Towards Integrated and Quality-assured Health Service Delivery: Making a Case for Health Smart Card in the Philippines

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ABSTRACT

Background and Objective. In the Philippines, patients are constrained from accessing their own records, restricting their ability to freely choose who to seek care from. To address this, the study makes a case for the development of the health smart card in the Philippines, an integrative tool unique to each citizen carrying their lifetime medical record.

Methods. The prototype is developed using no-code programming technology and validated through a series of focus group discussions and stakeholder consultations with patients (n=4), healthcare administrators (n=4), and hospital personnel (n=13). It was then revised based on the collected insights and recommendations.

Results. Findings report that the current facility-centric model utilizing paper records constrains patients' access to their records due to long wait times, slow turnaround periods, constant intra- and inter-hospital transfers, and even charging of fees to acquire a copy of their own data. The health smart card alternative was widely accepted by the participants, particularly for its contribution to increasing data accessibility, patient empowerment, and advancing patient data ownership. Nevertheless, several considerations for the upscale implementation of the health smart card emerged, including creating an interoperable environment through harmonizing standards and capacity-building programs, and ensuring data security through robust cybersecurity measures. Issues on scalability and funding of the project were also raised, centering on the critical role of the government in stepping up as regulator and potential funder. Concerns over potential abuse, dataveillance, and the digital divide are tackled, highlighting the need to account for socioeconomic factors to ensure that no one is left behind in the implementation.

Conclusion. The study makes a case for the development and adoption of a health smart card to address the inaccessibility of records to patients. The study concludes by recommending the conduct of a pilot implementation to comprehensively demonstrate and analyze the features of the proposed scheme.

Keywords: health smart card, patient empowerment, patient data ownership, ICT in health, Philippines

INTRODUCTION

In the Philippines, patients' access to their own health records is limited. Despite the patient's right to information, the current system restricts their access to their own data. The country's health record management adheres to a facility-centric or provider-centric model, wherein healthcare facilities and providers typically store patient data in paper records. In this traditional model of face-to-face consults, the patient is assessed by triage upon arrival at the healthcare facility and/or received by registration and pre-consultation with prior assessment by a health worker. The patient is then directed to the waiting area prior to consultation, called in for the consultation, then referred for discharge, for further tests at the laboratory, and/or for availing prescribed medicine from

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the pharmacy.[1,2] In this model, patients can only access their records upon request, usually receiving photocopies of their original records that tend to offer incomplete information.[3] As a result, patients lack the ability to freely choose who to seek care from.

Moreover, the paper-based information management system requires additional expenses from patients due to data requests,[3] takes a significant amount of health workers' time for document processing, and renders health facilities susceptible to errors due to data duplication and delays in documentation.[4] In addition, the patient experience from consultation to treatment is challenged by difficulties in securing appointments,[5] long waiting times, absence of information on available services,[6] and lack of infrastructure, especially among public healthcare facilities[7]. The breakdown of referral systems results in patients going to hospitals for illnesses that may be addressed at primary care facilities.[5] In some cases, the absence of a patient referral system, including information asymmetry between healthcare providers and patients, hampers efficient health service delivery.[8]

In 1974, smart cards were initially introduced as a means to pay for telephone calls without using coins, containing memory chips or microprocessors that enable the storage and transmission of data.[9] Over the years, smart cards were developed to meet other needs, including the improvement of healthcare services.[10] Health smart cards have allowed for timely access to patient baseline information, patient ownership over their personal medical information, more efficient processing, facilitating inter- and intra-hospital transfers, and have significantly reduced fraud among patients falsely claiming benefits.[10-13] Within Asia, other countries such as Hong Kong, Singapore, and Taiwan have developed technologies and legal frameworks, including IT solutions addressing privacy to enable an e-health network in Hong Kong in 2000, introduction of information systems by SingHealth in Singapore in 2005, and launch of the National Health Information Infrastructure (NHII) in Taiwan in 1999.[14] Taiwan notably introduced the first e-health network in Asia, where participation of all citizens, legal residents, and healthcare providers is mandatory and universal, with premium subsidies and supplementary financial and medical assistance extended to the disadvantaged.[15]

In 2004, Taiwan implemented the National Health Insurance (NHI) smart card project, replacing paper cards with one health smart card. The NHI smart card is intended to keep track of all the patient's health information.[16,17] Each Taiwanese citizen enrolled in the NHI program is issued a smart card, which is presented every time they avail themselves of medical services. The NHI Integrated Circuit (IC) card or smart card contains the cardholder's name, identification number, date of birth, the card serial number, and a photo of the cardholder. As such, patients are no longer required to present an additional ID to verify their identity.[16] The project enhanced the continuance of medical care and increased its accessibility, enabling patients to go to any healthcare institution.[18] Contrary to paper-based cards that need to be renewed after six uses, NHI smart cards can be used for five to seven years[16] and condense varied medical information to make tracking easier for the patient. Healthcare providers also benefit since the project streamlines previously time-consuming and expensive processes, shortens the waiting time for consultations, lowers administrative costs, and has a high coverage rate due to the compulsory nature of the NHI.[19] Moreover, smart cards enable the NHI Administration to investigate the occurrence of medical fraud[20], significantly improved the efficiency of insurance declaration and reimbursement,[17] helped monitor the continuity of care to vulnerable outpatients,[21] track risks of polypharmacy,[22] and identify potential carriers of communicable diseases during epidemic outbreaks[18]. The NHI smart card system was pivotal in Taiwan's management of the COVID-19 pandemic by tracing real-time travel and arrival history, allowing them to determine high-risk patients for COVID-19.[18]

Given the increasing recognition of technology in advancing the healthcare agenda,[5] the Philippines has similarly taken initiatives to harmonize health data through the Philippine Health Information Exchange platform of the Department of Health.[23] The Philippine eHealth Strategic Framework and Plan (PeHSFP) recognizes patients' right to be provided with timely information in a secure, electronic form as an enabling mechanism to support the delivery of health services and management of health systems.[24] The PeHSFP 2014-2020 reinforced the mainstreaming and scaling up of EMR systems through the updating of the DOH Integrated Clinic Information System (IClinicSys) for PhilHealth's eClaim packages, and the National Health Data Dictionary.[25] Strategic plans and platforms, including the Philippine Health Information Exchange (PHIE), have also been formed to ensure secure access to and exchange of health data,[26] especially in light of the absence of a facilitated referral system[8]. Private hospitals have also introduced EMR platforms, such as MedProjects' Health Engine[27] and Makati Medical Center's Integrated Hospital Information Management System (iHIMS)[28].

