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Improving Health Care Delivery in Ghana: A Need of Urgency for NHIS Card Upgrade

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ABSTRACT

Over the years, health care delivery has improved tremendously through the introduction of National Health Insurance Scheme (NHIS). With this scheme in operation, continuous ways of improving the health care delivery to people is sought and has provided a viable source of funding to the health sector. Under the scheme members are expected to identify themselves as they visit health post for health care service. If an individual register under the scheme, that person will be given a card which can be used to seek treatment in any hospital in the country. When that person visits a health facility with the card, that individual is treated and offered the services that are signed for without that person having to pay for anything – unless an extra service is requested, like a private ward. The bills are then sent to the scheme provider (district, private scheme or mutual scheme) which then pays the money to the hospital. The card can be used to buy prescribed drugs at accredited pharmacies or licensed chemical shops without payment at the point of service (the pharmacy will contact the service provider to take its money). The NHIA has improved its systems as it has upgraded to the use of the NHIS Cards to biometric cards. These cards are meant to hold a members' biometric information and can only identify that particular individual. This research seeks to look at adding a member's medical records and provide a special security mechanism for accessing such records or data from the card. If this is implemented on a wide scale, a subscriber will have little to worry about his/her missing folder, while doctors and nurses will easily track the medical history of a patient, if that patient is unable to talk.

Keywords: Cloud Management: Ghana NHIS, biometric cards, NHIS Cards, smart card.

I. INTRODUCTION

Health care as defined by the world health organization is the provision of western medical service for a patient who has been taken ill and needs such medication to resume full normal state of mind. Health Care delivery is important to any developing nation and Ghana is no exception. This is because a healthy citizenry add up to the production charts through their work and tax payment. Most African nations do their best to provide good health care for their citizens. They need a healthy citizenry who can help to produce as a country and to meet the global challenges of its increasing demand.

The roots of medicine in Ghana dates back in the 16th century, where village dwellers would consult herbalist for their sick relatives or friends for herbal remedies. These herbal medicines have help in most cases but there has been suspicion that most of these healings has spiritual and physical aspects. When herbal medicines are applied on a sick person and the person is not healed after some time, it is assumed the individual has something to do with a spiritual being who might have place such sickness on that person. Christian missionaries started introducing western medicine to the Gold Coast when they started sailing to its shores.

With the introduction of the western medicine into the country, the nation started experience a new health care system that has changed the face of medicine in the country. It turns to create various units to manage health related issues that late turned out to be sanitary working system that looked at the causes of such sickness even before they occur and help individuals in places deem venerable. The sector continued to see improvement till the 1880s, when a Medical Department was formed, which brought about the introduction of formal medical system. This medical system consists of a Medical branch (hospitals and clinics) a laboratory branch for research and a sanitary branch to help educate the public. The sector however saw a major reform after the World War II with organizations such as the United Nation and the World Health Organization providing assistance and support to help improve the health care delivery in Ghana. [1]

II. LITERATURE REVIEW

The government has been the sole health provider in the country since the inception. Private Non-governmental Agencies (NGO) have helped in their own capacities but administration of health needs is done by the government under the auspices of the Ministry of Health and Ghana Health Service.

According to the Ministry of Health and Ghana Health Service, there are five levels of health providers. The first primary level is the health post, which is mostly found in the rural areas. Then there are health centers and clinics which are also found in rural areas but can carry out medical services that cannot be found at the health post. There are also the district hospitals, regional hospitals and tertiary hospitals. These hospitals are with higher ranked because they usually have more sophisticated workflows of medical services. All these levels are funded by the government, donor-pool health fund, internally generated fund, financial credits and donations from philanthropic organization or persons. [2] There are some for-profit clinics, but they provide less than 2% of health care services run in the district, regional and tertiary hospitals.

