this system's roll out and maintenance. PSI would need to develop a payment model – for example a monthly subscription – whereby providers would cover the cost themselves.

For this reason, PSI proposed to use a flexible and iterative 'user-centric' approach: install a 'minimum viable product' in the clinic, pre-test with real live users, obtain feedback, make improvements, and repeat the process. In addition, PSI set out to make a system that, in time, the providers would be willing to pay for. PSI also envisioned that the system would

initially be limited to an EMR, based on the providers' wishes, but recognized that over time some providers would want to add on functions such as inventory management and continuum of care tracking. Thus, the system should have the potential to gradually evolve into a CMIS.

The first version of the Sun EMR application was rolled out with four providers in the strategic purchasing pilot in December 2017, and thus began a process of iterative design. As well as being able to improve

#### Box 2 – International Classification of Diseases, 10<sup>th</sup> Revision (ICD-10)

The International Statistical Classification of Diseases and Related Health Problems (ICD) has been endorsed by the World Health Organization (WHO) since 1990 and is commonly used for designing payment systems and claim reimbursement worldwide. Public hospitals in Myanmar already use ICD-10 classifications.

Benefits of using ICD-10 include:

- ◆ Helps unpack the category *general illness* in line with international standards
- ◆ Improves tracking of quality of services provided
- ◆ Improves compatibility with other systems
- ◆ Supports evidence for epidemiological patterns around diseases and outbreaks
- ◆ Supports service prioritization and evidence-based decision making

Challenges include:

- ◆ Providers are not familiar with using ICD in general practice
- ◆ May require laboratory confirmation in some cases, which is challenging for primary care in low-income settings
- ◆ May require periodic upgrades – for example ICD-11 was released by WHO in June 2018 with extended codes, but this has not yet been adopted in Myanmar

workflows based on recommendations from the providers, some of the improvements that were made included:

- Pre-loading the EMR with data collected from patients as they were screened at the registration process for the strategic purchasing pilot. This gave the doctors a critical mass of patients with which to begin using the system.
- Minimising the number of compulsory data fields to make registering new patients as quick and easy as possible.
- Introducing a module whereby doctors could simply take a photograph of their medical notes and store it in the record if they did not have time to type in detail.
- Adding a patient search feature that allows doctors to scan the barcode printed on the health cards of the beneficiaries of the strategic purchasing pilot or to search for patients based on their basic demographic data.
- Integrating 22 broad categories of the International Classification of Diseases, 10<sup>th</sup> Revision (ICD-10) in the back-end coding of the EMR system (see Box 2).

The development of the EMR has now gone through over 10 iterations. The implementation research built into the strategic purchasing pilot and an

independent review by a research and policy organisation, Innovations for Poverty Action, have identified that some limitations remain. Many providers do not like using the system in real time due to their limited consultation time with patients; and some clients complain that providers are not giving them enough attention (they might appear to be distractedly using a mobile phone). However, since it was also identified that patients valued providers keeping medical records, there is an opportunity for patient education to improve client perceptions of doctors using the EMR.

As the pilot is extended to new areas with new providers, PSI has also recommended that the EMR will be used from the start as the only system of record keeping. While this would mean a steeper learning curve for the provider at the beginning, there are significant long run benefits from being fully electronic. To partially mitigate the risk of getting incomplete records early on, financial incentives could be introduced to motivate providers to make the extra effort to maintain the EMR accurately (see [Brief #4](#)).

**Patient identification - the importance of a unique identifier code:** A unique patient identification system enables a provider to better manage, share and recall patient information with speed and accuracy and, as a result, provide a higher continuity of quality care. It also allows providers, and programs to track individual users over time, rather than just tracking the number of services provided.

Until recently, most patient tracking systems were either code-based or name-based, which can be burdensome for both patients and staff. PSI has experience with both, and knows that clients often lose their code, or feel uncomfortable being obliged to repeatedly reveal personal information. Staff can easily mix up patients by name – names may not be unique and may be easily misspelt, especially when databases use Latin script instead of Myanmar script. Patients who wish to maintain anonymity may even deliberately provide misleading information when receiving services with high stigma such as HIV care. Finally, patients can easily end up with multiple codes when they receive more than one service.