At present, EMRs are being adopted at different scales in public and private healthcare facilities in the Philippines. However, the scaled up and institutionalized adoption of EMRs was hampered by the COVID-19 pandemic, along with the absence of laws supporting eHealth in the country. A proposed House Bill 10245 or the eHealth System and Services Act sought to provide policy direction on eHealth in the Philippines, passing its third reading in 2021.[29] A senate version dubbed Senate Bill 1618 or the Philippine eHealth Systems and Services act was also put forward.[30] However, both have yet to be enacted.

The inherent challenges to EMR implementation and the success of Taiwan's NHI IC Card posit a need to revisit previous commitments to improve universal health care through exploring health smart cards. The study seeks to contribute to the initiatives of harmonizing health data in

the country by developing a prototype Health Smart Card (HSC), an integrative tool unique to each Filipino that carries their lifetime medical record. The prototype will undergo a series of validations and revisions based on the insights of key stakeholders. The adoption of the HSC is envisioned to facilitate a more accessible healthcare system and will serve as a tool to empower patients to take charge of their health.

METHODS

The methodology of the study was done in three phases, namely prototype development, validation, and revision.

Development

The development of the prototype is informed by a comprehensive landscape analysis of eHealth in the Philippines. Drawing inspiration from similar successful implementations, an HSC prototype was developed. Scalability, ease of use, and cost-effectiveness were the primary considerations in developing the prototype, leading to the following approach:

1. Use PVC ID cards as patient cards, embedded with a unique QR code for easy identification; and
2. Use no-code programming technology to develop a cross-platform (i.e., mobile and web) application to read and maintain patient health information that is accessible using the unique QR code.

Validation

Two levels of validation were conducted to ensure the functionality of the proposed prototype: stakeholder consultation and focus group discussions. The first level was a stakeholder consultation, where the earliest version of the prototype was presented to stakeholders to offer their comments and suggestions. Several nurses, administrators, and other personnel from one hospital in Quezon City attended the consultation.

Focus group discussions (FGDs) were also conducted to gain further insight on the prototype. The FGDs involve two groups of participants: healthcare administrators and patients. Healthcare administrators comprise chief operating officers, presidents, vice presidents, and operations representatives involved in managing their respective health-care facilities. Meanwhile, patients refer to prospective users and beneficiaries who have experienced accessing their medical records. The study employed purposive sampling, the deliberate selection of participants most equipped to provide substantial information relevant to the study objectives based on their qualifications.[31] The participants were selected according to their knowledge and experience in accessing and/ or managing health records. All participants were recruited directly by the research team through emails and calls.

Two sets of FGD guides were developed, one for each participant group – the provider and the user. While both FGD guides shared common themes such as perceived

Table 1. Description and Distribution of Participant Groups and Data Collection Methods

Group	Description	No. of Participants	Data Collection Method
Hospital Personnel	Hospital personnel with at least one year of work experience	13	Stakeholder Consultation
Healthcare Administrators	Healthcare administrator with at least one year of work experience	4	FGD
Patients	Patient with at least one dealing in a healthcare facility	4	FGD
Total		21	

benefits, challenges, and data security, among others, there were also thematic questions distinct to the participant group. The FGD guide for healthcare administrators covered aspects such as integration and interoperability, whereas the guide for patients focused on the patient's journey and the prototype's usability. The data collection activities were conducted from August to November 2023, involving a total of 21 participants (Table 1).

With the verbal and written consent of the participants, the sessions were audio-recorded and later on transcribed. The recordings were destroyed immediately after transcription. The researchers used identification codes, ensuring not to mention any identifying details in the transcripts and reports. The data were only accessible to members of the research team sworn to confidentiality. All the excerpts used in the study were de-identified.

The data from the discussions were then analyzed using thematic analysis. Thematic analysis is an approach that extracts meanings and concepts from data by determining, analyzing, and recording themes, enabling researchers to make sense of shared experiences.[32] The researchers conducted preliminary coding through open reading of the transcripts from the FGDs, which were then refined through multiple rounds of coding and finalized through consensus. The themes were then situated in the extant literature and the context of the study.

Revision

The prototype was then revised based on the insights and recommendations gathered during the prototype validation phase. Several improvements were made to address the participants' concerns and suggestions.

Ethical considerations

The study obtained ethical approval from the University Research Ethics Committee (UREC) of Ateneo de Manila University. Prior to conducting the stakeholder consultations and FGDs, written informed consent was also collected. It was clarified to the participants that confidentiality and

anonymity will be maintained, and that the study is purely voluntary.

RESULTS

This section introduces the developed prototype of the Health Smart Card, encompassing its design, architecture, and flow. It then delves into the findings from the prototype validation and presents the revised prototype based on these insights. The final part outlines the limitations of the prototype.

Prototype

Proposed Scheme

The prototype can be understood through its two components: the Patient or Px ID and the HSC application.

Px ID

The Px IDs are PVC IDs where the QR code and other basic patient information are printed and displayed for ease of access. For this prototype, the proposed design of the Px IDs is illustrated in Figure 1.

Each card will be issued per user, and upon scanning the QR code, it will provide access to the following information:
a. PhilHealth ID (identifier);
b. PhilSys ID (if available);
c. Name;
d. Birthdate;
e. Picture;
f. Blood type;
g. Allergy history;
h. Emergency contact; and
i. Other basic pertinent information.

Should access to the patient's detailed medical records be necessary (upon QR code scanning), the patient shall consent to view, upload, and share medical records with the provider by mapping their profiles through the HSC application.

HSC Application

The HSC Application is a hybrid web and mobile application with use cases for patients and providers:
a. For patients, in either the web or mobile version of the app, users can view all their records as uploaded by their provider; whereas
b. For providers, in either the web or mobile version of the app, users can search for patients using the Px ID presented to them and upload patient records. Other information, such as consultation notes and the like, may be added to the upload.

