



Southern Medical University



SNOMED CT Case Studies



Case Studies

Honghu Public
Health
Surveillance
System

COVID-19 Control

Mortality
PredictionCase
ManagementHonghu Public Health
Surveillance System

As a rapid response to the COVID-19 outbreak in China a public health surveillance system was developed and deployed within 72 hours in Honghu, Hubei province, a city of over 900,000 people, and 145 kilometers (90 miles) from Wuhan. This system collected daily, structured electronic medical record data from nine hospitals; real time information about symptoms and personal contact history from the WeChat social media platform; and daily reported case diagnosis information from labs and a public health information system. The high coverage (over 95% of residents) and daily active reports demonstrated the feasibility of intense monitoring during the COVID-19 epidemic.

The data feeds were loaded into a health data platform with a common data model that was built for the storage, management, and analysis of the integrated COVID-19 data. Vocabulary control in the data platform was achieved by using SNOMED CT Chinese synonyms for symptoms and the disease, and LOINC for tests.

The data was used by policy makers to strengthen the checkpoints on the full chain of COVID-19 control, including “early test, early report, early isolation, early support and early treatment” during the outbreak.

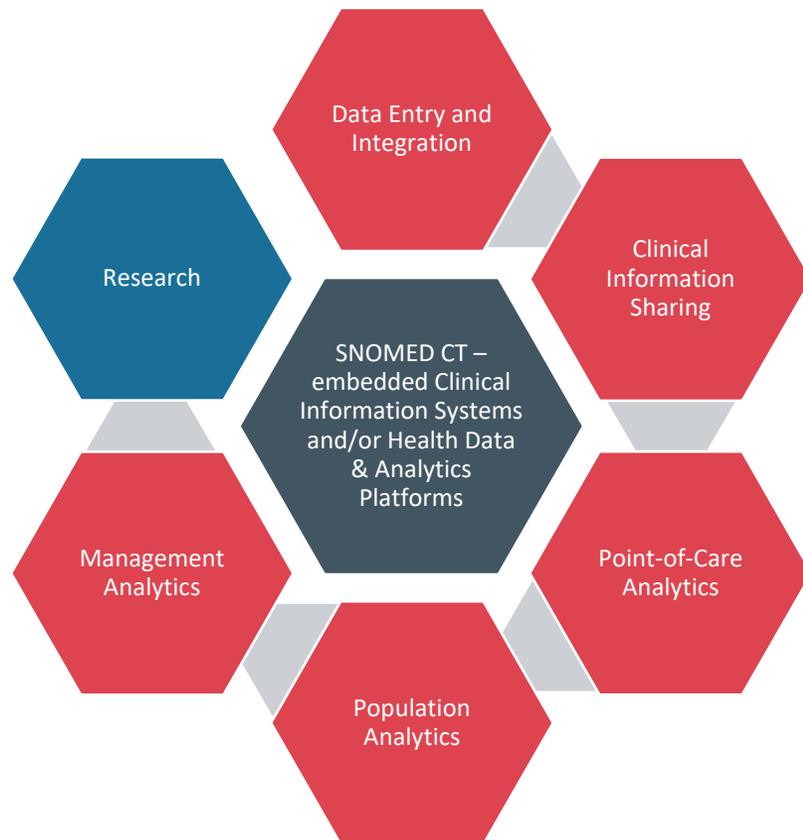
In addition, using the medical record data an in-hospital mortality prediction model was created for patients with COVID-19 to improve the clinical care, decrease death risk, and prioritize limited medical resources. About 10% of patients were classified as high-risk. They were either relocated to the single hospital in the area that had an intensive care unit or screened with important biochemical markers more frequently.

The WeChat social media platform was also used to register discharged patients and have them report their symptoms daily in the 2 months after discharge. 100% coverage was achieved within 3 days.

Further details on the Honghu Public Health Surveillance System Case Study are included in Appendix 5 [here](#).

Case Study #9

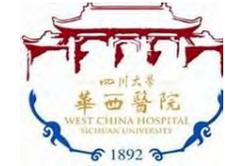
Public Health Surveillance



Southern Medical University



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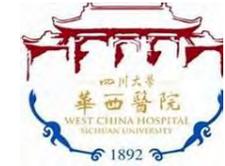


Case Study #9

Public Health Surveillance

China – Public Health (COVID-19) Surveillance in Honghu, Hubei.

