For discussion
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Legislative Council Panel on Health Services

Developments of the
Electronic Health Record Sharing System

PURPOSE

This paper briefs Members on the latest developments of the Electronic Health Record Sharing System (eHRSS) and the progress of its Stage Two Development, which includes enabling the sharing of radiological images and Chinese Medicine (CM) information; enhancing patient's choice over the scope of data sharing; developing a Patient Portal to facilitate patient access to the eHRSS; and improving the core functionalities and security/ privacy protection of the eHRSS.

LATEST DEVELOPMENTS OF THE eHRSS

2. The territory-wide eHRSS was formally launched in March 2016. It is an information infrastructure that enables registered healthcare providers (HCPs) in both the public and private sectors, with the informed consent of the registered patient and proper authorisation, to view and share the patient's electronic health records (eHRs) in the appropriate electronic format within the sharable scope[1]. The eHRSS aims to encourage public-private collaboration, facilitate continuity of care and enhance the efficiency and quality of healthcare services. The development and operation of the eHRSS is led by the Government with the Hospital Authority (HA) as the technical agency.

[1] The current scope of eHR Sharable Data covers: Personal Identification and Demographic Data; Allergies and Adverse Drug Reactions; Diagnosis, Procedures and Medication; Encounters/ Appointments; Clinical Note/ Summary; Birth and Immunisation Records; Laboratory and Radiology Reports; Other Investigation Reports; and Healthcare Referrals.

Patient and HCP registration

3. As at end-April 2019, close to 1 050 000 patients had joined the eHRSS on a voluntary basis, accounting for about 14% of the Hong Kong population. Around 40% of the registered patients are elders aged 65 or above. Patients can join the eHRSS in-person at specified HA hospitals, Department of Health (DH) clinics, and private hospitals and clinics, as well as through our mobile registration teams. Registration online, by post/fax and through an authorised person is also available.

4. As regards HCPs, which register on an organisational basis, HA, DH, all of the 12 local private hospitals and over 1 700 other private healthcare organisations (such as clinics, elderly homes and welfare organisations) have joined the eHRSS. More than 47 500 accounts have been opened for the healthcare professionals (HCProfs)[2] working under these HCPs to access the eHRSS, on a need-to-know basis and with prior patient consent, for provision of healthcare. It is estimated that about 53% of the doctors working in the private sector (more than 3 300) have an HCProf account.

5. To facilitate private HCPs to participate in the eHRSS and data uploading, we have provided clinical and management software and technical support free of charge[3]. We also provide technology know-how to the vendors of major clinical software products in the market to enhance their systems to interface with the eHRSS. Furthermore, to enable the use of the eHRSS by more HCProfs, access rights will be extended to medical laboratory technologists, occupational therapists, Part I optometrists, pharmacists, physiotherapists and radiographers working in the community-setting in the latter half of 2019. Access

[2] Currently, dentists, doctors, midwives and nurses working in all settings can view all types of eHRs. Medical laboratory technologists, occupational therapists, Part I optometrists, pharmacists, physiotherapists and radiographers working in HA, DH and private hospitals can view designated types of eHRs according to their clinical roles (known as role-based access control).

[3] These include the Clinical Management System (CMS) Adaptation modules for private hospitals to connect to and interface with the eHRSS, and the CMS On-ramp, a clinical management software with sharing capability and turn-key system readily usable by private clinics. We will provide the CMS On-ramp, with suitable modifications, to the upcoming District Health Centres for their use as the IT operating system for clinical and administrative purposes.

rights will be further extended to other HCProfs listed in the Schedule to the Electronic Health Record Sharing System Ordinance (Cap. 625), such as CM practitioners, subject to technical readiness of the eHRSS and consultation with the respective sectors.

Data uploading

6. As regards data uploading, as at end-April 2019, about 960 million records had been uploaded to the eHRSS for sharing. The vast majority (more than 99%) of the records came from the public sector, but we also note that the private sector, especially the private hospitals, is uploading more health data in wider domains. As the build-up of uploading capability of private HCPs, especially the solo practitioners, will take time, we will continue to provide assistance and advice to the private sector.

