Healthy World 2020

Scientific Data Sharing Platform

Depei Liu, MD, Ph.D.

Chinese Academy of Medical Sciences

2009-3-23
I will discuss... 

1. Background
2. Healthy China 2020
3. China’s Scientific Data Sharing Project on Population and Health
Background

Health is a topic relating to 6.8 billions people in the world.


In 2000, Japan released “Healthy Japan 21”.

In 2008, China’s Health Minister Chen Zhu initiated “Healthy China 2020”.

In 2008, WHO Director-General Margaret Chan initiated “Healthy World 2020”.

Health Concept

- Health concept continuously develops along with societal development.

- In 1948, WHO defined Health as ‘a state of complete physical, mental and social well-being, not merely the absence of disease or infirmity.’

- In China, Health is understood as: 无病无弱、身心健全、社会适应、环境和谐 (no diseases and no infirmity, physical, mental and social well-being, environmental harmony)
Paradigm Shifting in Medicine

- From bio-medical model to environmental-societal-psycho-engineering-bio-medical model;
- From allopathic medicine to holistic medicine;
- From study on disease itself to study a complete process of life and disease in a holistic, multiple perspectives through internal and external disciplines and systems;
- From emphasizing on diagnosis and treatment of diseases to emphasizing on disease prevention and control, and monitoring whole healthy life.
Major Health Challenges Human is facing

- Aging population
- Health and environment issues
- Health protection for vulnerable populations:
  - Women and children
  - Elderly
  - Disabled
- Mal-distribution of health care services.
Major Diseases Threatening Human Health

- Infectious Diseases
  - TB
  - Hepatitis
  - STD

- Chronic Diseases
  - Hypertension
  - Diabetes
  - Cancer
  - Cardiovascular & cerebro-vascular diseases

- Trauma and Disaster
Rising Medical Costs is a worldwide Problem

- Disease-centered, technology-driven Western medical service model raises medical costs, making medical insurance a worldwide problem.
- Medical insurance per capita per year:
  - US: $7000
  - Switzerland: $3500
  - Japan: $2000
  - China urban employees: 1200 RMB (176 USD)
Improve equity of medical services

- Reduce the disparity between developed and developing countries, urban and rural areas.
- Fully use and share medical resources.
- Improve social effectiveness of medical investment and welfare.
- Call for a scientific data sharing platform for Healthy World.
I will discuss…

1. Background

2. Healthy China 2020

3. China’s Scientific Data Sharing Project on Population and Health

Healthy China 2020

- August 2007: Ministry of Health proposed Healthy China 2020 strategic study plan
- Feb. –Dec. 2008: launched Healthy China 2020 strategic study
- 2009-2010: conceptual design, experiment phase.
Healthy China 2020

◆ Phase 1: By the year 2010, set up framework for primary health care system, China joins the family of countries with a national basic health care strategy;

◆ Phase 2: By the year 2015, preliminarily build up primary health care system, China takes a leading among developing countries in health care;

◆ Phase 3: By the year 2020, establish a relatively complete medical care system covering urban and rural population to achieve the goal that every Chinese has primary health care, and significantly improves Chinese people’s health.
Healthy China 2020

◆ Healthy China 2020 is a mid-term and long-term strategic development plan for health at national level;
◆ The goal is to improve the health quality of the whole nation, and to provide basic medical care services for all;
◆ To provide an action plan for medical care, health, administration, and scientific and technological support;
◆ To provide a road map for national health safeguard.
Scientific and Technological Support for Healthy China 2020 and Forefront Field

1. National Clinical Medicine Scientific and Technological Support System
   - National Clinical Data Center and Coordinating Network Research Environment Construction
   - Development of national academic hospitals and specialty centers
   - Epidemiological population research base construction
   - Integrated traditional Chinese medicine and western medicine clinical research platform construction

2. Major topic research

Scientific Data Center and Coordinating Network Research Environment Construction

