The Utility of Biometric ID in a National eHealth System

An Essential Building Block to Facilitate Universal Health Coverage

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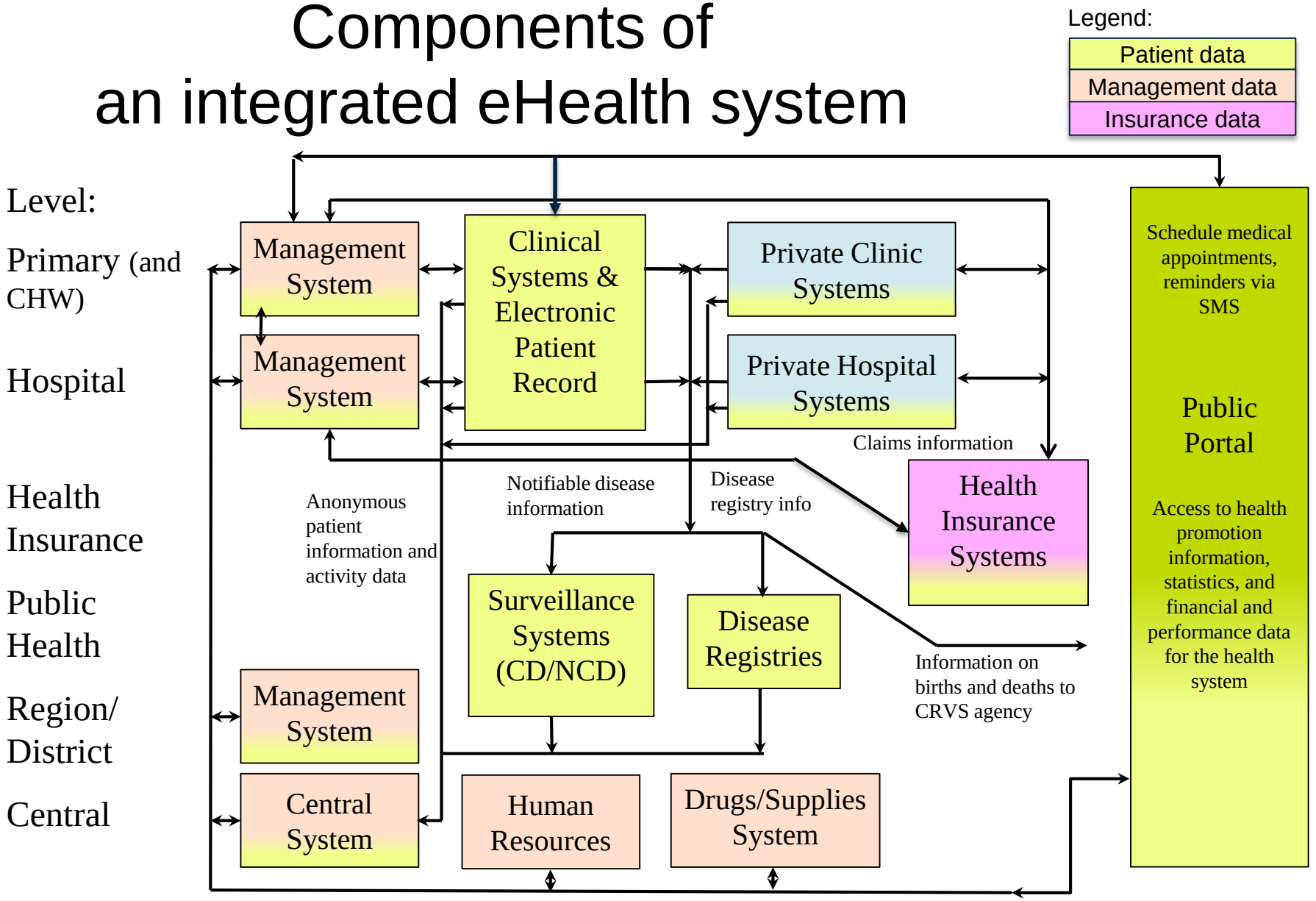
Objectives of a functional integrated e-Health system

- ✓ Patient-centered – the patient becomes the central subject of the system, including electronic health record, clinical decision support capability and a patient portal to provide access to their own health data and other functions;
- ✓ Integrated, responsive and flexible, providing real-time information;
- ✓ Interoperable with other systems, including those of the private sector and other health stakeholders such as health insurance funds;
- ✓ Used by all levels of the health system: primary care (including community health workers (CHW)), hospital care, public health and social services;
- ✓ Provide quality information at all levels that is reliable and timely;
- ✓ Respond to the strategic directions of the Ministry of Health to help achieve its short, medium and long-term health objectives
- ✓ Be both a clinical and management tool, that meets the needs of health care practitioners, administrators, managers, and directors