Publicity and joining eHRSS

7. We continue to promote awareness of and participation in the eHRSS through TV, radio, the press and the social media, as well as our mobile registration teams and electronic newsletter "eHealth News". Last year, we set up promotional and registration booths at the Hong Kong Sports and Leisure Expo and Gerontech and Innovation Expo cum Summit to reach a wider audience. Riding on the momentum of reaching 1 million patient registrations, we will continue to make use of these effective promotional channels, and launch roving exhibitions in the community. Furthermore, to promote the creation of life-long eHRs from a young age, we will step up promotional efforts to recruit more newborns and children to join the eHRSS, including enhanced collaboration with DH's Maternal and Child Health Centres.

8. Last year, we commissioned the Chinese University of Hong Kong to conduct a survey to help us find out how to enhance eHRSS registration. The survey comprised 1 000 valid telephone interviews with non-enrolled patients and 308 valid completed questionnaires from non-enrolled doctors to find out why they had not joined the eHRSS. The results were available earlier this year. It was found that 48% of the non-enrolled patients had concerns over security and privacy; 47% did

not require two-way sharing (e.g. they only went to public or private HCPs); and 43% were uncertain about the benefits of joining the eHRSS. For the non-enrolled doctors, 54% were concerned about additional workload; 45% perceived that the enrolment procedure could be complicated; and 45% perceived that the viewing of eHRs could be time-consuming. The survey also comprised 454 enrolled doctors, and about half of them considered simplification of the enrolment procedure and improvement of user-friendliness would improve the eHRSS. For the doctors, the most useful promotional channels for enhancing eHRSS registration were traditional channels such as TV advertisement, newspaper or magazine (94%) and medical publications such as medical newsletter or journal (89%). In view of the above, we will step up efforts to promulgate the benefits of the eHRSS to both HCPs and patients and encourage participation and sharing of data. With the upcoming launch of the Patient Portal (more on this in paragraphs 24-28 below), we believe that patients will be able to enjoy first-hand the benefits of eHR sharing[4]. We will also consider how to further streamline the enrolment process for HCPs.

9. Currently, the patients and service providers of various government-subsidised Public-Private Partnership (PPP) Programmes are required to join the eHRSS to facilitate continuity of care. We will extend the requirement to the operators, network service providers and clients of the upcoming District Health Centres (DHCs), the first of which will open in Kwai Tsing in around Q3 2019. We will also include in the Code of Practice under the Private Healthcare Facilities Ordinance (Cap. 633) a requirement for private hospitals to join the eHRSS as HCPs.

Security and privacy

10. We take system security and privacy protection very seriously as users' confidence in the eHRSS very much hinges on them. Last year, the eHRSS received the ISO 27001 Certification after its **information security management system** had passed the relevant security audit. It certified that we had put in place for the eHRSS a

[4] Currently, only HCProfs properly authorised by registered HCPs can access patients' health data with patient consent.

comprehensive suite of information security controls that would meet its ongoing information security needs. Under a Privacy Compliance Assessment last year, the external consultant identified no major system weaknesses or privacy risks in the eHRSS and found it to be generally in compliance with the relevant privacy requirements and guidelines.

11. On day-to-day operation, we carry out regular audit checks to detect aberrant cases of patient registration, giving of sharing consent and access to the eHRSS. Patients are sent notifications (SMS, emails or letters depending on their choice) when their eHRs are accessed so that they can contact us when they come across suspicious accesses. In addition to using up-to-date security hardware and software, we also enhance user **vigilance** through different educational activities. For example, we regularly conduct cyber security drills with private hospitals and the Police, and host for eHRSS users seminars on cyber security and personal data privacy in collaboration with the Police and the Office of the Privacy Commissioner for Personal Data (PCPD). We will continue to enhance system security and step up educational work.

Increasing acceptance and recognition

12. The eHRSS is gaining increasing local and international acceptance and recognition. In 2018, the eHRSS was awarded the Innovative eHealth Solutions Award of the Global Information and Communications Technology (ICT) Excellence Awards 2018 organised by the World Information Technology and Services Alliance. The eHRSS also received the Best Business Solution (Application) Award (Gold Award) in the Hong Kong ICT Awards 2017 and the Winner Award of the Government and Public Sector Category in the Asia-Pacific ICT Alliance Awards 2017.