Provision of health care in all these hospitals is variable as urban hospitals (district, regional and tertiary) turn to have better equipment and services across the country. The challenge here is that rural dwellers often have no modern health care. Persons who might fall sick in such places might have to fall on traditional herbal medicine or travel great distances for medical care. Ghana spent 6.2% of GDP on health care, or US$30 per capita in the year 2005. Of that, approximately 34% was government expenditure.[3]

III. NATIONAL HEALTH INSURANCE SCHEME

Health has been an important aspect to every government since that sector seem to help successive governments decide on how well to invest its resources. The National Health Insurance Scheme has witnessed sharp increase in membership and more people now access most medical facilities for concerns about their health. [4] This increase has brought about a number of challenges which are addressed to some extent but much more needs to be done. With reference to healthcare providers, they complain of reimbursement delay and workers not adequately compensated for the extra hours they are being forced to work.

Research carried out by health economists; suggest a major challenge disclosed by healthcare workers was a delay in reimbursement. Providers were not paid on time, in some cases for as long as 6 months. But the National Health Insurance (NHI) Act (650) stipulates that providers should be reimbursed four weeks following the month for which claims were submitted. The main reason for the delay in payment was identified to be the inability of the National Health Insurance Authority (NHIA) to provide funds for payment. The NHIA seems to be overwhelmed with the amount of claims submitted by the various health care systems for payment. But other reasons that could result in delays in payment included inadequate and incompetent staff in the facilities who were responsible for the submission of claims. Contentious claims between the facilities and the DMHIS could sometimes result in delays as well. Due to the delay in reimbursement, providers were unable to procure drug and non-drug supplies for the smooth operations of the facilities. [4]

Some providers perceived that the introduction of the NHIS had led to service abuse by the insured. The insured frequent the facilities with minor ailments and even attend to collect drugs for their uninsured relatives and friends. Some insured clients even offer their insurance ID cards to the uninsured for a fee to use to access health care. The high attendance and perceived service abuse by the insured had led to an increased workload for providers. Providers experience long working hours with little or no break times. However, providers were not motivated enough by the NHIS and government to compensate for the heavy workload experienced. Some insured patients also complain of having being turned away and longer waiting times because the provider chose to prioritize those who were ready to pay in cash over them. Other problems identified included inadequate logistics and human resources, limited space within the hospitals to cope with the increasing number of service users and "moral hazard" on the part of policy holders.

IV. PROPOSED SYSTEM

The proposed system design is to have a subscriber (patient/individual) data embedded in the chip or card. All his or her medical health record are kept on the same chip and later back up on a private cloud. In the event a patient shows up at any hospital, his history is quickly obtained through the slotting of the card in the card detecting device. Subscribers who are likely to misplace their cards can easily obtain a new card and have it synchronized with NHIA Private Cloud to buck up their records. Figure 1 shows the system architecture of the proposed system.

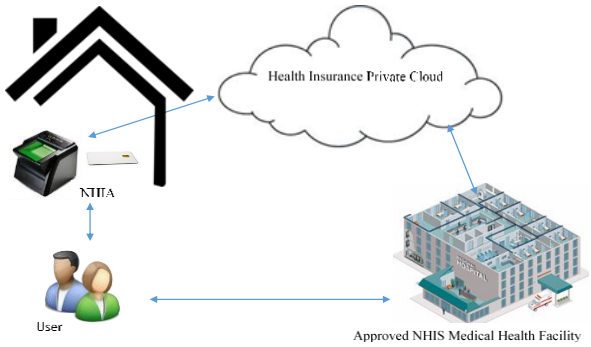

Figure 1: Architecture of Proposed System

4.1 The Smart Card System

A. The smart card system consists of the following major components: NHIS cards, the card readers for manipulation of the smart cards, the medical information systems that controls the operations of the card readers and the communication networks

that make the entire system work properly for medical services.

4.2 NHIS Smart BioCard

The NHIS card has an IC chip consisting of a CPU and 32 KB (103 bytes) of memory. The visible information on the NHIS card contains New NHIS logo, Ghana Coat of Arms, 8-digit member number Date (Date of issue of the card and Card expiry date), 8-digit card serial number, membership eligibility start and end date, and address ID: 13-character alphanumeric subscriber community code, and photo. [9] Currently the content inside a NHIS card can be divided into two segments: basic data and health insurance data.