- Establish National Population and Health Scientific Data Center and Coordinating Network Research Environment;
- Including Population and Reproductive Health, Basic Medicine, Clinical Medicine, Public Health, Traditional Chinese Medicine, and Pharmacy;
- Unify data criteria and rules, and integrate population and health data resources;
- Provide scientific and technological support, data sharing, and information services for “Healthy China 2020”.
I will discuss…

1. Background
2. Healthy China 2020
3. China’s Scientific Data Sharing Project on Population and Health
China’s Population and Health Scientific Data Sharing Project

- 2002: started study of the project feasibility
- 2003: approved “Medical and Health Scientific Data Management and Service System” project
- 2004: rolled into support for a pilot project
- 2005: submitted a feasibility report on “Medical and Health Scientific Data Sharing Network”
- 2006-2007: Experts reviewed and OK the project plan
- 2008-2010: implementation of “Population and Health Scientific Data Sharing Network”
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<tr>
<td><strong>Stage 2</strong></td>
<td></td>
<td>Medical Scientific Data Sharing Network</td>
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<tr>
<td><strong>Stage 3</strong></td>
<td>Sharing Service System</td>
<td>Population and Health Scientific Data Sharing Network</td>
<td>Population and Health Scientific Data Resources Planning</td>
<td>Population and Health Scientific Data Sharing Standards and Criteria</td>
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<tr>
<td></td>
<td>Scientific Data Centers: Basic Medical, Clinical, Public Health, TCM, Pharmacy, Population and Reproductive Health</td>
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<td></td>
<td>Local Service Node and Data Sharing Services</td>
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### Overall progress of the Network

**Demand Study of Medical and Health Scientific Data Sharing Project Construction**

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<tr>
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<td>1.2</td>
<td>资源需求和方法：描述资源需求和采用的方法。</td>
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<tr>
<td>1.3</td>
<td>数据采集和存储：说明数据采集和存储的流程。</td>
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<tr>
<td>1.4</td>
<td>数据清洗和预处理：介绍数据清洗和预处理的步骤。</td>
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#### 网络总体情况

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<td>2.3</td>
<td>网络总体建设：概述网络的总体建设。</td>
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#### 项目实施情况

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<tr>
<td>3.2</td>
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</table>

#### 总结

- **2021年度总结**：总结2021年度的项目实施情况。
- **2022年度计划**：规划2022年度的项目实施计划。

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#### 附录

- **数据资源目录**：列出项目中使用的数据资源。
- **技术文档**：提供技术文档以供参考。
Policies and Regulations, Standards, Specifications and Technical Documentation

Management and Operational Mechanism

Source System Construction

Standard Construction

Technical Platform Construction
Standard Development

(1) Classification Standards

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(2) Metadata Standards (3) Data Schema Standard (4) Data Element Standards

- **Metadata**: Description of the external characteristics of the data set, including labels, content and quality information.
- **Data Schema**: Description of framework, structure and levels of data set, including the entities, property and so on.
- **Data Element**: Standardized description of data element, including labels, definition and naming, etc.
Log analysis – Number of visitors by Country and region
  – By date
  – by machine

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Data Resource Planning System

Medical Scientific Data Resource Analysis

- Basic Medical Data Resources
  - Medical Biology
  - Anatomy
  - Body Function
- Clinical Medical Data Resources
  - Diagnostic Information
  - Treatment Information
  - Nursing Information
  - Rehabilitation Information
  - Hospital Management
  - Clinical Research Teaching
  - Epidemiology
- Public Health Data Resources
  - Basic Public Health Information
  - Diseases Information
  - Health Risk Factors Information
- Chinese Medicine Data Resources
  - Chinese Medicine
  - Chinese Herbal Medicine
  - Acupuncture
  - Ancient books
  - TCM R&D
- Pharmacy Data Resources
  - Pharmacy Management
  - Drug Resources
  - Drug Research & Development
  - Drug Production
  - Drug Use
Data Query through metadata online links by connecting to Medical and Health Scientific Data Sharing Network, through metadata online links.

