“Let Data Run More, So, Patient Can Run Less”

Using digital health tools to improve the accessibility of high-quality PHC services in a poor rural county, Yangqu, China

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Overview of Yangqu county

- Yangqu is a county of Shanxi Province, North China.
- The county has a land area of 2 700 square kilometers, a permanent population of 128 thousand people,
- Jurisdiction over 10 town/townships and 128 administrative villages/neighborhood committees.
- It was one of provincial level poverty county in Shanxi province.

Three tier healthcare system and key challenges in rural China

Facilities	HRs	Beds	Pop coverage	Services
County hospital 	~200-300	~200-300	~200-300K	▪ Diagnosis and treatment of common and frequently-occurring diseases ▪ Emergency and critical diseases treatment, complex diseases referral ▪ Specialist services ▪ Training and technical supports to lower-level facilities.
Township health center 	~20-30	~20-30	~10-20K	▪ Diagnosis and treatment of common and frequently-occurring diseases ▪ Emergency treatment and two-way referrals ▪ Public health services including control of infectious diseases, chronic diseases management etc.
Village health post 	~1-3	None	~1-3K	▪ Initial diagnosis and basic treatment of common diseases ▪ Provide basic public health services including health education, disease prevention etc. ▪ Referral and patient management services ▪ Preventive and public health services

SOURCE: 2014 National Health and Family Planning Development Report; Lit search; Team analysis

The establishment of a Cooperative Health Alliance (CHA) in 2017
- A vertical integrated delivery system

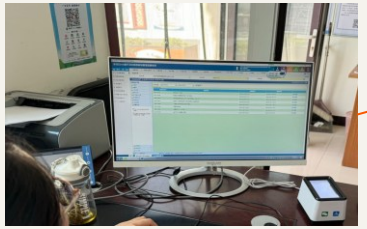
- *Integrated governance/Administration/Operation*
  - *Legal representative, leadership team, workplan, service standards, and capacity building*
- *Integrated human resource*
  - *Manpower management and allocation*
- *Integrated financing mechanism*
  - *Global budget payment and shared financial responsibilities (loss or profit)*
- *Integrated asset/financial management*
  - *Asset/capital resource allocation, financial management*
- *Integrated pharmaceutical-purchasing system*
  - *Centralized bulk-purchase and integrated distribution system*
- *Integrated performance management system*
  - *Integrated performance measurement system tied with financial incentive mechanisms*

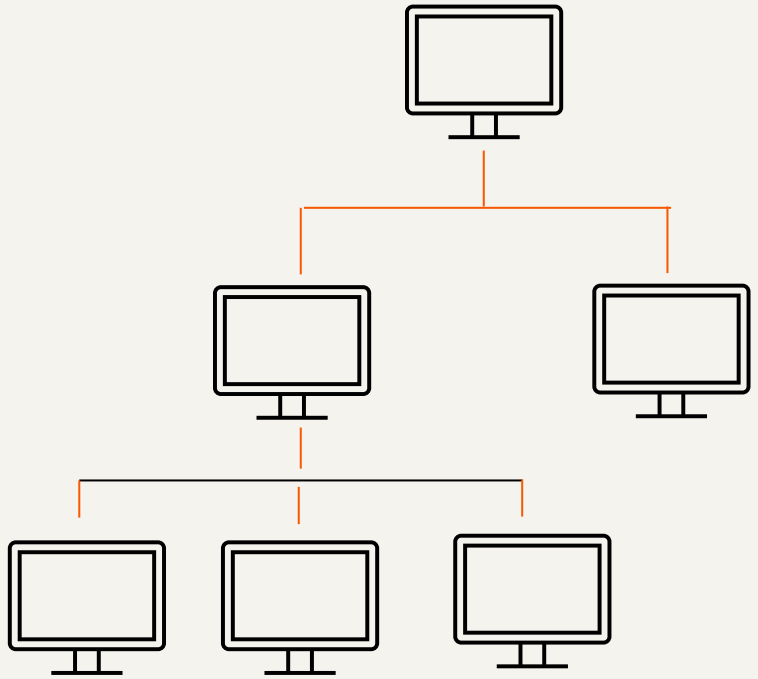
Integrated information system with e-tech enabled PHC services

