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Title: Unifying Electronic Medical Records (EMR) Systems in Singapore

Rationale:

In Singapore, as the number of people hitting the 60s and above increase, the load on the healthcare system in Singapore will become heavier. There is a need to address this issue to ensure that the level of healthcare provided is maintained and even improved. Having a unified EMR will help to achieve this. The EMR also has the potential of helping the research community gather clinical data. In addition, with globalization, interoperability of EMR systems in different countries can allow patients to seek treatment overseas with the assurance that the proper medical records and history are available for physicians and medical experts regardless of their geographic locations.

A unified EMR can help improve patient's healthcare experience and provide a more consistent healthcare delivery, especially for patients having chronic illnesses. With a unified EMR, in situation where a patient is delivered into the Accident & Emergency department, the doctors can get accurate and up-to-date medical record (including drug allergies, long-term medication etc) of the patient which would help to make better decision in the type of treatment to be given. The availability of such records would also help those who require long-term care. The care givers might change in the course of the patients' life (e.g. after being treated in the hospital, the patients could be discharged, but need follow up with his general practitioner). The EMR will provide subsequent care givers about the type of medication and care plan given by the previous care givers.

The public health sector in Singapore is already quite well connected via the EMR exchange system (EMRX). The push now is to ensure that the rest of the private health sector is connected up with the public health sector. ([1-4](#))

This project will examine the current situation of EMR implementation in Singapore, identify the potential challenges of implementing a unified EMR system in Singapore and propose possible approach to tackle these challenges.

Scope:

1. Examine the current situation of EMR implementation in Singapore.
   a. The public health sector in Singapore consists of 2 clusters: Singapore Health Services (SingHealth) and National Health Group (NHG). The 2 clusters have each implemented an EMR system for their cluster and the 2 systems are currently connected via an EMR exchange system (EMRX). ([1,2](#))
   b. Find out what is the situation for private hospitals and general practitioners
2. Examine the approach taken by other countries (e.g. Canada, New Zealand, Australia, USA) in implementing EMR
3. Identify potential challenges faced in implementing a unified EMR system in Singapore. Possible areas are:
   a. Technical challenges
      i. Standard representation of EMR
      ii. Exchange format
      iii. Security

    iv. Availability
  b. Non-technical challenges
    i. Cost of implementation
    ii. Resistance to change
4. Suggest possible approach to handle challenges identified (incorporating suitable approaches adopted by other countries if they apply):
  a. Technical challenges
    i. Identifying required contents of EMR. Leverage on ontologies based on HL-7, SNOMED-CT, and Continuity of Care Record (CCR) standards etc.
    ii. Use a neutral exchange format e.g. XML
    iii. Role-associated views for contents of EMR, password, access card, digital signature, audits ([6])
    iv. Web-based system; back-up servers
  b. Non-technical challenges
    i. Leveraging on or extending existing infrastructure ([5])
    ii. Identify workflows and model approaches to minimize disruption to workflows; Ease of use of EMR systems

Focus will be placed on creating a unified EMR system nationwide (mainly focussed on standard representation of EMR and exchange format). The approach needs to take into considerations of extensibility to data mining for research, change of definition of contents of EMR and interoperability with other countries' systems.

Proposed Approach:

1. Survey current EMR implementation in Singapore and other countries via Google, pubmed etc.
2. Approach SingHealth, NHG and NCS to find out more about the EMR and EMRX currently in place.
3. Approach private hospitals and general practitioners to find out about the type of EMR systems (if any) that is in place and also the workflows.
4. Survey literatures for approaches to handle challenges

Difficulties may be encountered in approach 2 and 3 as there may be no responses.

Proposed Architecture:
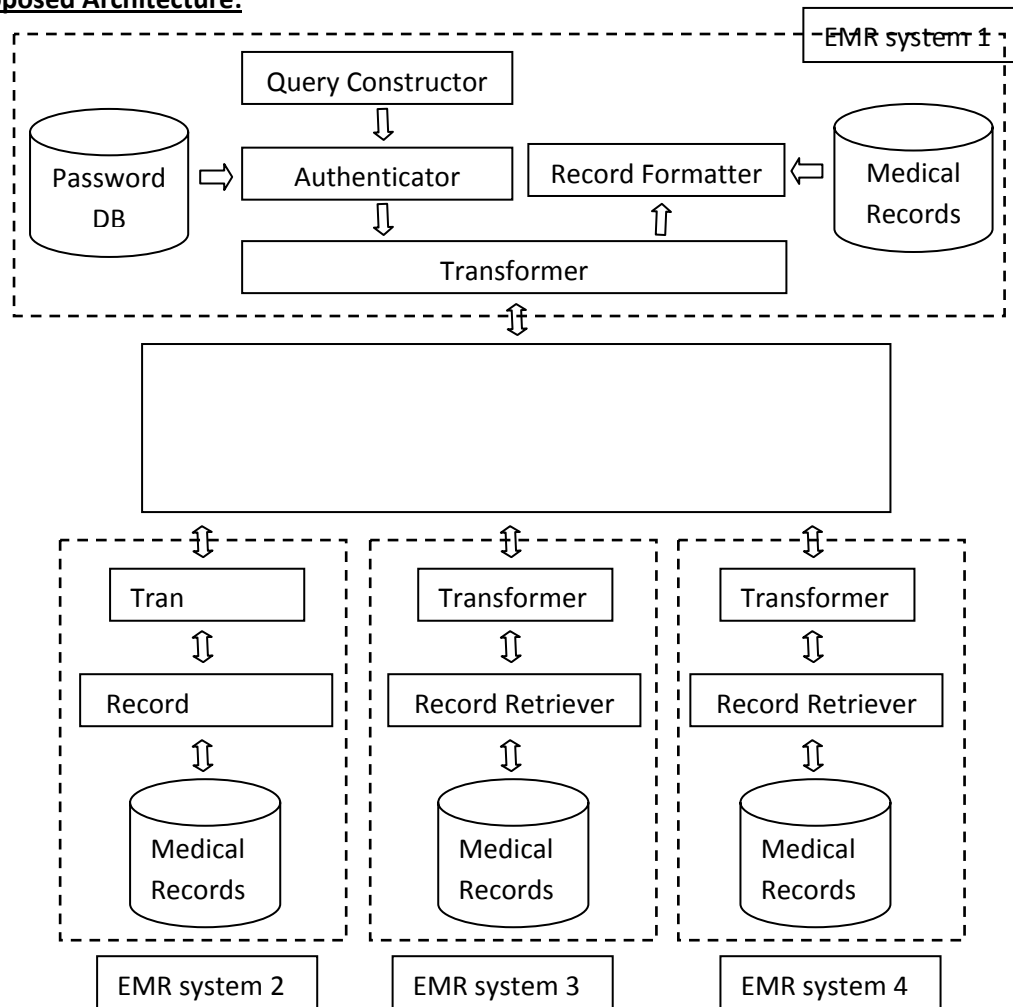
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