Direct browse data or input query.
Data Processing and Management Platform, dealing with online data producing, review and publishing.

Login on and operate data under corresponding permission.
Chinese Physiological Constants Database

- Heart Output

  - Range: 17-18 years
  - Sex: Male

  - Reference Value: 6.55 (3.23-9.48) L/min
  - Average (average $\pm 1.96 \times$ standard deviation)

  - Percentile Table

    | Percentile | P2.5 | P5  | P15 | P25 | P50 | P75 | P85 | P95 | P97.5 |
    |------------|------|-----|-----|-----|-----|-----|-----|-----|-------|
    |            | 3.71 | 4.20| 5.00| 5.30| 6.10| 7.10| 7.80| 9.10| 9.98  |

- Frequency Distribution

- See Chinese Physiological Constants Database for more details.
Chinese Digital Human Data Sets
### Public Health Scientific Data Applications

#### Cause of Death Data Sets Dynamic Query

<table>
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<tr>
<th>Disease</th>
<th>ICD10 Code</th>
<th>Mortality Rate (per 100,000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other Diseases</td>
<td>C19+CH5</td>
<td>15.3634</td>
</tr>
<tr>
<td>Diabetes</td>
<td>C10</td>
<td>1.3306</td>
</tr>
<tr>
<td>Lung Cancer</td>
<td>C15</td>
<td>2.6772</td>
</tr>
<tr>
<td>Esophageal Cancer</td>
<td>C12+</td>
<td>2.6772</td>
</tr>
<tr>
<td>Liver Cancer</td>
<td>C22</td>
<td>6.6931</td>
</tr>
<tr>
<td>Bladder Cancer</td>
<td>C67</td>
<td>9.0703</td>
</tr>
</tbody>
</table>
Public Health Scientific Data Applications

Cause of Death Data Sets online Analysis Model
【材料】
1. 试剂
   Beckman-Coulter
2. 试剂
   2.1 缓冲液 Buffer
   2.2 稀释液，磷酸
   2.3 试剂盒，磷酸
   2.4 指示剂
   2.5 质控品

【方法】
酶法（IFCC推荐）：

\[
\begin{align*}
\text{ALT} & \quad \text{ALT}
\end{align*}
\]
\[
\text{L-谷氨酸} + \text{丙酮酸} \quad \text{LDH}
\]
\[
\text{丙酮酸} + \text{NADH} + \text{H}^+ \quad \text{L-谷氨酸} + \text{NAD}^+
\]

上述酶偶联反应中NADH在340nm处光度的下降与样本中ALT的活性成正比。

【标本要求】
1. 种类： 血清，肝素或EDTA抗凝血浆，应避免溶血。
2. 量：  3ml静脉血，血清或血浆最小量不少于500μl。
3. 保存： 血清或血浆2~8℃保存稳定7天，15~25℃保存稳定3天。

【设备材料】
1. 仪器：OLYMPUS AU系列生化分析仪。
2. 试剂（OLYMPUS）R1： 100mMol/L Tris 缓冲液（pH 7.15），500mMol/L L-丙氨酸，0.2mMol/L
   L-谷氨酸，0.1mMol/L 丙酮酸，1mMol/L NADH，1mMol/L NAD+
Example of Pharmaceutical Scientific Data Applications

- **Pharmaceutical Targets Database**
  More than 75% visitors are from universities and research institutes. This shared database plays an important role in drug mechanism research, new drugs research and development and graduate education.

- **Medicinal Natural Bioactive Products Database**

- **Domestic Drug Database, Pharmaceutical Patent Database**
  Contains abundant information of Chinese medicine varieties and pharmaceutical patent information, and helps enterprises for research and register.

