Web-based Tuberculosis Recording and Reporting System in China

National Center for Tuberculosis Control and Prevention, China-CDC

11 March 2011
Overview

- Infectious Disease Surveillance System
- Tuberculosis (TB) Reporting System
  - First version (2005)
  - Second version (2009)
- Data quality control
- System application-PPM
Chinese Infectious Disease Surveillance System

- 2004: launch of disease surveillance system - after SARS
- Vertical from national to the lowest level (township)
- 37 notifiable infectious diseases to be reported by law
- Web-based, real time, case based reporting
Features of the Web-based Reporting System

Unified Management of Data: Collection, Management, Utilization, Publication

Data Reporting → Data Management → Data Utilization → Information Publication

Data Center, China CDC

VPN

Connection and Application Service

Database

Hospitals

Township clinics

County CDC

Others

Data Collection

Display and Application of the Data

Ministry of Health

Health Bureaus

CDCs at all levels

Others

Statistical Report

Instant Reviewing

Analysis

Data Mining
SOP for instant surveillance with individual case reports and management on all levels

Data flow and management

hospital

Suspect by clinical diagnosis

County health bureau

County CDC

prefecture health bureau

Prefecture CDC

Provincial health bureau

Provincial CDC

China CDC

MOH

Report card of infectious disease

Questionnaire for individual cases

County CDC

Prefecture health bureau

Prefecture CDC

Provincial CDC

China CDC

MOH

National data center

Hospital

Suspect by clinical diagnosis

Case investigation

Detection, diagnosis

Input

Correct

Report card of infectious disease

Questionnaire for individual cases

Precheck

Feedback

Analysis

Result

Publication

Info flow

Work flow

Trace, correct, investigate

Feedback
By end 2008, web-based reporting covered 100% of CDCs, 96.98% of county and above hospitals and 82.21% of township level clinics. Up to 68,000 users (facilities).

Every day, about 25,000 infectious disease cases are reported.
NTP guidelines ask for reporting of care-seeking information of all registered pulmonary TB cases

Built in the national infectious disease surveillance system

Information on TB cases: registration, treatment management and outcome

Information on NTP managerial activities: drugs, training, supervision, finance
### Information exchange between the two systems

<table>
<thead>
<tr>
<th>First report but not show up in TB facility</th>
<th>First diagnosed in TB facility</th>
</tr>
</thead>
<tbody>
<tr>
<td>First report but not TB</td>
<td>First suspect report and confirmed TB by TB facility</td>
</tr>
<tr>
<td>First suspect report and confirmed TB by TB facility</td>
<td>Send back after check</td>
</tr>
<tr>
<td>First case report and confirmed TB by TB facility</td>
<td>Send</td>
</tr>
<tr>
<td>First diagnosed TB in TB facility</td>
<td>First diagnosed TB in TB facility</td>
</tr>
</tbody>
</table>

In surveillance system

In TB system
Implementation process

- 2003: review of information flow procedures and need analysis
- Beginning 2004: finalize design
- First half 2004: design the software
- Second half 2004: pilot in 4 provinces
- End 2004: cascade training all levels
- 2005: national-wide implementation

- NOTE:

  Parallel reporting of paper based and electronic data to ensure data quality
Lessons learnt

Strengths

• Individual case data of TB patients
• Timely and real time data transmission
• Link and information exchange with the infectious disease surveillance system
• Automatic generation of tables
Weaknesses

- Some redundant information
- Workload for staffs (number of variables and parallel reporting)
- Slow speed of internet affects data input
- Management and output information functions are weak
- Limited number of automated tables
- HIV, MDR, migrant data not collected and analyzed
- Inflexibility for review
- Data use by users – weak !!
Tuberculosis Recording and Reporting System (second version)

- Modifications
- To change the B/S structure into C/S structure, add client software at county level
  - Server software at national level
    - Collect only core information of NTP through internet or client transfer
  - Client software at county level
    - Meet management demand
    - Data saved in local computer for analysis
- Easy operation interface (GUI) and scientific operation procedure
Features of the second version

- Only core information, no redundancy
- New contents: MDR-TB, TB/HIV, migrants
- All statistical forms can be saved and reviewed on the stable page, to reduce the burden on the system
- Structure of the system: the client is added and the management function is strengthened
- Interface of the system is simple and clear, easy to understand and user-friendly
## Comparing the first and second version

<table>
<thead>
<tr>
<th></th>
<th>First version</th>
<th>Second version</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Structure</strong></td>
<td>Only one server software</td>
<td>Server + client software</td>
</tr>
<tr>
<td><strong>Data input</strong></td>
<td>Online</td>
<td>Online for server, Offline for client</td>
</tr>
<tr>
<td><strong>Contents</strong></td>
<td>“three registration books” and information of patients taking drugs</td>
<td>Server only collects core Information of NTP, including HIV, MDR, migrant; other information are on client</td>
</tr>
<tr>
<td><strong>Output</strong></td>
<td>Basic statistic function</td>
<td>Enhanced statistic function</td>
</tr>
</tbody>
</table>
Implementation process

- End 2006: Review of information flow procedures
- 2007: Needs analysis
- Beginning 2008: finalize design
- Second half 2008: Pilot in 4 provinces
- End 2008: Training on different level
- Since March 2009: Nation-wide implementation
Modules and functions

- **Reporting card management**
  - Look through the reporting card
  - Look through the excluding card

- **TB Patient’s file management**
  - Registration
  - Management
  - Management of MDR-TB suspects
  - Management of transfer-in/transfer-out of floating TB patients (internal migrants)

- **Project management**
  - Project information update
  - Project initial information form
Modules and functions

- **Input quarterly reports**
  - Drug management, sputum smear examination, contact tracing, township sputum smear examination sites, supervision, IEC, training, etc.