System Architecture

The HSC system architecture, as shown in Figure 3, consists of four main components: Px Master Data, Provider Master Data, Px ID with QR Code Generator, and HSC Database. The HSC administration team will input, manage, and maintain the whole system (Figure 2).
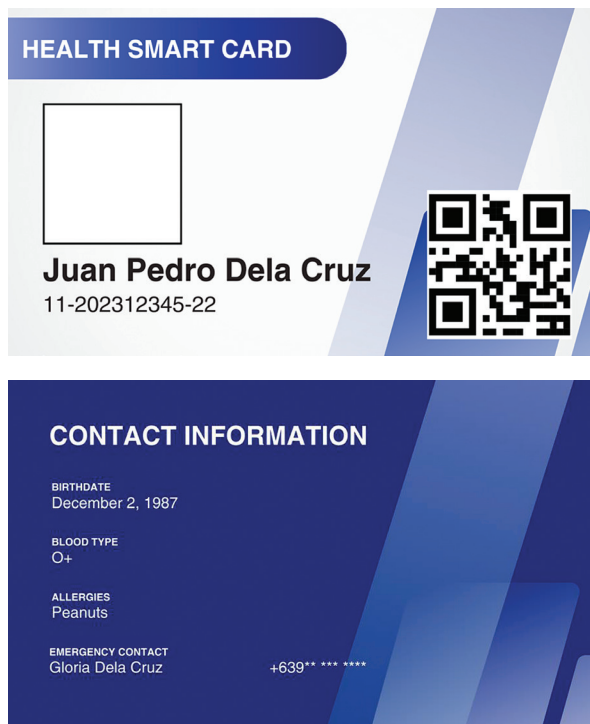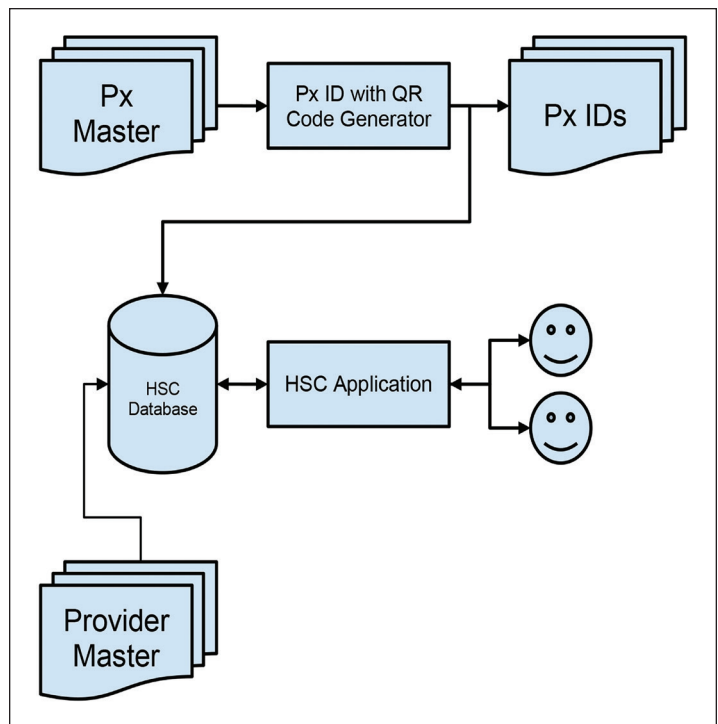

Figure 1. Px ID design.

Figure 2. HSC system architecture.

Px Master Data

The Patient or Px Master Data is the primary source of patients' information in the system. The proposed system is a closed system, which means the universe of patients (i.e., the patients allowed to use and interface with the system) is dictated by this source. The generation of Px IDs (and consequently the QR codes) also depends on this source. If a specific patient is not indicated in the Px Master Data, then he/she cannot be part of the system and use its features. The prototype accepts a CSV or XLS format for the Px Master Data.

Provider Master Data

Similar to Px Master Data, the Provider Master Data is the primary source of information for the allowed providers in the system. As a closed system, the system does not allow any providers not maintained in the Master Data to access or maintain information inside. The prototype accepts a CSV or XLS format for the Provider Master Data.

Providers are mapped to patients manually (through the HSC Database) or through the application itself, triggered by the patient. Patient information will not be visible to any provider until the provider is linked to the patient's profile. In this version of the prototype, access to the patient's profile is maintained and controlled only by the patient and the HSC administration team.

Px ID with QR Code Generator

The Px ID with QR Code Generator is a simple web-based application that automatically maps the Px Master Data to a unique QR code. This mapping is then transformed manually into Px IDs using any third-party graphics design tool.

HSC Database

The HSC Database stores the ingested Px Master Data and Provider Master Data into the various records between the patients and providers. The records are encrypted by default, ensuring data privacy. It can be laboratory results, prescriptions, medical summaries, and the like uploaded in image format (JPG, PNG, etc.) or document format (PDF, Word, etc.). This is done to minimize any encoding work on the side of the provider but still capture the information that usually comes in a document (either written or printed) format.

User flow

Patient User Flow

Users will be asked to provide their basic information, including their name, email, birthday, blood type, allergies, emergency contact, PhilHealth ID (required), and PhilSys ID (optional). Upon signing up with the HSC administration team, the users will receive their PVC card containing their unique QR codes and basic identification details. Once
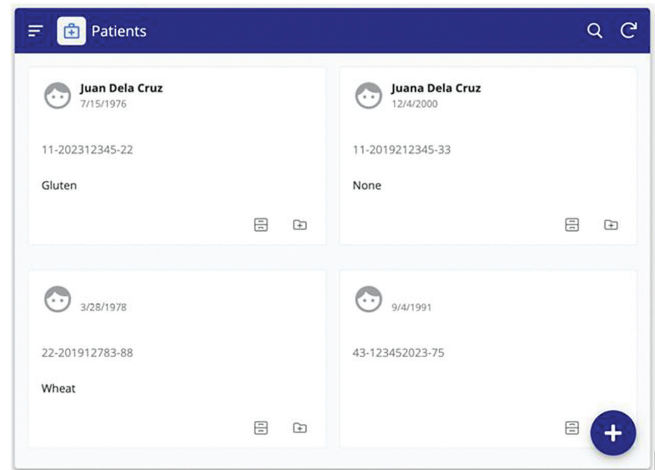

Figure 3. Example screen from HSC patient user interface.

signed up, the users may access the HSC app using any web browser or by downloading the mobile application. The users may log in using the registered email address and PIN/password they used to sign up.

Upon logging in, patients will see the following screen. In cases when the PhilHealth ID is mapped to more than one patient (i.e., when there are dependents), multiple profiles can be seen upon logging in (Figure 3).

In the app, patients can click on a card and view further information, including the following:

a. **People Detail.** This contains the basic information that was encoded upon signing up. The user may edit information such as allergies and notes at any time.

b. **Documents.** Various documents may be uploaded to a patient's profile. In this version of the prototype, these documents include medical summaries, lab results, and prescriptions. Patients and doctors can view and add documents. No deletion of records is allowed.

