Predictive Analytics in the People's Republic of China

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AGENDA

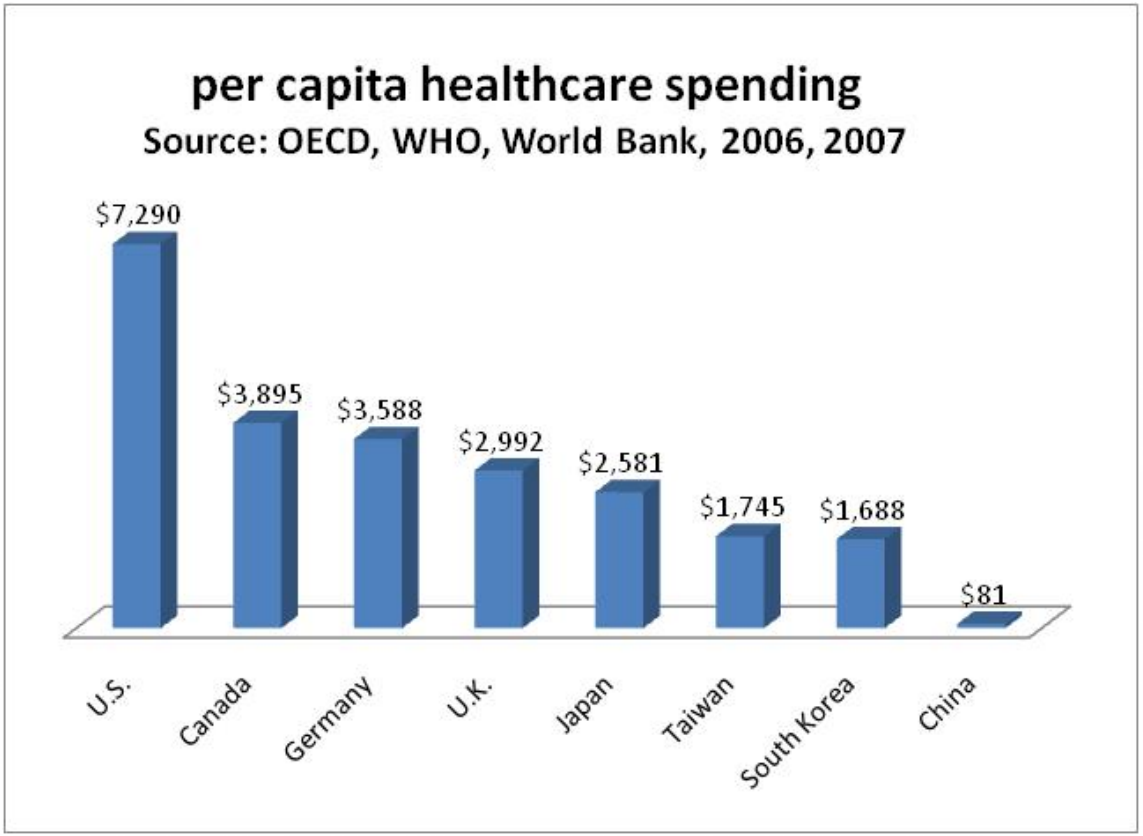
- Basic statistics about China
- Overview of China's current health care system
- Demand for predictive analytics in China
- Data sources and coding conventions
- Current research and development

Basic Statistics about China

- Rank 2nd in GDP, at $4.99 trillion
  - US is first at $14.3 trillion
- Rank 97th in GDP per capita, at $3,677
  - US is $46,442, rank 6th using PPP, or 17th using nominal GDP
- Exchange rate $1 ~ 6.8 yuan
- Annual GDP growth 9%

Source: CIA World Fact Book

Basic Statistics about China's Health Care



Life Expectancy: 73
Infant Mortality: 14.9 per 1,000

22% world's population, 2% world's health care resources.

China's health care spending is 4.7% of GDP.

2/3 of the population are in the rural area, supported by only 20% of health care resources.

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Chronic Disease Prevalence

- Chronic conditions account for 80% of deaths in China
- Hypertension: 18.1% of population (160 mil), increased by 33% in 10 years.
- CVD: 16% (230 mil)
- Diabetes: 9.7% (92 mil) adult diabetes, 15.5% (148 mil) prediabetes.
- Overweight and Obesity: 8.1% children age 7-17, 22.4% adults
- Liver: 15% nonalcoholic fatty liver

Source: NEJM 2010, 2007 China's National Health and Nutrition Survey, 2009 China's Cardiovascular Disease Report


中国教育新闻网
WWW.JYXB.COM.CN

Challenges in China's Healthcare System

- Demand side:
  - aging population
  - industrialization, urbanization, changes in natural environment

  →changes in lifestyle and social values

  →changes in disease profile and prevalence in the population
- Supply side:
  - Inequality in resource allocation by geography
  - Focus on treatment instead of prevention
  - Perverse incentives due to physicians' compensation structure