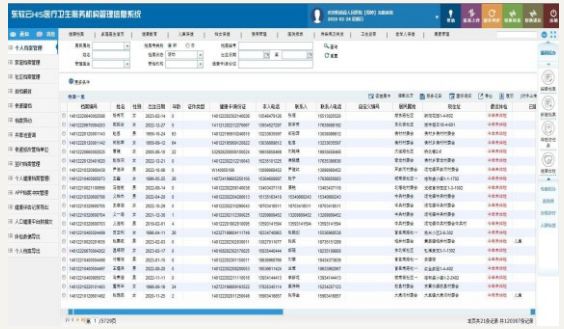
- Integrated information system as the backbone for all digital health technologies
  - An initial investment of over ￥17m (Chinese Yuan) has been made to establish an integrated information system
  - The information has been used for performance management/financial incentive estimation and resource allocation decision makings.
  - It has also been used for patients and management (upward and downward referral and patient tracking)
- Digital health technologies used at the community/village health post level
  - All-in-one health machine with the Tele-ECG (￥9600 Chinese Yuan/per machine for 96 village health posts)
  - AI-based medical assistance （￥10000 Chinese Yuan per village health post)
  - Tele-medical consultation (costs are covered by initial investment)
  - Medical decision training app (a pilot project)
- Additional digital health technologies used at the township health center level (as part of PHC services)
  - AI-based medical assistance
  - Tele-medical consultation
  - Remote imaging network
  - *Remote/mobile ECG monitoring network*
  - Remote lab test system

Integrated information system-the backbone of integrated healthcare and digital health use

Data is collected in community and rural doctor's office







Data enters integrated information system shared with all healthcare providers in the system

Date is used for medical decision making, service tracking, and patient management

All in one health machine:

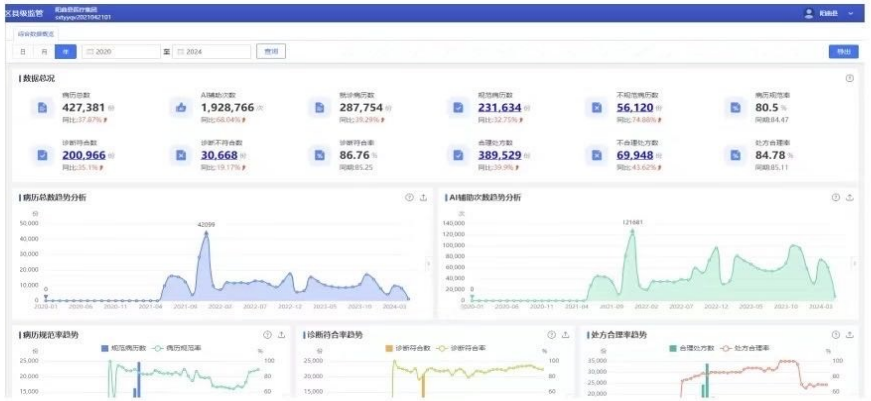
Key functions

- Blood pressure, blood glucose, blood oxygen.
  - These measurements will be for the diagnosis and treatment by the rural doctor at the community level, and will be directly entered into the medical record
- ECG
  - This measurement results will be sent to the doctors at higher level facilities via internet, and the diagnostic results will be sent back to the rural doctors for the diagnosis and treatment
- Medical record
  - The ID will be used to turn on the tests and the results will be directly entered into patient's medical record to track the changes overtime

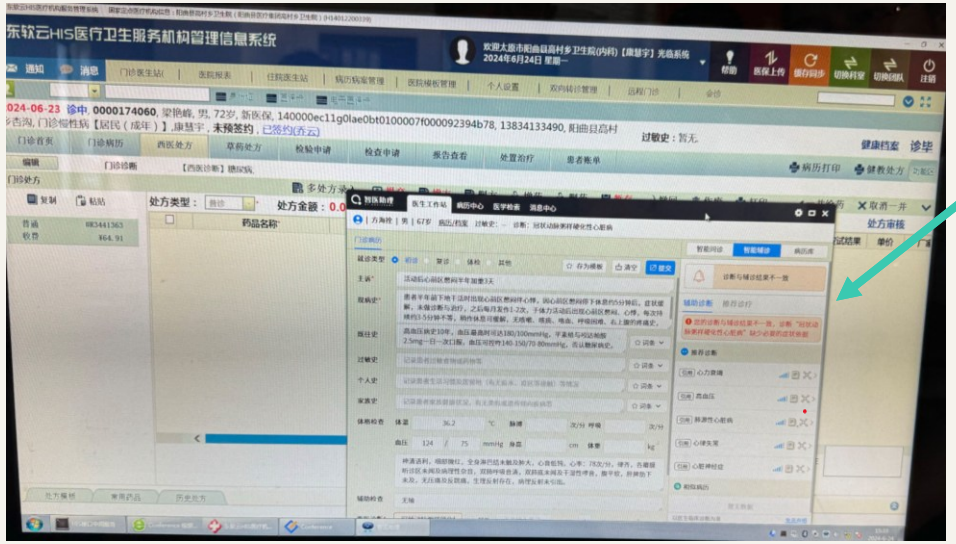
Artificial intelligent-based medical assistance