Components of an integrated eHealth system



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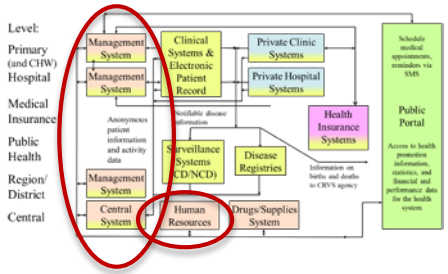
Rationale for using biometrics

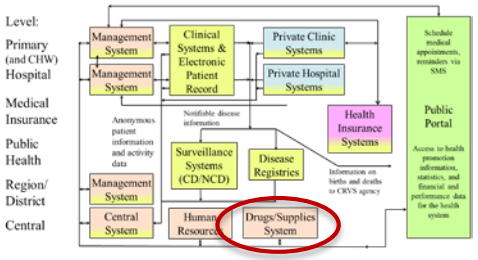
- Speed of access and ease of use leading to operational efficiencies
  - Biometric identification is easy to use and can quickly identify individuals
  - User do not need to be literate to utilize the technology
  - Biometric characteristics are generally stable over time
- Facilitate access in a secure way
  - Allows access to systems and physical locations and authenticate users
  - Allows the identification and authentication of those eligible to receive services
  - Provides permission to access personal information
  - Eliminates/reduces need for paper-based IDs
- Increase security and reduce fraud
  - Reduce the need for passwords that may be written down or forgotten
  - Increase privacy of personal information by reducing the need to disclose it
  - Allows access to information to be monitored
  - Positively identify those receiving services or coverage

Biometrics in management and human resources systems



- Access control to physical locations and resources
  - Authenticate and control access to facilities
  - Control/record access in restricted areas (OR, ICU, etc.)
- Access control to administrative systems
  - Positively identify those accessing or making modifications to systems
  - Provide audit trail for system updates and other modifications
- Reduce fraud and “ghost workers”
  - Guinea implemented biometric identification of civil servants (including in the health sector) to register all government employees, resulting in the identification of about 11,000 ghost workers (11% of the total), and saving and estimated $20 million annually
- Time and attendance management
  - Mauritius uses fingerprint identification to record time and attendance for civil servants
  - India has developed a biometric attendance system for civil servants, linked to Aadhaar – data is transparent and available on-line

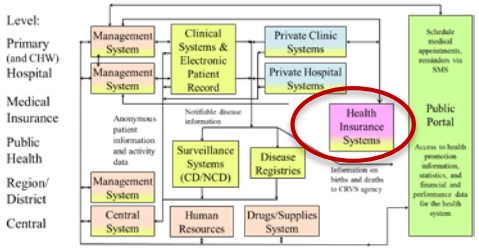
Biometrics in supply chain systems



- Existing approaches
  - Biometric access to medical dispensing cabinets, pharmacies
  - Biometric authentication for prescribing controlled substances
  - Positively identify patients prior to medication administration
  - Biometric fingerprint sensors help track vaccination patients
    - Currently implemented in Benin, Kenya, Uganda and Zambia

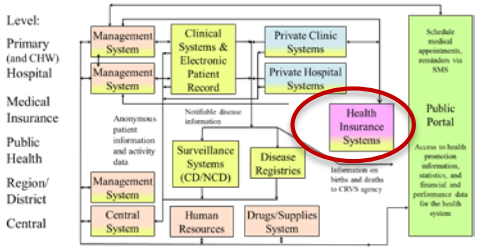
- Approaches under development
  - Using biometric identification of health workers and (possibly) patients to record the receipt and distribution of medications
  - Bar codes on incoming drugs are scanned, together with health worker ID, and data is stored on the blockchain; when medicine is dispensed, bar code as well as worker and patient ID are scanned, and this is also recorded on the blockchain
  - Proof of concept currently being developed by World Bank Blockchain Lab

Biometrics and health insurance (1)



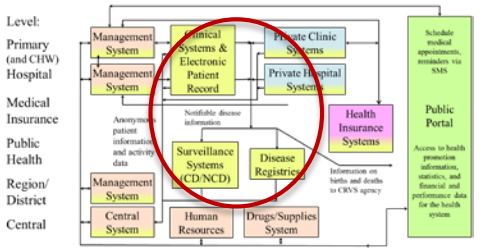
- Insurance eligibility verification
  - Gabon CNAMGS Electronic Registration Cards
    - Cards include civil data, a photograph of the holder, and two digitized fingerprints within the microprocessor ensure encryption and protection of the data.
    - Fingerprint sensors used in health facilities to verify eligibility while protecting the confidentiality of personal data.
  - India RSBY
    - Families are issued a biometric enabled smart card containing their fingerprints and photographs.
    - Card ensures that only real beneficiaries can use the smart card and access insured services.
  - Ghana NHIS
    - Biometric verification at health provider introduced – expected to significantly reduce fraud
- Insurance registration and unique identification
  - Ghana NHIS
    - In 2013, the NHIS had 26 million names in their registration database – 2 million more than the population of Ghana – currently 7.5 million registered with biometrics and no duplications