- **Input annual reports**
  - Funds, equipment and human resources
Modules and functions

- **Statistical analysis forms and routine surveillance reporting forms**
  - Reporting and referral from non-TB facilities, tracing of TB facilities
  - Notification of TB patients
  - Sputum conversion at the end of 2nd and 3rd month of treatment
  - Treatment outcomes
  - MDR-TB, TB/HIV, migrant

- **Quality control (automatic check and reminding)**
  - Timely input of the patient’s file and reporting card
  - Chest X-ray data input
  - Sputum smear examination results data input
Modules and functions

- **Reminding function during treatment**
  - Follow-up visits to pick up drugs
  - Follow-up visits for sputum smear examination

- **Individual management**
  - Set up the management unit, supervision unit and DST unit

- **Basic data management**
  - Information on tracing, source of TB suspects, TB category, sputum smear examination, treatment outcomes, etc.
# Modules and functions

## Tuberculosis Management Information System

<table>
<thead>
<tr>
<th>患者基本信息</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>姓名</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>身份证号</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*性别</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>出生日期</td>
<td>2008-04-22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*生日不满20岁</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*民族</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*职业</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*户籍类型</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>患者现住址属于</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>现地址</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>现地址详细</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>患者联系电话</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>患者工作单位</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Data quality control

- Assign trained staffs to input
- Data audit of the system
- Quality control of the system
  - Analyze all kinds of error
- SOP manual
- Data quality assessment manual
- Individual investigation of missing reports
- Supervision and feedback
System application

PPM
Situation of TB case detection before 2003

Main reason for low case detection:
weakness of collaboration between general hospitals and TB dispensaries

- Low DOTS coverage
- Low successful case referring rate
- No follow up of patients diagnosed in general hospitals, referred but not arrived in TB dispensary.
New Policy in 2004

To strengthen the collaboration between General Hospital and TB Institution, including:

- All Pulmonary TB cases and suspects detected in general hospitals should be reported into Webb Based Infectious Disease Surveillance System.

- All general hospitals must refer TB patients to TB institutions.

- All TB institutions must follow up the PTB patients who have not arrived in TB dispensary.
Use of Internet Based Infectious Diseases Surveillance System to improve Case detection

PTB patients diagnosed in general hospital

Patients/suspects reported to the internet and referred to TB dispensary by hospital

Patients who failed to go to TB dispensary

Successfully arrived

TB dispensary (Registered, free diagnosis and treatment)

Tracing by TB staffs
Fig 1 Situation of cases reported by hospitals, 2004-2007

- Smear (+)
- Only Culture (+)
- Bacteria(-)
- No examination done

<table>
<thead>
<tr>
<th>Year</th>
<th>Smear (+)</th>
<th>Only Culture (+)</th>
<th>Bacteria(-)</th>
<th>No examination done</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>69142</td>
<td>295765</td>
<td>100101</td>
<td>200000</td>
</tr>
<tr>
<td>2005</td>
<td>77491</td>
<td>492137</td>
<td>112409</td>
<td>300000</td>
</tr>
<tr>
<td>2006</td>
<td>80068</td>
<td>130744</td>
<td>601053</td>
<td>400000</td>
</tr>
<tr>
<td>2007</td>
<td>76663</td>
<td>144930</td>
<td>685403</td>
<td>500000</td>
</tr>
</tbody>
</table>
Fig 4 Contribution to total arrival rate, 2004-2007

Over time, the contribution to the total arrival rate changed, with referred arrivals and tracing arrivals showing different trends. In 2004, referred arrivals constituted 42.7% and tracing arrivals 16.0%. By 2007, referred arrivals increased to 46.4%, while tracing arrivals dropped to 31.5%. This indicates a shift in the composition of arrivals over the years.
Fig 5  Total number of smear(+) cases and those who came from hospital, 2004-2007

- 2004: Total no. of SS+ = 497118
- 2005: Total no. of SS+ = 563871
- 2006: Total no. of SS+ = 546829
- 2007: Total no. of SS+ = 536847

- No. of SS+ from hospital:
  - 2004: 81038
  - 2005: 127488
  - 2006: 160195
  - 2007: 176607
Conclusion

- The internet-based infectious diseases surveillance system has strengthened the hospital and TB dispensary collaboration.

This significantly contributed to the TB case finding efforts in China.
Next steps

- Improve data entry and statistical function for MDR-TB and TB/HIV

- Improve capacity to analyze data
THANK YOU