To add documents, patients/doctors must click on the plus (+) icon in the Documents sub-card, select the Document Type, and choose to upload an Image, File, or type in Notes. Once done, patients/doctors can click on the Save button. These features are illustrated in Figure 4.

c. **Px Providers.** This is a list of providers or healthcare professionals allowed by the patient to gain access to his/her complete medical records. When a provider is not on this list, he/she cannot access the patient's records. Providers are mapped to patients manually (through the HSC Database) or through the application itself, triggered by the patient. To add providers, patients must click on the plus (+) icon on the Px Providers sub-card and then choose the Provider's name (Figure 5).

When adding a new provider, a prompt will appear to confirm this action. This shall serve as a reminder that
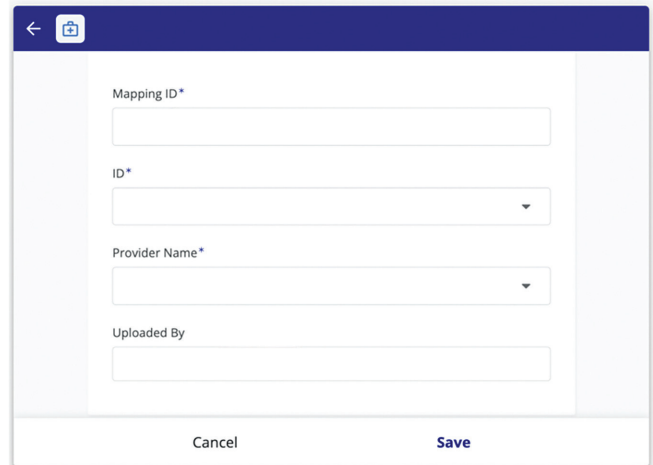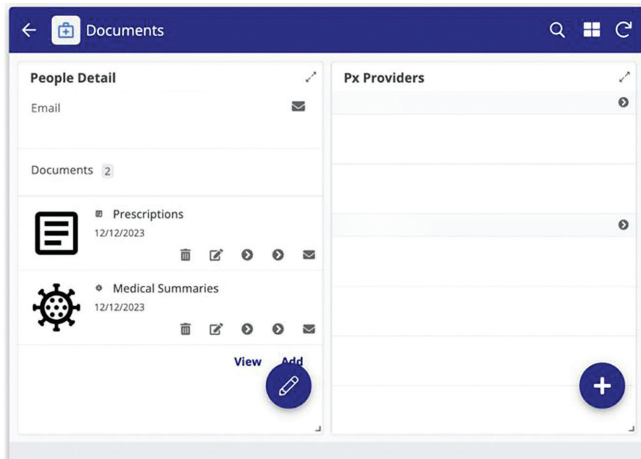
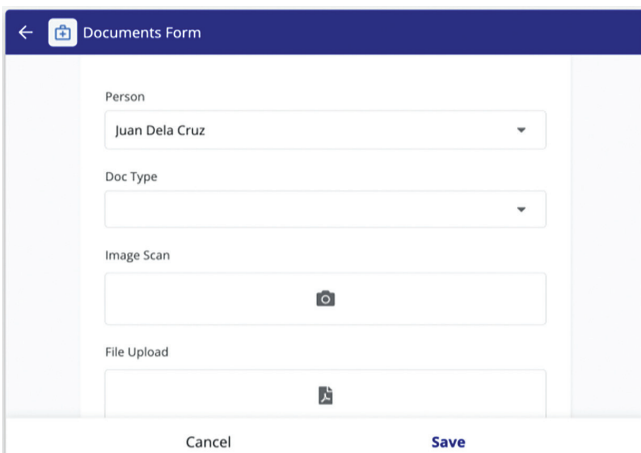**Figure 4.** Example screens from HSC patient user interface: Documents.

Figure 5. Example screen from HSC patient user interface: Px providers.

Figure 6. Example screen from HSC patient user interface: Addition of provider.

Figure 7. Example screen from HSC patient user interface: Deletion of provider.

by confirming, patients are consenting to give all added providers access to their existing and future medical records. The confirmation prompt can be seen in Figure 6.

Additionally, patients have the option to delete providers from their provider list. Once removed, the provider will no longer have access to the patient's records. They can only regain access if the patient adds them back to the list. This can be seen in Figure 7.

Provider User Flow

To create a profile, providers will need to provide their name, email address, and license number. Once signed up, providers may access the HSC application using any web browser or by downloading the mobile application. Providers need to log in using the registered email address and PIN/ password they used to create a profile. Upon logging in, the provider will see the Patient Records View page. If a provider is a new user to the system, they will not see any records yet. As patients link their profiles to providers through the application, the page will be populated by the patient cards. Providers can click on a card and view further information (Figure 8).
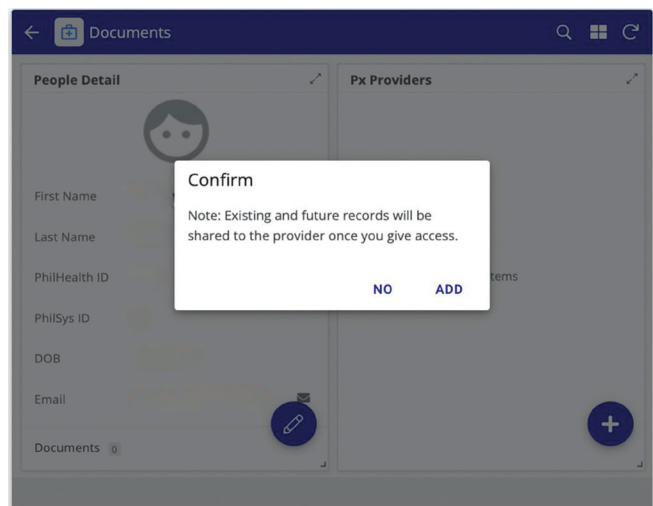
Figure 8. Example screen from HSC provider user interface: People Detail.
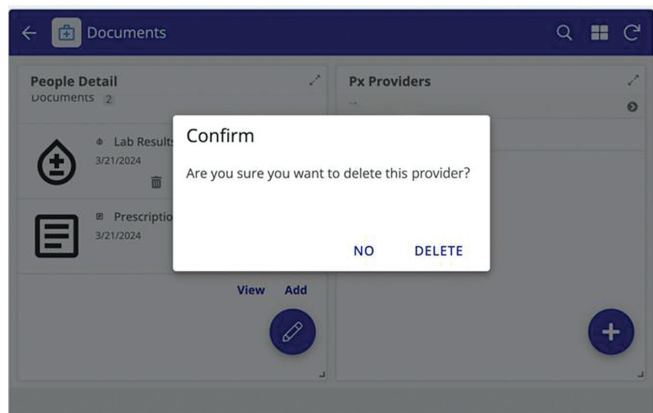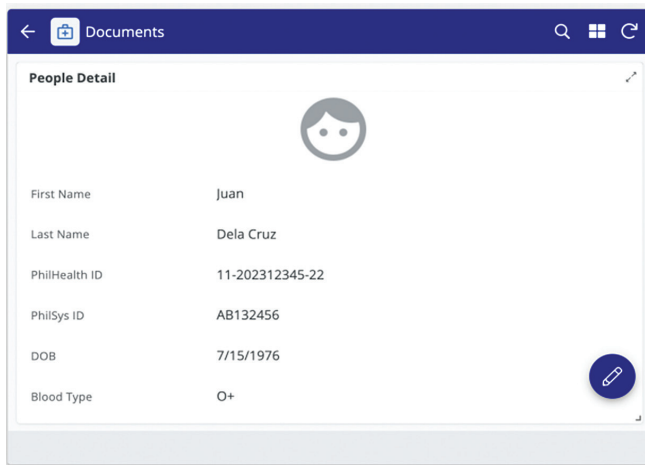
Prototype Validation