- Standardized medical records template
- Standardized diagnostic procedure
- Treatment recommendations

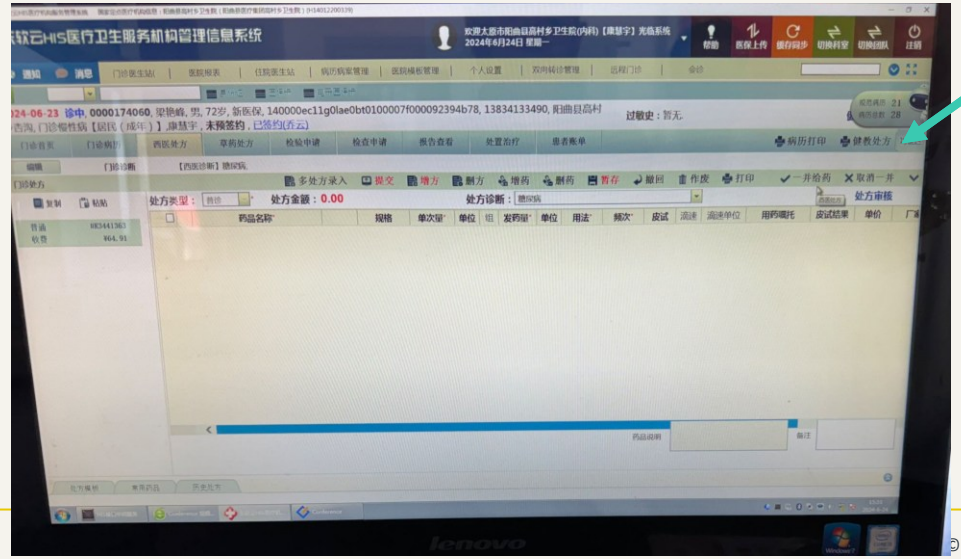
Since May 2021, over 278K medical records have been written, about 80% of these records complied with the established standards



The comply rate in April 2024 was 87%, which is 1.4% higher than the rate in Mar 2024