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Healthcare Policymaking

- 14 different ministries and commissions are involved in China's public health and healthcare policymaking.
- Key organizations are:
  - Ministry of Health
    - Rural healthcare, New Cooperative Medical System
  - Ministry of Human Resources and Social Security
    - Medical insurance for urban workers and residents
  - Ministry of Finance
    - budget
  - National Development and Reform Commission
    - Reform initiatives and policy oversight

Healthcare Coverage Types

- **Rural: New Cooperative Medical System**
  - Started in 2003, 100% reach at village level as of 2010
  - Voluntary, county level, multiple sources of funding (central + local)
  - Basic coverage
- **Urban: workers medical insurance and residents medical insurance**
  - Workers medical insurance started in 1998
  - Residents medical insurance started in 2007
- **Private insurance**
  - Chinese insurers dominant, foreign insurers 5% in market share
  - Starting in 2011 foreign insurers are allowed to enter the China market for individual and group health insurance
- **Medical assistance (free care)**

China's Current Health Reform

- Improving the healthcare system is a high national priority.
  - State Council 4/2009 "Notice about Deepening Health Care System Reform"
    - Social welfare, inequality, affordability, healthcare system insufficiency and inefficiency, resource allocation,
    - $124 billion initial investment between 2009 and 2011
    - Basic coverage for 90% of the population by the end of 2011.
    - More comprehensive coverage by 2020
      > MoH "Roadmap to Healthy China 2020"

China's Current Health Reform

- Reform highlights:
  - Investment in
    - public hospitals: 2,000 new in 2009-2012
    - community health: 3,700 new community health services centers, 11,000 new community health services stations
    - traditional Chinese medicine
  - private sector allowed to invest in public hospitals or take over the management
  - commercial health insurance supplement basic coverage provided by the government.
  - National drug directory and drug price reform
  - Provide coverage for seniors, children and disabled through urban residents' medical insurance
  - Medical informatics
  - Payment reform – DRG, capitation, P4P

Coding and Data Collection

Rural New Cooperative Medical System:

- Ministry of Health, 2005 “Guidelines for NCMS Information Systems”
  - Software development guidelines
  - Information Security
  - Coding , formatting, data fields
    - MoH’s coding of diseases, specialties, provider types, procedure codes, hospital discharge status, etc.
    - All in Chinese. Possible to crosswalk in some categories.
  - As basis for reporting and establishing Information Exchanges

Coding and Data Collection

Urban workers medical insurance

Urban resident medical insurance

Migrant workers medical insurance

- Ministry of Human Resources and Social Security
  - Inpatient discharge data with diagnosis codes
  - Weak outpatient data. Diagnosis codes often not required.
  - Big variations in file layout and detail level by geography
  - Defer to local governments on benefits, allowed medical devices and diagnostic tests
  - National Drug List, defer to local governments on additional drugs to cover and level of benefits

Demand for Better Analytics

- Rural NCMS
  - Fixed contribution for all age/sex; county level risk pools
    - → Deficit in case of catastrophic events, rare diseases, high-cost patients
      - → Need risk assessment and risk adjustment to set reasonable budget, and perhaps merge risk pools

- Urban Healthcare
  - Under utilization of primary care and community health centers; overcrowding at hospitals for nonurgent care
    - → Reform primary care and community health centers: staffing, communication with patients, case management, referral, care integration, capitation
      - → Need risk-based physician payment systems and predictive analytics for medical management

Demand for Better Analytics (cont.)

- Urban Healthcare
  - Hospital reform: management & compensation
    - DRG pilots in a few hospitals; high priority
      - ICD-10 codes.
      - weak in claims audit and chart review
      - serious concerns about upcoding.
    - Contracting with private entities in hospital management
    - Private investment and takeovers of public hospitals
      - Suqian hospital reform 2000-2006

    → Need to recalibrate DRGs to China's data

    → Need independent quality accreditation

    → Need best-practice guidelines

Demand for Better Analytics (cont.)

- Chronic disease specific
  - Hypertension management and intervention has 50+ years of history in China
  - Identification of early stage or pre-condition population
    - HRA tools since 2003 (SARS)
    - Comprehensive physical exams
  - Disease management or community based chronic disease management ?
    - Public sector: prefers using community health centers for chronic disease management
    - Private insurers: fierce price competition, low margins; interested in pilots and performance guarantees.

Predictive Analytics Applications

No claim-based predictive modeling at the present time.

Commercial use of scoring methods and HRA tools:

- HRA research committee under China's CDC
- Proprietary HRA tools developed on China's data
- Specific scoring tools, e.g., ICU scoring systems, disease-specific scoring

Disease risk prediction models based on health screening data on large populations

- long range prediction
- Divide factors into short-term and long-term groups, and model short-term risks first
- Long term risks are modified using long-term factors such as lifestyle and behavioral factors (smoking, exercise)

Predictive Analytics Applications

Small scale research studies , not yet commercialized:

- DRG feasibility studies
  - Based on the Australian & German DRG systems
  - Code set modified, but weights are not
  - Validated on data from hospitals in Beijing
- Predictions of health care spending using survey data and regression techniques
  - Limited to specific geographic area and demographics
- Neural Network models for predicting medical errors and malpractice.