This section maps out the patient journey through the lived experiences of the patient group and discusses the insights or feedback of participants on the prototype, identifying relevant challenges and opportunities.

Patient Journey

In the current healthcare system in the country, the patient's experience in accessing their medical records is fraught with challenges. The traditional method, which primarily deals with paper records stored by healthcare facilities, is found to constrain the accessibility of patient records. This is most notable when compared with the use of electronic health records. *"The [teleconsultation] platform is the one that booked the schedule of my blood test and X-ray. So, when I went to the facility, I was no longer asked for any records. All my details were there,"* a participant shared. The short wait time and fast turnaround time for results were cited as advantages of electronic medical record-keeping and, consequently, the limitations of the traditional method.

Another significant limitation of the traditional method is its impact on both intra- and inter-hospital transfers. Navigating the hospital requires the patient to go from department to department to get their records in the absence of a centralized record-keeping system. It becomes even more challenging when the patient consults a hospital different from their frequented facility, often being required to obtain copies of their documents from the previous hospital for comparison. Inter-hospital transfers require patients to pay transportation expenses and charges for additional tests, forming part of healthcare costs that patients are made to bear. Participants jointly raised the issue of having to pay to get a copy of their own medical records, such as medical certificates and lab results. This burden is especially heightened for financially marginalized patients.

Aside from accessibility, paper records also raise concerns about accountability. One patient recounts their experience with a family doctor, underscoring the absence of transparency in their own records. *"Our personal records were filed through index cards. [We don't] have access to what it looks like, what is written on the index card, what is being referenced,"* they shared.

Nevertheless, an important consideration that emerged was the patient's perception of comfort, which was found to be inextricably linked with trust. In the traditional system, patients' level of comfort and confidence in the upkeep of their data is dependent on how much they trust their healthcare provider. With no direct access to their data, patients resort to creating their own records. A participant shared how they write the information for every consultation in their personal notebook, which they always bring with them during medical appointments.

All these hinder patients from reaching optimal health outcomes and bar them from making quick, informed decisions about their health. At best, these obstacles inconvenience patients and take time out of their days. At worst, however, delayed retrieval of information can be a matter of life and death. Hence, the proposed scheme seeks to provide a solution approach encompassing these issues by developing an integrative tool that stores all of the patient's medical data.

Challenges and Opportunities

Interoperability

A primary concern shared by both healthcare administrators and patients is the interoperability of the proposed health smart card. As one healthcare administrator explained, *"There are prerequisites to the interoperability of getting data, which, if not resolved, may not make the endeavor worth the cost."* Participants raised concerns over how to migrate existing records into the health smart card and emphasized the importance of harmonization. Healthcare facilities use different standards in terminologies, naming conventions, file formatting, and even technologies that first need to be harmonized to create an interoperable environment for the proposed health smart card.

This harmonization effort– expressed as long overdue– is integral in making the proposed project possible. This initiative necessitates training and capacity-building for healthcare providers, including healthcare practitioners, hospital administrators, and patients. Many of the patients' concerns revolved around how to use the card, the work they had to put in, and its accessibility in remote areas where internet connection may not be available. On the provider side, they stressed the preparatory work involved in creating an interoperable environment, which includes devoting entire teams to harmonizing standards and even the inclusion of proper coding in the curriculum of medical schools.

There is, however, an acknowledgment that the transition period will be long and arduous: *"It is very difficult to change to another level when people have become used to it."* Fundamental to this transition is the perceived regulatory role of the government, especially in harmonizing the standards to follow and the platforms to use. However, even with the existing EMRs, participants noted the government's inability to fulfill this role.

In light of this, patients and healthcare administrators have taken it upon themselves to establish initiatives with similar objectives to the health smart card. Patients shared how their patient organizations have worked on comparable projects to store their data on one device for ease of transfer among facilities, such as creating portable devices and applications that store patient data. Patients expressed their preference for having a tangible item that stores their data. A participant emphasized, however, that such projects can only be fruitful *"as long as we can get the government on board."* On the other hand, healthcare administrators who are carrying out similar projects expressed that they *"cannot wait for the government."* Participants shared how private and community organizations have started their own projects and secured the buy-ins of equipped hospitals. Adoption, however, has been relatively slow. According to one healthcare administrator, *"There is a need for complementation of benefits, especially since private institutions are moving on their own."*

The existence of similar projects demonstrates the relevance and acceptability of the proposed project. The perception of the prototype among all groups of participants was largely positive. Its usefulness to patients is underscored, especially among those who frequently travel and/or seek care from different healthcare facilities. Participants also expressed optimism about the potential of the project, suggesting that the implementation can leverage existing standards, such as the American Medical Association Current Procedural Terminology (CPT), International Classification of Diseases 10th Revision (ICD-10), and Health Level 7 Fast Healthcare Interoperability Resources (HL7 FHIR), in harmonization efforts and creating an interoperable environment. Once standards are in place, *"It should be the facilities adapting to the system, to the standards."*

Data Ownership

A main point of contention in data sharing is the question of who owns the data. With the prototype aligning itself with patients owning their data, healthcare administrator participants cautioned about differing views from healthcare providers, especially doctors. As one participant explained, *"There may be resistance as practitioners want to keep some level of data within their control."* Among the reasons why healthcare providers prefer to keep the data is to use it for data mining, using patient data and comparing them over time to determine trends and patterns.