This paper proposes two additional segments: medical data and public health administration data. The basic data segment stores the identification information for both the cardholder and the card itself. The health insurance data segment is comprised of the cardholder's insurance information and service data for insurance claims. The medical data segment will contain 4 KB of memory, and is used to record important physician orders, prescriptions and drug allergies. The public health administration data segment contains 2 KB of memory, and is used for recording personal data pertaining to public health such as vaccination records and organ donation notes.

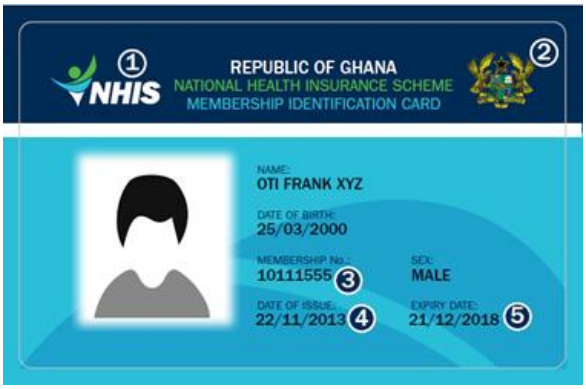

Figure 2a: NHIS BioCard front

ated to be data the h is usually a client of a medical information system or a standalone computer. The host computer can invoke a set of predefined application programming interfaces (control software) to operate the reader and to manipulate the data in the NHIS cards.

Each card reader would be equipped with a unique security access module (SAM). Security Access Module or Secure Application Module is based on Smartcard Integrated circuits (IC) and is used to enhance the security and cryptography performance in devices, commonly in devices needing to perform secure transactions, such as paying terminals. [10] Since the data on the card is sensitive, the card reader when powered on, must perform an authentication test on its SAM against NHIS Private Cloud/database. Only after successfully passing the test, can the card reader work properly.

4.4 Registration

To register with the scheme, subscribers go to the NHIS District offices or Regional Offices where they are asked for their personal information. Subscribers will go to this point only to give out their biometric information as required by the NHIA. Later on, as they visit their preferred health facility, their medical health record is put into the system and updated with NHIA Severs.

4.5 Medical Information System

A medical information system in general refers to a computer system that handles the workflows of daily medical services, facilitates the management of

financial, administrative and clinical data. The medical information systems here could be used to processes healthcare insurance claims as it links up directly to NHIS Private Cloud. Some hospitals in Ghana have developed their medical information systems. The changes to the workflows of medical services due to the introduction of NHIS cards with some medical data/record will likely affect their information flows, and hence may result in changes to such information systems.

According to the Ministry of Health and Ghana Health Service, hospitals are ranked based on their capacity and capability in providing the quality of health care. They are, from the lowest to the highest, health post, Health centers and clinics, district hospitals, regional hospitals and tertiary hospitals. Hospitals with higher rank usually have more sophisticated workflows of medical services, resulting in sophisticated information systems in such hospitals. The medical information systems in health post which are mostly found in rural areas are relatively simple since workflows there are straightforward. Thus, in this study we focused on tertiary hospitals, regional hospitals and district hospitals. We use ‘‘hospital’’ to refer to those three categories of the hospitals later in this paper.

These hospitals are characterized by the large volume of medical services and extensive use of computers. The proposed system will be very effective and efficient if these hospitals integrate NHIS card readers into their medical information systems so that the workflows of the medical services can be streamlined and the service time for a patient can be optimized. That is, the data required to be recorded in a NHIS card can be collected and made ready for transferal to NHIA Private Cloud with as little human intervention as possible.

4.6 NHIS Interconnection Networks

To facilitate the operation of the proposed system, most of the health providers (Health Post, Health Centers and Clinics, District Hospitals, Regional Hospitals and Tertiary Hospitals) the NHIS need to establish NHIS card Data Center (cloud) to manage and maintain the card database and a high bandwidth health insurance service network for connecting the card readers and data servers installed in hospital or healthcare providers. Smart Card readers are readily available in all District, Regional and tertiary Hospitals which can easily implement such system.