STAGE TWO DEVELOPMENT

13. With the required funding of about $422 million approved by the Finance Committee (FC) of the Legislative Council in March 2017, we commenced the Stage Two Development of the eHRSS in July

2017. As approved by FC, the scope of work of the Stage Two Development, spanning a five-year timeframe from 2017-2022, includes –

(a) to broaden the scope of data sharing and develop the technical capability for sharing of radiological images and CM information;

(b) to enhance patient's choice over the scope of data sharing and to facilitate patient access to the eHRSS; and

(c) to improve and enhance the core functionalities and security/ privacy protection.

Target (a): to broaden the scope of data sharing and develop the technical capability for sharing of radiological images and CM information

Radiological images

14. Sharing of visualised radiological investigation results will better support collaborative care among HCPs and improve continuity of care. The related development work has commenced, including setting up the necessary infrastructure, designing the security framework, and developing the standard interface for radiological image sharing among HCPs through the eHRSS. We expect the function to be piloted in the first half of 2021.

CM information

15. To facilitate the sharing of CM information on the eHRSS, we are developing the turn-key clinical system for CM practitioners, namely the Chinese Medicine Information System (CMIS) On-ramp. Its key functions include patient registration and appointment, consultation, prescriptions, dispensary, etc. Following demonstration of the prototype to CM practitioners in Q1 2019, we plan to launch a CMIS On-ramp Pilot in the second half of 2019 to collect user feedback. Standardisation of

CM information and terminology is also underway. We plan to enable the sharing of CM data and information among CM practitioners in the first half of 2021. In view of operational experience and stakeholders' views, we will explore the possible sharing of data and information between CM and Western Medicine practitioners.

Target (b): to enhance patient's choice over the scope of data sharing and to facilitate patient access to the eHRSS

16. During the Bills Committee stage of the Electronic Health Record Sharing System Bill in 2014-2015, a majority of Members, then-PCPD and a number of patient groups requested that some form of sharing restriction features (also known as "safe deposit box" features) should be developed. This was meant to give patients additional access control over their eHRs so that they can exclude certain HCPs, to which they have given sharing consent, from access to certain parts of their health data. The Government undertook to conduct a study along a positive direction during the Stage 2 Development with a view to developing some form of sharing restriction features. Members also requested the Government to provide a Patient Portal in the eHRSS to facilitate registered patients to more conveniently access to or upload their data to the eHRSS. The Government undertook to conduct a study on the setting up of a Patient Portal.

17. We completed a study on sharing restriction and Patient Portal with the help of an external consultant earlier this year. The study comprised the analysis of the experience of nine economies[5] and local stakeholder engagement. In the process, we consulted stakeholders from different sectors, including relevant medical professional bodies, patient groups, government departments, HA, HCPs, Office of PCPD and the Steering Committee on Electronic Health Record Sharing (the Steering Committee), a list of its members is at **Annex**.

[5] Viz., Australia, Canada, Denmark, Estonia, France, Singapore, Switzerland, Taiwan and the United Kingdom. They were chosen based on their eHR regimes' potential adaptability and comparability to Hong Kong's in relation to implementing e-health initiatives.

Sharing restriction

18. Sharing restriction can give patients the choice to restrict/ control the scope of data sharing under an eHRSS. They can choose to mask certain records so that other HCPs, even with their sharing consent, cannot see these records on the eHRSS. The arrangement is seen by some as an additional layer of privacy protection for certain patients.

19. As noted by the consultant in its international research, all of the analysed economies (except Singapore) provide some form of sharing restriction features. However, the consultant also remarked that Hong Kong has privacy protection measures that many other economies do not have, including a voluntary opt-in system that requires explicit joining consent, requirement of individual sharing consent for different HCPs (except HA and DH), a role-based access control (RBAC) mechanism that assigns access right to different HCProf types based on their clinical roles, etc. In the consultant's view, sharing restriction is put in place in other economies to provide greater privacy control because they do not require explicit consent to join or share, do not have RBAC, or do not send out access notifications.