Nevertheless, several government initiatives have sought to make data more accessible to patients. A cited example was the Department of Health's Hospital Health Information Management Manual, which lists management standards that hospitals must adhere to. According to the manual, information may be released to patients. Barriers, however, remain. As one participant stated, *"Doctors do not want to share information. The Memo [does] not have the precision to articulate which information can be released. The doctor's notes or assessments are not disclosed."*

As such, the issue still goes back to the healthcare providers' refusal to share data. *"The main barrier is that access to historical [patient] data creates friction,"* stated one healthcare administrator. This opposition stems from the fear that their patient may take the data and consult with another doctor, losing them their patient. A participant also added, *"From the medico-legal point of view, the hospital holds part of the data."* Healthcare providers may be compelled to keep patient data within their purview to avoid potential medico-legal risks from having other parties perusing their notes. All these prove to be a significant impediment in granting patients access to their records and consequently in bolstering the acceptability of the proposed health smart card project.

Nevertheless, it is notable that all participants stated that patients should own their data, forming a consensus. The project helps advance this position not only by increasing the accessibility of data to patients but also by empowering them to make decisions regarding their own health, including choosing their providers based on comprehensive information on their health. As one healthcare administrator articulated, *"[The patient] owns the data, never the hospital. Whenever the patient demands the data, then it should be provided."*

Data Security

Central to discussions on electronic health records is the topic of data security. A concern immediately raised during the discussion is the security of the platform to be used. As one patient said, *"It pays to know where and who exactly has access to it."* For paper records, security is linked to the patient's trust in their healthcare provider, which they see and communicate with in person. This element is lacking in electronic health records, leading patients to be more cautious. Healthcare administrators similarly exercise extra vigilance. As one participant explained, *"People are careful because vulnerability expands in a shared network, which may affect the entire hospital system."*

Participants inquired about the project's alignment with the Data Privacy Act of 2012, which seeks to protect personal data in information and communications systems. On the other hand, hospital personnel shared concerns over providing patients complete access to their records, noting how it may cause unnecessary worry. They also raised the issue of how some data are only meant to be seen and interpreted by other healthcare professionals. These divergences tie in with the issue of data ownership and in determining with finality who has the decision-making authority in the provider-patient relationship.

Healthcare administrators are, however, optimistic that the proposed project can serve as a mechanism for minimizing fraud, waste, and abuse. Participants cited instances of fraud and waste in data use *"simply because some patients are not able to get their test results."* One participant added, *"There are doctors and hospitals who exhibit fraudulent, wasteful, and abusive charging behaviors."* In light of this, healthcare administrators note the importance of Know Your Client (KYC) compliance, as *"There are many opportunities to misuse the data if you are unsure [if the data holder] is in fact the data subject."* Finally, participants recommend having more robust cybersecurity practices, including risk and threat assessments, and tabletop discussions before implementation to minimize the risks and reservations of intended users.

Scalability

Another notable issue raised is the scalability of the proposed project. Echoing previous responses, the involvement of the government is fundamental to the project's scalability. However, most participants expressed doubt whether the government will step up to take on this task. *"We don't see the government understanding their role– the regulatory role,"* a healthcare administrator expressed.

Participants also stressed the primacy of fixing the foundation, going back to the need for an interoperable environment. As one healthcare administrator articulated, *"If problems on interoperability exist, then I don't think it's going to be worth the cost– unless storage, marketing, and infrastructure concerns are addressed. We have to fix the foundation."* Furthermore, resistance from healthcare providers may prove to be a barrier to scaling up the project.

Nevertheless, participants are hopeful to get the project off the ground. Many shared suggestions on how the project can be implemented. One healthcare administrator suggested an alternative to physician resistance, *"On a small scale, sharing of laboratory results which will not go through the EMRs may work."* This suggestion circumvents the hesitance of healthcare administrators to share their notes. Furthermore, patients and healthcare administrators alike share the sentiment that the project can be carried out on a smaller scale.

Participants displayed keen interest in implementing the project on a more community level, spanning barangays within a municipality and/or city. For local-wide implementation, a patient participant suggested conducting advocacy activities to gain the buy-in of the local government. For national-scale implementation, a healthcare administrator noted the importance of a *"concrete plan conducted at the national level with a multi-year map [and] clearly delineated responsibilities."*

Funding

The question of who would finance the project was naturally raised. Acknowledging that the project– still in its infancy– requires several massive and potentially costly steps, the final theme that emerged in the analysis is funding. Notably, both groups of participants inquired, *"Who will pay for this?"* Tied to this is the question, *"How will this be a sustainable project?"* A participant immediately flagged potential reluctance from hospitals to pay for the project, articulating how hospitals will ask, *"What's in it for us?"*

Automatically assuming that users will shoulder the fees, a patient inquired about how much application to the project would cost. Patients found the initiative project and demonstrated a willingness to pay for it but were simultaneously worried about shouldering too high of a fee. In contrast, healthcare administrators were entirely against the idea of imposing a user's fee, citing the possibility of inequity, *"with only those with the capacity to pay [having] access."*

Rather than the user, healthcare administrators suggest that PhilHealth should instead serve as the payor. As a government-owned and controlled agency, PhilHealth is seen to be in an ideal position to implement the project and ensure its integration into healthcare facilities. Integral as well is PhilHealth's ability and mandate to reach the indigents and marginalized. Nevertheless, the same concern about whether PhilHealth would step to the plate remained.

Prototype Revision

The prototype was revised based on insights gathered from the stakeholder consultation and focus group discussions. Specifically, adjustments were made to accommodate the potential lack of internet connectivity, particularly in remote healthcare settings, as highlighted by the participants. For use cases where internet connectivity is intermittent or absent, the mobile version of the application will enable offline access.

Upgrades to the prototype were also implemented to ensure the confidentiality of sensitive medical records, a significant consideration that emerged during the consultations. Patients might be reluctant to participate in the proposed project if required to bare the entirety of their data to their provider, especially those with sensitive medical records such as HIV/AIDS and mental health conditions. A suggestion put forward is to allow patients to limit the records accessible to their providers. As such, a private tagging feature was implemented in the prototype.

Providers can click on the Add button, select the document type, then either take a photo or upload a file, type in text into the notes field, and tag the document as private or not. The patient or the attending provider can identify whether a document can be tagged private. With this new feature, private documents are only viewable by the patient. This aligns with the project's goal of empowering patients to take charge of their health. The private tagging feature is seen in Figure 9.