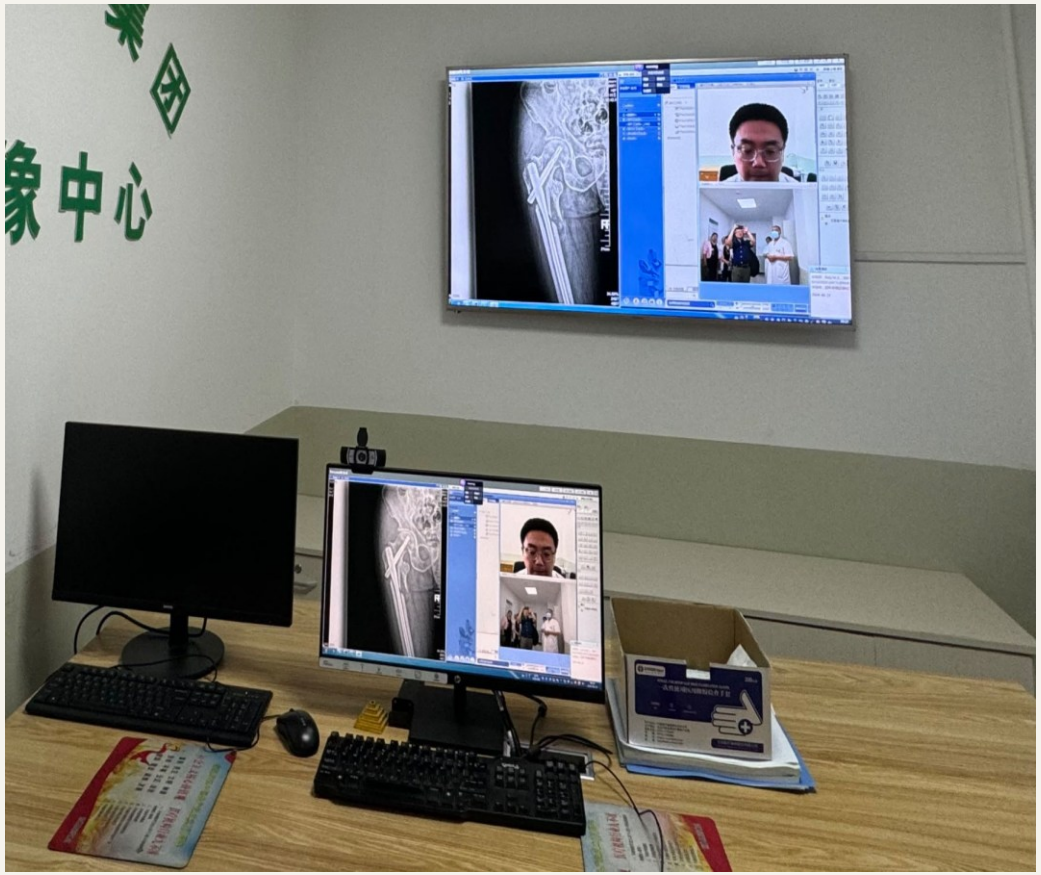


A warning if the diagnosis does not align with the AI's recommendation



A reminder about the number of medical records that comply with the established standards

Tele-medical consultation and medical training app



Tele-medical consultation procedure can be carried out from three approaches (free of charge).

- Medical record approach
  - Rural doctor can send the medical record to the relevant doctors at higher level facilities for consolation. The doctors at higher level facility will send his/her recommendations back to the rural doctors at the PHC level
- Telephone approach
  - Rural doctor can call the relevant doctors directly via telephone
- Video approach
  - Rural doctor can initial this tele-consultation via a video call as well.

Tele-medical consultation and medical training app

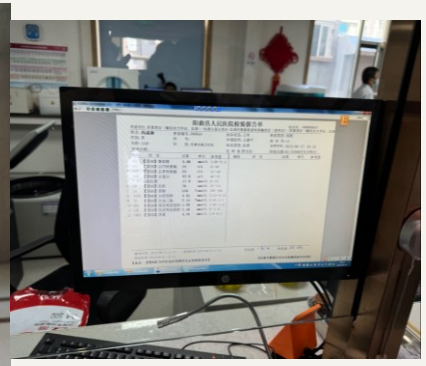
The "Zhiqu Medical Education Cloud" system, established in 2014, covers different functions such as teaching, learning, training, examination, evaluation, management, etc. The core is to improve the clinical decision thinking training.

- This system focuses more on hospital-based services training
- Recently, it has been expanded its contents to PHC-based services

In the future, this cloud-based education system is expected to build artificial intelligence as the core.

Remote imaging, ECG, and Lab-test networks

- The “samples” are collected at township health With this system, township can take the digital x-ray photo and send it to the county x-ray diagnosis center
- The “samples” are sent to the county diagnosis centers for the diagnosis, and results and suggestions are sent back to township for medical decision making.



- The use of these digital health technologies yields significant savings.
- These savings include the saving from the prices difference between county and township level price difference as well as the savings from potential salaries of specialists hired at the township levels.
- These savings reduced the cost of health insurance, the OOP from patients, as well as government healthcare spendings

Key achievement and Challenges for potential improvement

- Achievement
  - **Access**, bringing more services at lower facility level
  - **Quality**, making high-quality services at lower facility level
  - **Cost reduction**, using lower prices than the prices at higher facility
- Challenges
  - Quality of the inputs of AI learning
    - Requirement of additional skills/capabilities to assess and make decision on follow/not follow the AI recommendations
  - Increase of the scope of work and the workloads
    - More patients with additional health conditions can be treated at the local level with digital health assistance, which requires more knowledge/skills/capabilities at the local level.
  - New digital capacities/skills with short-term/solution-based training requirements
  - Digital technical challenges
    - System update and compatibility: (information systems introduced by different agencies)
    - Stability of the internet
    - High upgrade and maintenance costs