20. During the local engagement, the consultant found that the actual demand for sharing restriction is not very high, mainly coming from groups of patients suffering from particular diseases, such as mental illnesses and sexually transmitted diseases. This is in line with international experience. At the Steering Committee, we noted that patient views as reflected by patient groups were diverse. Some patients were of the view that sharing restriction could provide additional privacy control, which was a patient right. Some others were concerned that patients might not be clinically knowledgeable about what to mask. Most of the medical professional groups, out of concern that some patients might not have the professional medical knowledge of the relevant risks, voiced strong reservations over sharing restriction on the grounds of clinical and patient safety, while noting the argument that currently patients can choose not to fully disclose their conditions before a consultation or operation.

21. Taking account of the local views and international

experience, on balance we consider that some form of sharing restriction features should be introduced in the eHRSS as an available option to cater to the specific needs of certain groups of patients, along the following major parameters –

(a) Administratively, the setting of sharing restrictions should not be too complicated, otherwise it would discourage use[6]. We plan to allow patients (including those setting the restrictions on their behalf, if applicable) to set restrictions by date and/ or HCP for ease of use. This will enable them to restrict data on consultations and operations in relation to certain diseases conveniently. Patients may remove, amend or add new restrictions at any time. However, they will only be allowed to mask, but not delete, their records so as to maintain the integrity of their eHRs and in case they want to undo the masking later.

(b) We will alert the patients the potential clinical risks and implications of masking certain eHRs (e.g. the potential impact on the treatments to be provided to them) by asking them to read and sign relevant consent forms/ undertakings. The setting of sharing restrictions should be a well-informed decision. Patients will be advised to seek professional advice from HCProfs before setting sharing restrictions if deemed necessary.

(c) For patients' safety, we will **not** allow the masking of certain critical health data, including medications, allergies and adverse drug reactions (ADR).

22. There is also the issue of whether the masking of eHRs by a patient should be masked to others on the eHRSS. We note that there were different views. Some considered that there should be a flag if a patient had masked certain eHRs so that the HCProfs taking care of him/ her could be aware and better consider the suitable course of treatment

[6] For example, in Australia, patients can set sharing restriction to the individual record level. It was noted that use of the sharing restriction features there was less than 1% in 2018.

from the clinical safety angle. Some others supported the "mask the masking" approach so that patient privacy could be better respected without affecting patient-HCProf trust. The consultant's international research showed that among the economies that had sharing restriction in place, only France adopts the "mask the masking" approach. Taking account of the views and findings, and that patients already have the choice of individual sharing consent for HCPs, on balance, we are inclined to flag it up if a patient has masked his/ her eHRs so that other authorised HCProfs would be aware of it.

23. We will commence the substantive technical development of sharing restriction features along the major parameters as set out in paragraphs 21-22 above. We aim to make available sharing restriction features in the first half of 2021 subject to further consultations as appropriate. We will arrange to bring the relevant provisions (Division 4, Part 2) in the Electronic Health Record Sharing System Ordinance (Cap. 625) into force at an appropriate juncture after the arrangement of the sharing restriction features has been ironed out.

Patient Portal

24. In the course of the study on international experience, the consultant found that with the exception of Canada, Switzerland and the United Kingdom, all of the analysed economies currently have some form of Patient Portal in place. These Patient Portals can serve a myriad of functions, including allowing access to certain eHRs by patients, disseminating health messages from the Government, promoting health programmes and health education, managing sharing consent and sharing restriction, contributing health data, etc. The more common types of eHRs opened up for direct access by patients include medications, allergies, ADR, immunisation, discharge summary and laboratory test results. Patient Portal functions are generally rolled out progressively, starting with the most value-adding and least sensitive ones. They are then built up and expanded on a step-by-step basis, having regard to user feedback and operational experience. The consultant also found that having a well-defined market positioning is also important for arousing the public's awareness and interest and encouraging use.

25. During local stakeholder engagement, the idea of developing a Patient Portal was generally welcomed. Stakeholders generally expressed that, in addition to accessing certain eHRs, the more useful features of a Patient Portal would be accessing public health and government programme information, appointments reminder, managing sharing consent, etc. For the types of eHRs that should be opened up for patients' direct access, the stakeholders generally considered that priority should be given to allergies, ADR, medications, appointments and diagnosis.