V. BENEFITS

Outline in this research paper are five ways in which the healthcare delivery in Ghana can benefit from upgrading to the use of smart cards for both NHIS and patient/subscriber medical information.

5.1 Enhanced patient identification

Real-time verification is a superior method for confirming the identity of an incoming patient, and smart cards can be highly reliable and secure identifiers. The cards can securely store various identity credentials (such as a PIN, photo, or biometric) on the card and make it very difficult to forge or steal the credentials. Besides these smart cards are buck-up in a secured cloud. A smart card can also support digital signatures, which can guarantee that information has not been modified. Smart cards therefore can represent a considerable barrier to medical identity theft and fraud.

5.2 Augmented administrative efficiency

Time and records are important resources for health facilities across the world. The time and resources required to admit a patient are critical measurements of hospital efficiency. Busy waiting rooms, thin staffing levels, language barriers, and manual transcription of important data from handwritten forms all create opportunities for error. Smart NHIS BioCard can decrease the time required for admissions by providing immediate access to accurate, up-to-date patient information from the cloud. Moreover, the set of information typically provided by the patient can be obtained through an online preregistration process and downloaded onto the smart card.

Additionally, admissions can be streamlined when patients use smart cards at unmanned booths, removing the labor element altogether. These

efficiency gains can result in lower costs, reduce errors, and improve the patient experience. [5][6]

5.3 Better medical records management

With the proposed system, medical records would be widely improved in the sense that, a patient's medical record is updated each time the patient uses the card being it at the pharmacy or the health facility. The card is automatically synchronized with the private cloud which has been set up by the NHIA. The challenge mostly occurs at the hospital where patient's record are created and entered into the system. There is a likelihood of human error been generated at this point as patients or health personnel's are in a hurry to write out information. Smart healthcare cards can significantly decrease the incidence of and expenses associated with duplicate record creation, improving both administrative functions such as billing and registration and continuity of care. [7] This can ensure comprehensive and accurate patient health and personal record.

5.4 Enhanced quality of care/service

One key benefit of using smart healthcare cards is a potential reduction in the number of medical errors and the quantity of duplicative medical testing. More than 195,000 deaths occur in the United States because of medical error, with 10 out of 17 medical error deaths each year due to "wrong patient" errors.[7] Smart cards can contribute to better care by authenticating the identity of the person receiving medical treatment. The ability to accurately link a patient to an institution's medical records potentially reduces the number of adverse events and medical errors that occur due to lack of patient information. With improve records and proper matching algorithms, much attention will now be concentrated on a patient's wellbeing at the health facility and thus improved quality of care [7].

5.5 Increased privacy, security and confidentiality

The Smart NHIS BioCard is in the possession of the patient, and the information being supplied by NHIS providers in an "approved" network (private cloud) with audit capabilities, these cards have better privacy and security well beyond the requirements of Health Insurance Portability and Accountability Act (HIPAA) regulations. The patient information on a smart card can be encrypted using robust standard cryptography methods that are extremely secure. Smart card technology can also reinforce internal hospital security systems [7].

VI. SUMMARY AND CONCLUSIONS

To make health care access and much more efficient to not only urban dwellers, the NHIA will need to consider setting up its own private cloud or virtual Private Network (VPN). The authority will need to upgrade its system to ensure that subscribers enroll with them, have their medical records reported at any health facility (at least the history of last five cases).

Smart cards issued as health provider identifications can provide secure, affordable remote access to patient health information via a range of devices. As a result, health providers can increasingly access information when/where they need it in a convenient, user-friendly manner.

The NHIA can also supervise secure remote authentication for providers. If there is one technology from the ICT sector that help will change the phase of the health care delivery in Ghana, then the smart card technology is one sure technology needed in Ghana's Health Sector.

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