Administrators and healthcare professionals also raised the issue that there are pieces of information only meant to be accessed by the provider, not the patient. Hence, a confidential notes feature was added to the prototype. With this, individual providers can maintain confidential notes identifiable by their patients' names, viewable only to them. This also addresses providers' hesitation to share their notes
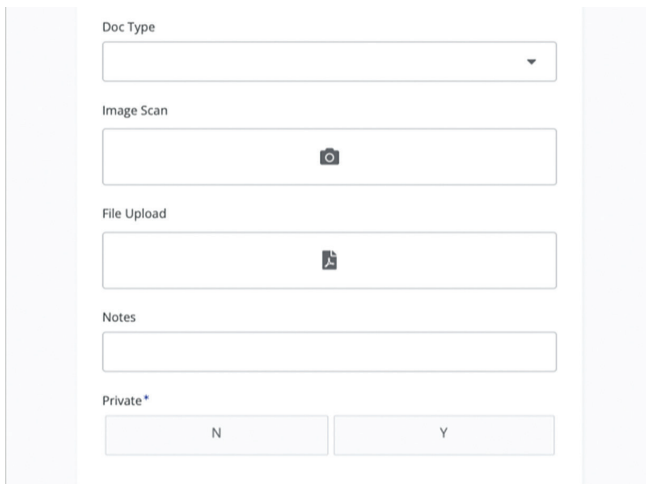
Figure 9. Example screen from HSC patient user interface: Private tagging.
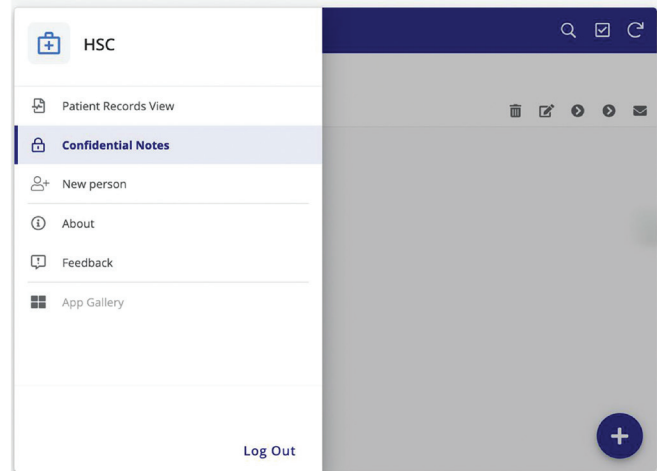

Figure 10. Example screen from HSC provider user interface: Confidential notes.

and have other parties poring over them. A similar feature is available for patients, where they can store private notes and documents only viewable to them (Figure 10).

Limitations of the Prototype

Despite the revisions, there remain four main limitations to the prototype:
1. The current prototype accepts all inputs, and no standard terminology is being used.
2. Provider's access to patient records is not time-limited. Once a provider is mapped to a patient, the provider retains access to all medical records of the patient, even after the consultation, unless the provider is removed from the patient's provider list.
3. Installation of the mobile version of the prototype is currently done through the AppSheet mobile application. Upscaled implementation may include the purchase of AppSheet licenses.
4. For simplicity, the database used for the prototype is Google Sheets. At a later time, this can be upgraded to use Cloud SQL or similar database services.

DISCUSSION

Who really owns your data?

Reconciling the issue of data ownership proves to be a significant prerequisite in advancing the proposed project. This requires an admittedly radical shift from the current provider-centric model. Nevertheless, advancing healthcare innovations requires taking a firm position. Ownership determines the ability or legal right to exclude others from using the property in question.[33] It also implies the explicit right to possess the property, which entails the ability to control, use, make a profit, or even destroy it.[34] However, this concept becomes muddled when involving incorporeal ownership such as data. At present, the debate over patient

data ownership remains unsettled. Hall and Schulman articulated this debate by asking, "Who owns medical information? The one who gives care, receives care, or pays for care? All of the above? None of the above?"[35] Presently, the answer varies depending on who you ask. Resolving this matter, however, is integral to addressing ethical and practical issues surrounding health data access.[36]

As providers of care and collectors of data, healthcare institutions tend to view patient data as their property.[37] This explains the reluctance of healthcare providers to share data with other parties, even with the patients who were the source of these data. In several instances, patients are required to pay to acquire this data, and even then, the copy they are given reflects limited information. As evidenced by the present findings, healthcare providers are hesitant to share data with other healthcare providers for many reasons, including the fear of being 'corrected' or losing a patient. It is however argued that healthcare institutions are simply 'data custodians', exemplified by how data use outside the institution requires patient consent.[37] Meanwhile, the government is conferred the role of regulating the process of sharing patient information, controlling who can view and receive such information.[38]

Over the years, the patients' clamor to own their data has grown steadily. This insistence has escalated in light of the emergence of big data in health care, which has presented challenges to the privacy, security, management, and control of patients' personal data.[34,39] At present, patients cannot see the complete picture of their health, with their data dispersed across healthcare facilities. Patient data proves challenging to 'propertize' as it carries both clinical and personal valence and may include sensitive information about third parties.[40] The present study argues that it is precisely for these reasons that patients must own their data. It further posits that reasons often cited to complicate the issue of patient data ownership inadvertently strengthen the position of patients in this

longstanding debate that poses a challenge to health policy.[41] Real-time access to their data improves patient outcomes, providing them with a complete picture of their health, choices, habits, and risks, which consequently inform their medical decisions and health management.[42] Aligned with the present findings, patients owning their data is especially beneficial for those with chronic illness, enabling them to track their diseases alongside their providers and potentially seek early interventions in times of need.[43]

To shift or not to shift?

The current state of EMRs offers an insightful glimpse into the potential of the health smart card, with smart card implementation providing patients with electronic medical records containing their complete medical information, ranging from immunizations to laboratory test results.[44] First developed in 1972, EMRs are expected to serve as drivers in the transformation of healthcare.[45] Its potential benefits are measured against the pitfalls of paper medical records, which were found to be costly to maintain and offer incomplete information. It is important to note that the preference to replace paper records was not merely viewed as a matter of convenience but also that of life and death. Laboratory tests and diagnostic study results are oftentimes kept in repository systems separate from the patient's medical record.[46] Such delays in retrieval and fragmentation of records may lead to ill-informed critical medical decisions. In contrast, retrieval of information from EMRs is considerably faster, proving to be especially crucial in emergencies.[47]

However, evidence supporting the perceived superiority of EMRs is scarce. There remains a gap between the potential benefits and actual proof, with several studies demonstrating no change in patient communication and satisfaction.[48,49] In low-resource countries especially, there is little evidence that EMRs positively impact the quality of health data,[50] especially with numerous barriers to EMR adoption such as absence of infrastructure, standards, management commitment, interoperability, and support.[51] For many healthcare institutions, the supposed shift to EMRs has not led to its complete adoption but rather a dual documentation practice that utilizes both paper-based and EMR systems. This has led to poor quality of EMR data.[50] Furthermore, the acceptability of EMRs remains mixed. The implementation of EMRs incited major disruptions in established clinical practices,[52] forcing clinicians to perform new tasks. Clinicians tend to disapprove of EMRs for disrupting their workflow and allegedly wasting time that could otherwise be more productively spent on patient care.[53] This resistance is consistently echoed in the present findings, making it an essential consideration for the researchers to optimize the acceptability of the proposal to clinicians, ensuring that both patients and providers benefit from the project.

