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|  | INTERNATIONAL TELECOMMUNICATION UNION  **TELECOMMUNICATION STANDARDIZATION SECTOR**  STUDY PERIOD 2017-2020 | | FG-AI4H-A-012 | |
| **ITU-T Focus Group on AI for Health** | |
| **Original: English** | |
| **WG(s):** | | N/A | Geneva, 25-27 September 2018​ | |
| **DOCUMENT** | | | | |
| **Source:** | | Xiangya Hospital Central South University | | |
| **Title:** | | China's smart medical practice in skin diseases | | |
| **Purpose:** | | Discussion | | |
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| **Abstract:** | This document introduces China’s recent research and development work in general medical big data platform with standard terminology systems, clinical speciality datasets. Datasets include biological sample bank and image library of skin diseases for AI processing, m-health and smartcare applications in a cooperative network connecting hundreds of primary care units and low level secondary care hospitals across China. Related standardization work is to consider speciality and diversity in clinical care including standard terms, dataset, clinical pathway, quality and outcome evaluation in smart care contexts. China can actively contribute in these areas on an existing basis. |

# I. Background and Achievements

Clinical Dermatology is a discipline involving over two thousand diseases, with incidence rate reaching almost 100%. There are about 21%-87% population in the world has skin problems in different area and skin diseases have become a major public health and social problem in our country. Currently in China, the number of hospitals from which the outpatient number of departments of dermatology per year over one million is five. There is great and urgent need to have more dermatologists. However, the outpatient waiting areas of dermatology clinics in provincial hospitals are always overcrowded, and the medical staffs are always working overtime. While the dermatology training of basic-level practitioners, including rural practitioners, community general practitioners, and county dermatologists is not enough.

China is a large country with a population of 1.3 billion, while, the number of Chinese dermatologists is only 22000. There is an urgent need for a change of medical-seeking pattern in dermatology to improve the deficiency in number of dermatologists. Thus, it is imperative to standardize the Medical Big Data and Internet+Medical, explore the area of artificial intelligence and promote the new medical-seeking pattern such as Internet+Medical. We currently has obtained results as follows:

**1. Data standards:**

i. Huge investments made by Central South University（CSU）: In 2013, CSU took the lead in the construction of Medical Big Data. We has spent one hundred million supporting 100 projects, and finished the first standardized set of terms for medical big data.

ii. Leading the process of standardizing Medical Big Data, dermatologists write the first standardized set of dermatological terms in China, actively promote the establishment of Medical Combination Platform for dermatological health and disease, and establish standards of Medical Combination Platform for dermatological health and disease and standards of Medical Big Data of Skin Diseases.

**2. Datasets:**

i. The experts have accomplished the first phase of establishment of Internet Data Center (IDC) and the development of electronic medical record (EMR) system covering different hospitals.

ii. Medical Big Data of Skin Diseases: We started building Medical Big Data of Skin Diseases from 2014 and our system has connected over 200 hospitals. It is the biggest public platform of medical big data of skin diseases in China. We have stored about fifty thousand records of six kinds of skin diseases which are common or have high mortality: cutaneous tumor, psoriasis, urticaria, acne rosacea, alopecia and SLE. The data includes clinical images, pathology images, patients’ information and the medical history. With the analysis of data from this platform, we have already published twelve papers with high impact factor and applied for five patents.

iii. The construction of biobank of skin diseases: Our biobank has a history of over ten years supported by the construction of hardware and software platform. The biobank has a complete protocol for biological sample collection. So far, there are over twenty thousand biological samples of skin diseases including tissue, blood, urine and stool in our biobank.

iv. The achievements of artificial intelligence: We have established the largest standardized image library of AI in China with over 10 years efforts and image data from 39 hospitals, furthermore, we also have the largest image library of psoriasis in the world. In this library, each case has its own images, patient’s information and medical history. With the cooperation of experts from Information Security and Big Data Research Institute, we built CNN network for skin diseases. We have published two articles and applied for nine software copyrights in this area.

v. Dermato-epidemiologic research: We focus on skin health of general populations, and investigate the epidemiology and risk factors of common skin diseases, and establishing three population-based cohorts: the Hunan Resident Health Cohort in Heavy Metal Pollution Areas, the Central China Chronic Disease Cohort, and the China College Student Skin Health Promotion Program. The cohorts comprise of 150,000 participants nationwide, and are the largest cohorts that focus on skin health in China. The baseline survey of the cohorts has already completed and preliminary findings have been published. Follow-up survey is being conducted in field.

## 3. Platform:

1. We built the “Mobile Health Care” Ministry of Education-China Mobile with China Mobile and the Information Security and Big Data Research Institute.
2. The Medical Big data Application Technology National Engineering Laboratory has been approved by National Development and Reform Commission.
3. The establishment of Internet+medical platform: the Medical Combination Platform for dermatological health and disease of CSU has integrated the good resources from three dermatology departments in Chinese medical system. It is the first platform which combined clinics, science, education and prevention of dermatology in China.

With this platform, the remote, dual referral, online subsequent visit, E-prescription, remote drug delivery has been realized. From October 2017 until now, we have accomplished over 100 cases of remote consultations and dual referrals. This platform covering 54 county and municipal hospitals, 24 community health service centers in Changsha and 5037 remote medical networks. We also get the support from government and will cooperate with them.

# II. Experience sharing and next recommendation

The market demand for skin diseases is huge. AI and the Internet + platform are integrated into the whole medical process, including intelligent self-diagnosis, triage, guidance, registration and follow-up, etc., to provide convenient, efficient and high-quality services for patients and doctors. At the same time, the data need to build a unified standard. By virtue of the platform of the health committee, provincial medical information will be collected. At the same time, we cooperate and co-construct with relevant enterprises. And under the leadership of government and hospital, we carry out the promotion and application of big data mining, AI and medical.

The establishment of the platform of dermal health and disease medical big data and Internet+Medical should be based on the requirement of patients and serve in the whole medical course. Combination of artificial intelligence, Internet and medical will provide many functions for this platform. Every procedure should have standardized protocol and set of medical terms. The cooperation with government and companies and supports from university and hospitals are also the success of key in application and promotion.

Our next priorities are as follows:

1. Standardization:

1. User standardization: We will make the standardized set of terms for users from the aspect of clinics and patients depending on the real requirements of patients, operability and applicability in clinics.
2. Clinical therapeutic standardized protocol: We will complete our standardized set of clinical terms and promote it to more hospitals. We will also build protocols for consultation, referral, triage and subsequent visit and dermatological surgery procedure.

2. Dataset:

1. Standardized biobank: We will standardize the management pattern of our biobank for skin disease depending on the platform of the hospital biobank.
2. Make great efforts to build a national dermatology big data center: We will rely on the existing platform, increase promotion efforts, and cooperate with the government to gradually promote the standardization and unification of national dermatology data.

3. Platform:

Group of experts: We will optimize our group of experts by introducing academicians in dermatology and computer depending on the existed group of experts from Information Security and Big Data Research Institute.

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