- **Averse Drug Reaction Database**
  Averse drug reaction cases in clinical use play an important role in guiding clinical drug use, and the visitors are mainly from clinical medical institutes such as hospitals.
TCM Scientific Data Center

我们提供以下数据库查询：

- 中医防治呼吸系统疾病数据库
- 中医防治遗传性病数据
- 中医防治肠胃数据
- 中医防治血液疾病数据库
- 中医防治消化系统疾病数据库
- 中医防治泌尿系统疾病数据库
- 中医防治神经系统疾病数据库
- 中医防治肿瘤数据库
- 中医防治心血管疾病数据库
- 中医防治儿科疾病数据库
- 中医防治免疫系统疾病数据库
Examples of Database
Actively push the sharing information to urban communities and rural areas
宽城县新农合患者就诊机构分布图（共5142人）
2007年1-11月

宽城县新农合患者外地就诊机构分布图（共298人）
2007年1-11月

宽城县新农合患者外地就诊疾病构成比（共59人）
2007年1月-11月

小庙沟村民健康档案疾病谱（共704人）
China’s rural tertiary medical and health services network construction
Training oncology professionals for hospitals at grass root level by the Data Sharing Network in 2009

<table>
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## Earthquake Relief

### Scientific Data Sharing Services on Public Health Emergencies

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<tr>
<td>5.12 Sichuan Earthquake basic injury data collection</td>
<td>Huaxi Medical University Information Center</td>
<td>Director Huang yong</td>
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<tr>
<td>5.12 Wenchuan earthquake medical and health reconstruction criteria</td>
<td>China National Institute of Standardization</td>
<td>Dean Zheng weihua</td>
</tr>
<tr>
<td>Shifang Population and health survey and the rural tertiary health service system construction</td>
<td>Shifang Health Bureau, Sichuan</td>
<td>Director General Liu can</td>
</tr>
<tr>
<td>5.12 Northwest minority healthcare and data sharing</td>
<td>Northwest Nationalities University Hospital</td>
<td>Dean He ye</td>
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内容概述

2008年5月12日，我国四川省汶川地区发生8级大地震，波及周边多个市县，目前已经有超过6万的人员伤亡（已确认）。在巨大的灾害面前，党中央和国家领导人的直接指挥下，全中国人民和在抗震救灾第一线的解放军武警战士们一起，通过各种途径和办法，为灾区人民挽救生命，重建家园做出不懈努力。

医药卫生科学数据共享网项目组在灾后召开了由项目领导、专家与工作人员共同参与的工作会议，就尽快组织并发布数据资源的工作做出了讨论与部署。希望通过医药卫生科学数据共享平台的特有方式，提供面向救灾应急需求的数据资源，为救灾工作做一份贡献。

目前，在各方收集资料的基础上，推出这一专题数据平台，主要包括文字科普材料和结构化数据资源两种类型。
12th May 2008, a 8.0 earthquake occurred in Wen Chuan, Si Chuan Province. It caused a series of population and health problems that were beyond ability of any one department, industry, profession, or discipline to deal with.

The network launched the post-earthquake Population and Health Scientific Database construction.
I will discuss…

1. Background

2. Healthy China 2020

3. China’s Scientific Data Sharing Project on Population and Health

International Cooperation

- October 2006, the first China-US Roundtable Conference on Scientific Data Sharing
- March 2007, Beijing Xiangshan Scientific Conference
- November 2007, Washington DC, China-US Roundtable Conference on Scientific Data Sharing
International Cooperation

CODATA Conference: In October 2006, Dr. Liu Depei presented a report on “Medical Scientific Data Sharing” at the International CODATA Conference, and aroused interests from international data organizations.
International Cooperation

In March 2007, Xiangshan Scientific Conference on International Biomedical Data Sharing in Beijing;
In October 2007, 2nd China-US Roundtable Conference on Scientific Data Sharing in Washington DC. 15 Chinese biomedical experts discussed bilateral cooperation on scientific data sharing with experts from NIH and NCI.
Healthy World 2020

Scientific Data Sharing Platform Vision

- Necessity
- Feasibility
- Pilot database
  - Gene Database
  - Proteome Database
  - Cancer Database
  - Neuro-informatics Database
Thanks