Figure 3. The iris scanning process



**Box 3 – Patient identification approach**

PSI chose iris scans above fingerprints when exploring biometric technology. While finger printing was more affordable to implement, iris scanning proved to be more reliable, as it offered:

- ◆ Accurate 1-to-1 patient matching and identification
- ◆ Secure data encryption to protect patient privacy
- ◆ Potential for sharing and coordination of patient data between multiple organizations due to the unique code it generates

However, some practical challenges remain with implementing this technology in Myanmar:

- ◆ It is an online system that requires a stable internet connection.
- ◆ It currently only runs on Windows (not Android) and is therefore operated in parallel to the EMR for the time being.
- ◆ For security reasons the Windows software must be kept continuously up to date.
- ◆ Scanning irises has proved to be challenging for some of the youngest and the oldest beneficiaries, and has added time to the registration process.

PSI wished to adopt a system that would ensure anonymity, reliability and speed of recall in its strategic purchasing pilot. Given that beneficiaries would be selected to receive a health card providing them with financial benefits (in this case, heavily discounted health care), it also wanted to make sure that non-beneficiaries would not be able to pass themselves off as beneficiaries, so security was considered essential.

For the sake of simplicity, PSI chose to adopt a biometric system that it had already been using since 2015 under a separate project to overcome the challenges of a name- or code-based system while uniquely identifying extremely vulnerable HIV patients from key populations without compromising confidentiality. During registration into the strategic purchasing program (see [Brief #3](#)), clients receive an iris scan (see box 3) that generates a unique 12-digit identifier code, a UNiD, (using technology from a company called [iRespond](#)), which is then attached to the health card they receive and the medical record inside the EMR. This unique code follows them through their involvement in the program.

Following a period of implementation of the biometric system, PSI soon learned that the providers felt the photo ID on the health cards was sufficient for them to identify cardholders, and they did not consider that fraud was a

problem. In practice, due in part to the challenges described in Box 3, the providers did not use the biometric system to determine patient identity on a routine basis, but found the bar code printed on the card was very

useful for pulling up the record inside the EMR. Ultimately, the biometric system was most useful for the creation of the UNiD, rather than for ensuring privacy and anonymity of the patient, or for preventing fraud.

In the long run, there is clearly value in partners realizing the opportunity that a universal ID system offers to better understand how patients move between various service providers, while also preventing the creation of multiple codes for individual patients. The path towards a uniform medical ID system in Myanmar is unclear and multiple parallel systems exist. Moving forward, PSI will continue to share its experiences with

iRespond and the EMR to support the process of moving towards a uniform ID.

Figure 4. A registered beneficiary receiving health cards



#### ADDITIONAL DATA-RELATED ISSUES

**Data Security considerations:** As seen, EMRs bring many benefits to the health care environment, including improved patient care and the ability to report disease occurrence as part of surveillance activities. Yet these same benefits introduce a range of risks to patient data security, privacy and confidentiality. This is especially true in a country like Myanmar that does not have a clear regulatory environment around data security. PSI is working to build an EMR system

where patient data will be stored securely, managed responsibly and used legitimately.

Throughout the development of the EMR, PSI and Koe Koe Tech have worked together to mitigate risks related to cybersecurity, focusing on the following areas:

1. Each EMR user requires a password to access the application. Different users have differing levels of access. For example, a clinic assistant is only able to register new patients, not view full patient records. Viewing full patient records requires an additional password only held by the provider.
2. End-to-end encryption secures against hacks across the whole communication chain by preventing outsiders from accessing the cryptographic keys needed to decrypt given data.
3. All devices using the EMR are enrolled in a Mobile Device Management system. Therefore, if a device is compromised or stolen, Koe Koe Tech can remotely shut down, lock or wipe the device to prevent data breaches. It can also remotely reset the password.
4. Each provider must commit to using a specified android device uniquely for the purposes of the EMR system, to reduce the risk that a device becomes infected by viruses downloaded by other applications.

As the system evolves, appropriate precautions will continue to be taken to protect patient data, specifically data linked with identifying information, from any potential security risks. These would consider factors such as how and where the data is stored (on a local device or computer, or in the cloud), how to keep personally identifiable information separated from personal health information, who has access to the data (both administrators and providers), and what other precautions are needed to prevent data breaches.

**Data ownership - and what it means in practice:** Data ownership is a complex concept that PSI chose to translate into the following set of principles:

- Any patient data collected with the EMR is owned by the patients themselves. Patients are the sole owners of their data and have the right to receive their personal data and medical records entered by the provider. It is the responsibility of the provider to inform the patient of this right.