Biometrics and health insurance (2)



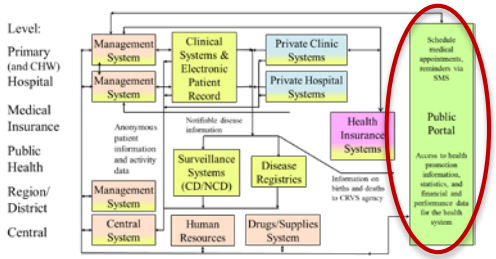
- Premium collection
  - Kenya NHIF
    - Biometric national ID card is needed to create an M-Pesa mobile money account, which can be used to make premium payments.
- Claims processing and payments
  - Ghana NHIS
    - Identity of member is biometrically authenticated when they seek medical care, and that identify is linked identity to any claim made by the provider on their behalf.
    - A positive match generates a unique 13-digit claim verification code (CVC), which the provider adds to the claim form as a biometric signature along with the member's ID, the health provider's ID and other details. Because the CVC can only be generated in the case of a live fingerprint match, it acts as a vital proof of presence to the insurer, demonstrating that the patient was actually there when the claim was made, and ensuring that the claim is valid.
    - Verification is done through 3,000 biometric verification devices by health providers across the country.
  - Chile I-Med
    - Patients pay copayment electronically using a fingerprint at the doctor's office.

Biometrics and clinical systems



- Access control for patient information
  - Linking fingerprints to EHR can eliminate the need for patients to carry ID, reduce errors from manually copying patient ID numbers, and decrease processing time
  - Biometrics can also be used to access the EHR when the patient is not conscious, such as in a pre-hospital care or emergency room setting
- Authentication and access control of health providers
  - Biometric technology has shown to be a reliable user authentication mechanism – it restricts delegation of access rights and discourages fraudulent access or impersonation of users.
  - It also facilitates remote access to EHRs by using a biometric feature as a method of authentication, while maintaining a record of access and/or modification of health records.
- Biometric encryption to increase security of health data
  - Sensitive information can be encrypted based on a biometric feature making the information available only to the person that possesses the relevant biometric characteristic.

Biometrics and patient access to their data



- Access control to patient information
  - Patients can have access to their personal information (either remotely or at a health facility) by using a biometric feature such as fingerprint.
  - The biometric scanner will be able to capture an image of the biometric feature and send it to a centralized system for verification purposes.
  - The image is matched with the stored biometric profile of the patient.
  - When the identity of the patient is verified the system sends back the information originally requested by the patient.
- Authentication and access control for eHealth services
  - Biometric technology can be used to access appointment scheduling and other services when accessing a patient portal.

Challenges in incorporating biometrics

Challenge	Potential Mitigation
▪ Potential false positives and negatives	▪ High quality sensors, multi-modal or two-factor identification
▪ Potential hacking of biometric database	▪ Encrypt sensors, store encrypted digital representations rather than biometric images.
▪ Resistance by employees/patients due to concerns about privacy or cultural issues	▪ Communications highlighting the benefits (ease of use, security) ▪ Offer alternative modalities that are considered more culturally appropriate
▪ Cost/logistics of setting up biometrics infrastructure and related databases	▪ Biometrics-as-a-Service (BaaS) cloud-based solutions
▪ Integration with existing eHealth applications	▪ BaaS (and variants), biometrics also already incorporated into many commercial and even open source eHealth modules (e.g. OpenMRS)
▪ Potential destruction of biometric sensors to obstruct accountability	▪ Multi-functional approaches (e.g., same sensor for time/attendance and access to patient records)

Conclusions

- ✓ Biometric technology can be used in all parts of a national eHealth system – whether the system is integrated or not.
- ✓ There are advantages to using biometrics compared to current methods of identification and authentication.
- ✓ A number of issues still exist with current technological solutions, and their integration the into existing eHealth system, so these issues will need to be considered.
- ✓ In developing country contexts, issues of access to electricity as well as internet connectivity also need to be addressed.
- ✓ Nevertheless, good examples of innovation using biometric technology exist across a number of developing countries, and many additional options are being actively explored.

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