Nowadays, numerous public and private healthcare facilities in the Philippines are moving towards the adoption of EMRs at different scales.[26] The DOH has further supported the integration and expansion of EMR systems through the PeHSFP 2014-2020.[25] While these ongoing initiatives offer a conducive environment for the establishment of a health smart card, the present findings suggest the need to create an interoperable environment across systems. The study strongly advances for a nationwide harmonization of standards among healthcare facilities, including terminologies, naming conventions, file formatting, etc.

Aligned with the digitalization of healthcare advanced by the DOH, healthcare providers, including professionals and administrators, must be taught and trained in understanding and adopting EMR codes and practices. However, capacity-building must be two-way, with patients sufficiently educated on EMRs to prevent furthering information asymmetry and contribute to patient empowerment. Furthermore, noting the current activities of private groups, it is highly recommended that the private sector be engaged in moving forward with the proposed project. Future enhancements may include merging the patients' records with their medical insurance data.

The dangers of digitalizing a nation

More than implementation gaps, a necessary consideration before undertaking the proposed project is the implications of digitalizing a nation. Defined as the integration of digital technologies into public health operations, digitalization is not limited to a mere change in technologies but rather involves changes in organization and culture in broad strokes in order to meet newly established public health goals.[54]

A critical factor to account for in any information systems implementation is resistance to change. Resistance is high prior to implementation and is directed toward the significance of the proposed system, the proponents, or the innovation itself.[55] This resistance was present prior to the execution of the health smart card project in Taiwan. In 1998, the project received harsh criticism from its citizens for its potential violation of privacy. The slack privacy protection laws in the country drove the public to question how their rights would be realized under the national initiative.[56]

Such resistance is not unique to smart card innovations but is elicited by national computerized identification schemes. Citizens were reasonably wary of giving the government unprecedented access to their personal data in fear of potential abuse or misuse.[57] This fear was not unfounded. In 2016, Philippine electoral records were breached, exposing the personal information of more than 50 million Filipinos.[58] In critiquing the National ID system, the Foundation for Media Alternatives posed a critical question, "If [the government] is incapable of protecting a voter registration database, how can it be expected to fare better when handling a bigger and more complex system?".[58] The same question applies to the proposed electronic health database.

Further, the digitalization of health ushers in anxieties over an increasingly surveilled world. A primary danger

linked to smart card initiatives– which inevitably involve the creation of a comprehensive database of integrated personal information of the population– is the possibility of dataveillance.[56] Defined as the systematic use of personal data systems to monitor the communications and actions of individuals,[59] dataveillance is a particularly touchy subject in the Philippines. With the government's track record of cracking down on its critics and dissenters, it is reasonable for the public to worry that the resultant database from the proposed project may be weaponized for state profiling.

The project shall ensure the security of the overall system and users' data before implementation. An immediate recourse offered by the project is its focus on health, non-inclusion of information such as address and contact details, and requiring a unique PIN upon logging in. Nevertheless, the researchers acknowledge that health data carry a certain degree of personal valence that proves risky amid intensified surveillance. Evidently, there is a need to fortify data security. Before implementation, the system or prototype shall undergo vulnerability assessment and penetration tests to ensure its security against cyber attacks. Moreover, building upon the Data Privacy Act is an essential step; however, more has to be done at a national level.

Finally, digitalization also ushers in information asymmetry between those who generate data– in this case, patients– and those who control the data: the state, platforms, and corporations.[60] The asymmetry, however, does not simply end here. There also exists a divide between those with smartphones possessing digital literacy and those without.[61] Despite the prototype's offline feature, hasty implementation of the project without considering the extant digital divide will further isolate those without access to smartphones and digital technology, who are likely the same underserved population facing the brunt of health inequities. This socioeconomic dimension must, therefore, be accounted for in executing the project, ensuring that the projected nationwide implementation will leave no Filipino behind.

Limitations of the Study

The study faces several limitations. Primarily, the hospital personnel and healthcare administrators are exclusively drawn from private hospitals. As such, the absence of representatives from government healthcare facilities may restrict the study's ability to encompass the full range of viewpoints and experiences within the healthcare sector. Additionally, the qualitative nature of the study may limit the generalizability of the findings. Nevertheless, the study serves as a pioneer study on exploring health smart card in the Philippines.

CONCLUSION

The study makes a case for the development and adoption of a health smart card. Currently, patient records are largely inaccessible to patients, constrained by long wait times, slow turnaround periods, difficult intra- and inter-hospital transfers, and lack of transparency. The proposed scheme seeks to address this by developing an integrative tool that stores all patients' medical data, enabling them to access their own records easily. The prototype was widely received by the participants. However, concerns around interoperability, data ownership, security, scalability, and funding remain. Interoperability across different healthcare facilities emerged as a major challenge, highlighting the need for harmonizing standards and technologies. Findings also underscore potential resistance from healthcare providers on losing 'ownership' over patient information. Other concerns such as EMR adoption and the dangers of digitalization similarly have to be considered. The government is urged to step up to the critical role as regulator and funder of the proposed health smart card project. Moreover, they have an imperative role in driving the conversation on incomplete EMR adoption and tackling the fear of potential abuse, dataveillance, and worsening digital divide to ensure that the public's best interests are upheld. Finally, the developed prototype has to undergo pilot implementation to comprehensively demonstrate and analyze the features of the scheme. Key issues around usability and scalability will need to be considered. Experience, insights, and best practices from the pilot implementation are critical in developing the prototype further and strengthening the case for its adoption in the Philippines.

Statement of Authorship

All authors certified fulfillment of ICMJE authorship criteria.

Author Disclosure

All authors declared no conflicts of interest.

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