- The provider has the right to use entered patient data for purpose of diagnosis, treatment and management of patient. Data entered into the application may only be used for medically and ethically sound purposes.
- By signing the application's terms and conditions, providers have the right to access, at any time they choose, all data held on them and their patients in an electronic format.
- PSI has the right to extract aggregate data from the EMR to be used for the following purposes
  - Share with Ministry of Health and Sports and donors as part of routine data collection
  - Improve PSI programmatic performance of the Sun Quality Health Network
  - Seek permission from ethical bodies to publish studies based on data
  - Monitor adverse events
- For some specific notifiable diseases, PSI may be required to extract individual records and report client level data (devoid of personally identifiable information, unless for exceptional cases with written approvals and/or as clearly mandated by law) to the Ministry of Health and Sports, with implied consent from patients.

#### Box 4 – is iris scanning secure?

A Seattle-headquartered technology solutions non-profit – iRespond – has created a proprietary process that combines biometrics with certain security features of blockchain technology to provide individuals with an unalterable, Unique Numerical Identity (UNiD). iRespond's identity solutions capture the body's own signature – namely the unique signature of the iris – and convert that into an encrypted information code comprised of a twelve-character numeric sequence. The files of the encrypted IDs are so small that UNiDs for the entire population of Myanmar could fit on a single micro USB card.

iRespond does not collect, store or make available any personally identifiable information or personal health information. The UNiD acts solely to validate that the individual being scanned is truly who they say they are.

PSI established these principles by including them in the contract with the developer and in the application terms and conditions, which all providers sign prior to use. As the application progresses beyond the launch phase, PSI will continue to refine its approach to data ownership and associated protocols and practices, and these will be captured in a written consumer data protection policy.

**Portability of coverage (and medical history).** An important part of any electronic record system is portability – the ability to transfer the record to another provider. The most obvious application of this is for referrals for services that the GP cannot provide – for example to a specialist clinic or a hospital, so that diagnoses or tests do not need to be repeated and the providers have access to the complete medical history.

Another important consideration is that offering a choice of provider to the beneficiary, and enabling beneficiaries to move to different providers if they do not receive a satisfactory service, may be a critical factor in ensuring quality in a future social health insurance scheme, especially one that uses capitation payments under a strategic purchasing mechanism (see [Brief #5](#)). Being able to ensure that a medical record will seamlessly follow a patient to the new provider is an essential part of that process.

Portability of electronic medical records will however require careful consideration of patient privacy. In the future, a system such as the UNiD described above could be the basis for ensuring that an encrypted medical record could only be unlocked and read by the new provider if the patient is present and able to provide a biometric signal (an iris scan or a fingerprint for example).

**Reporting to the Government of Myanmar.** Following the example of many other countries, the MoHS in Myanmar has adopted the District Health Information System (DHIS2) as its primary Health Management Information System. PSI also uses DHIS2 for its own data collection both globally and within Myanmar. Once the key elements of the EMR have stabilised, in particular the adoption of ICD10 categories, PSI and Koe Koe Tech will ensure that the EMR is able to interface with the DHIS2 for ease and simplicity of reporting.



## THE IMPLICATIONS FOR PROJECT PLANNING AND IMPLEMENTATION

The development of a well-functioning EMR in a challenging environment such as Myanmar is a time consuming commitment, and PSI has had to put significant effort into the development of the EMR to date. It has been important to expand the scope of the EMR to providers outside of the strategic purchasing pilot in order to both achieve economies of scale, and to ensure that the potential benefits are dispersed as widely as possible. In the long run, PSI hopes that this will improve the sustainability and affordability of the EMR itself and increase the overall supply-side readiness of the private sector when the national health financing strategy is operationalized.

When it comes to scaling up the use of the EMR, there are many challenges still to overcome, such as how to roll out training and support in the context of relatively low digital literacy, particularly among older providers. Other complicating factors remain outside of the control of the project such as the reliability of the power supply and mobile data coverage, and the fact that Myanmar still lacks clear and up-to-date laws and regulations to ensure the protection of identifiable patient data. In the absence of a donor willing to pay for the cost of scaling up the system, more work is needed to offer a commercially viable EMR product which providers might be willing to invest in themselves, as well as the development of reliable payment options – for example a monthly subscription model for the EMR.

At the same time, the progress to date shows that there are many potential benefits that could eventually outweigh these challenges. On the supply side these include integration of electronic payments for capitation and claims reimbursements under a future health insurance scheme which are directly linked to data collected through the EMR. For the people of Myanmar, the day can be imagined when they will have full control over their own secure and transferrable medical records, which they can use to access an unprecedented continuum of quality and affordable healthcare.

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