26. Taking account of the local views and international experience, and in light of the greater emphasis on promoting primary healthcare, medical-social collaboration and PPP in recent years, we consider that a Patient Portal should be developed in Hong Kong to help patients more actively manage their health. We also consider that the Patient Portal should be positioned as the public health portal of Hong Kong so as to better leverage the eHRSS infrastructure, in addition to just providing eHRSS-related functions as originally envisaged[7]. In this way, target users can include not only patients, but also health-conscious citizens, participants/ users of government health programmes such as PPPs and the upcoming DHCs, and even the carers of patients, etc.

27. We plan to develop the Patient Portal along the following major parameters –

(a) We can disseminate useful public health information and messages (e.g. the launch of new public health programmes), even in a personalised manner. The Patient Portal can also serve as an integrated platform, or a "hub", to allow patients convenient access to general information on government health programmes and public health education.

(b) Patients can access part of their key eHRs, including medication, appointments, allergies and ADR. The scope of data sharing will be reviewed from time to time, and patient

[7] The original planned functions included viewing of eHRs, updating of personal particulars, management of eHR registration and sharing consents, and other administrative tasks such as making data access requests and data correction requests, etc.

needs, potential clinical risks and security concerns should be balanced when considering expanding the scope of accessible data.

(c) To encourage active health management, the Patient Portal will allow self-input of health information/ data. Initially we plan to include growth charting for children and inputting of immunisation records. The scope of self-inputted data can be expanded in the future with reference to operational experience and user feedback.

(d) eHRSS account management functions will be included, such as updating personal particulars, managing sharing consent and sharing restriction, making administrative requests (e.g. data access requests), receiving notifications, etc.

(e) Other value-added functions will be included. Initially, we plan to provide checking of the balance and transaction history of Elderly Health Care Vouchers and quota balance of PPP Programmes, and an integrated "Doctor Search" function.

28. We will commence the substantive technical development of the Patient Portal along with the major parameters as set out in paragraph 27 above. We will develop the Patient Portal and roll out functions in a "building-block approach", with pilots and trial programmes where appropriate. We will follow a "mobile-first" strategy, with user-friendly screen designs and intuitive page navigation to cater for even the less tech-savvy users. We plan to make use of the prevailing technologies for authentication and data protection purposes (e.g. considering the upcoming eID as a means for secured authentication). A pilot version of the Patient Portal is expected to be rolled out in Q4 2019 to selected user groups (including patient groups, clients of the Kwai Tsing DHC and non-government organisations) for usability testing and collection of user feedback. The formal launch of initial functions is planned for the second half of 2020.

Target (c): to improve and enhance the core functionalities and security/ privacy protection

29. We continue to enhance the system features of the eHRSS in light of technological advancement to enhance the user experience of HCProfs and administrators, as well as further improve the functions of the clinical and management software developed for private hospitals and clinics. We also continue to enhance secure and privacy protection of the eHRSS in the light of the ever-changing cyber security situations and to support the launch of the public-facing Patient Portal.

ADVICE SOUGHT

30. Members are invited to note the latest developments of the eHRSS and the progress of the Stage Two Development, and provide comments on the parameters of the sharing restriction features and Patient Portal.

Food and Health Bureau
May 2019

Annex

Steering Committee on Electronic Health Record Sharing
Membership List

Chairperson:
Permanent Secretary for Food and Health (Health)

Members:
Representatives of –

- Hong Kong Academy of Medicine
- Hong Kong Dental Association
- Hong Kong Medical Association
- Hong Kong Private Hospitals Association
- Hong Kong Public Doctors' Association
- Alliance for Renal Patients Mutual Help Association
- Care For Your Heart
- Hong Kong Alliance of Patients' Organizations Limited

Dr CHOW Yat
Dr LAU Ho-lim
Mr LEE Wai-kwong, Sunny
Mr LEUNG Kin-man, Michael
Prof. MENG Mei-ling, Helen
Mr POON Yan-wing, Lawrence
Dr WONG Chun-por
Prof. Maurice YAP

Representatives of –

- Food and Health Bureau
- Department of Health
- Hospital Authority
- Office of the Government Chief Information Officer