- The outbreak of the coronavirus disease (COVID-19) in China and many other countries has put huge pressure on the health care system. One method of controlling the communicable diseases is the use of a surveillance system to track the exposed and infected individuals, as well as clinical outcomes. However, traditional surveillance systems have limitations in terms of timeliness, spatial resolution, and scalability. Meanwhile, reporting from these systems tends to be national or regional with insufficient information about diseases at the community or city level, which caused low efficiency for the social distancing and quarantine measures.
- In response to this significant challenge the Honghu Hybrid System (HHS) was developed at a cost of USD\$430,000 as a pilot for COVID-19 surveillance and control. It was successfully deployed within 72 hours in Honghu in the Hubei province, a city 145 kilometers (90 miles) away from Wuhan (the capital city of the Hubei province) with a population of over 900,000 people.
- This system (see schematic overleaf) collected daily structured electronic medical record data from nine hospitals; real time information about symptoms and personal contact history from the WeChat platform (one of the largest mobile social network apps in China with more than 1 billion monthly active users); and daily reported case diagnosis information from one third-party polymerase chain reaction lab, one third-party antibody lab, and one public health information system. A novel mini program using the WeChat platform software development kit was created for symptom reporting and spatial data collection.

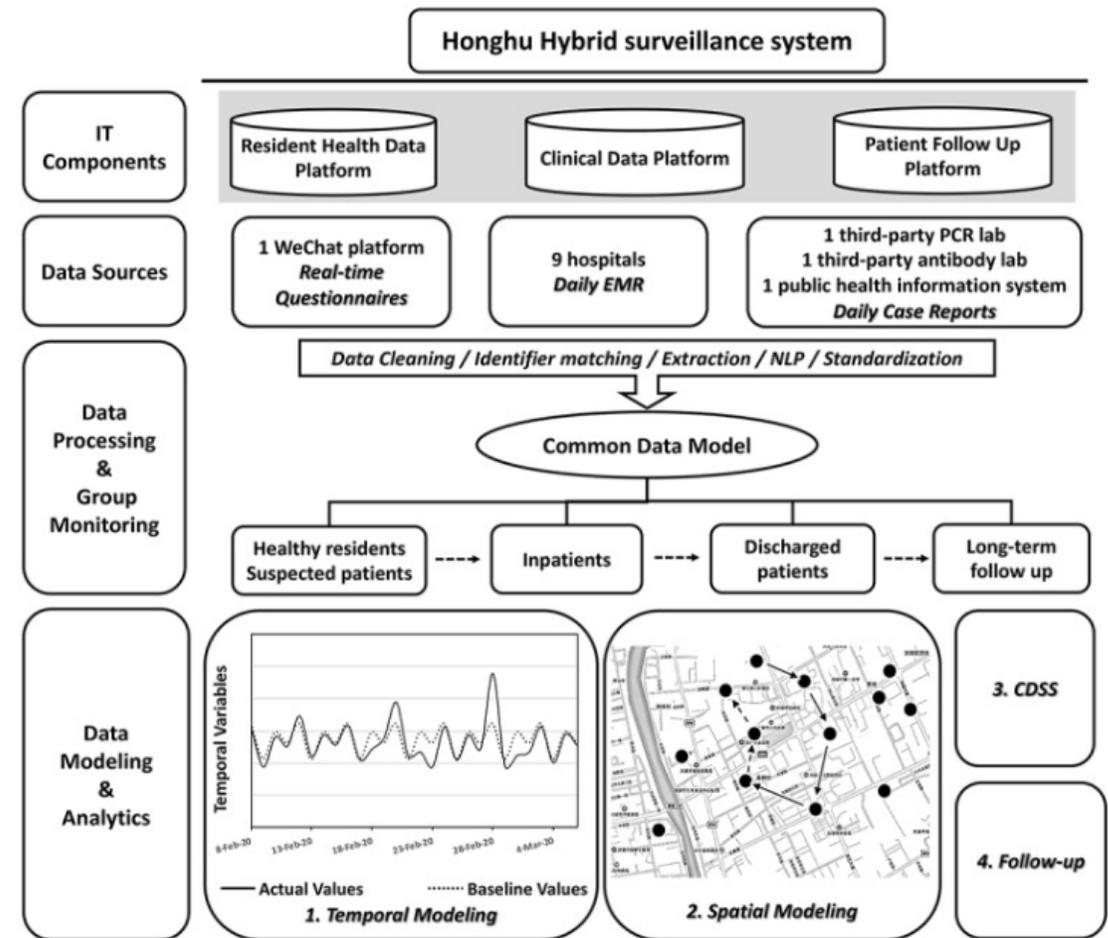


Case Study #9

Public Health Surveillance

China – Public Health Surveillance in Honghu, Hubei.

- The data feeds were normalized temporally and spatially and then loaded into a common data model that had been built for the storage, management, and analysis of the integrated COVID-19 data.
- Vocabulary control was implemented based on the **SNOMED CT** synonyms in Chinese for symptoms and the disease itself. LOINC was used to code-related tests and ICD-10 CM codes for the diseases based on the coding standards released by the National Health Commission of China.
- Syndromic surveillance was implemented on a mobile phone–based social media platform targeting different groups of individuals (e.g. I am experiencing a cough today). This included the general population, in hospital and discharged patients, people with higher risk of infection (i.e. those with travel history to Wuhan, contact history with confirmed cases, or under medical observation in isolation sites), and health care professionals (i.e., doctors, nurses, public health experts, and social workers).





Case Study #9

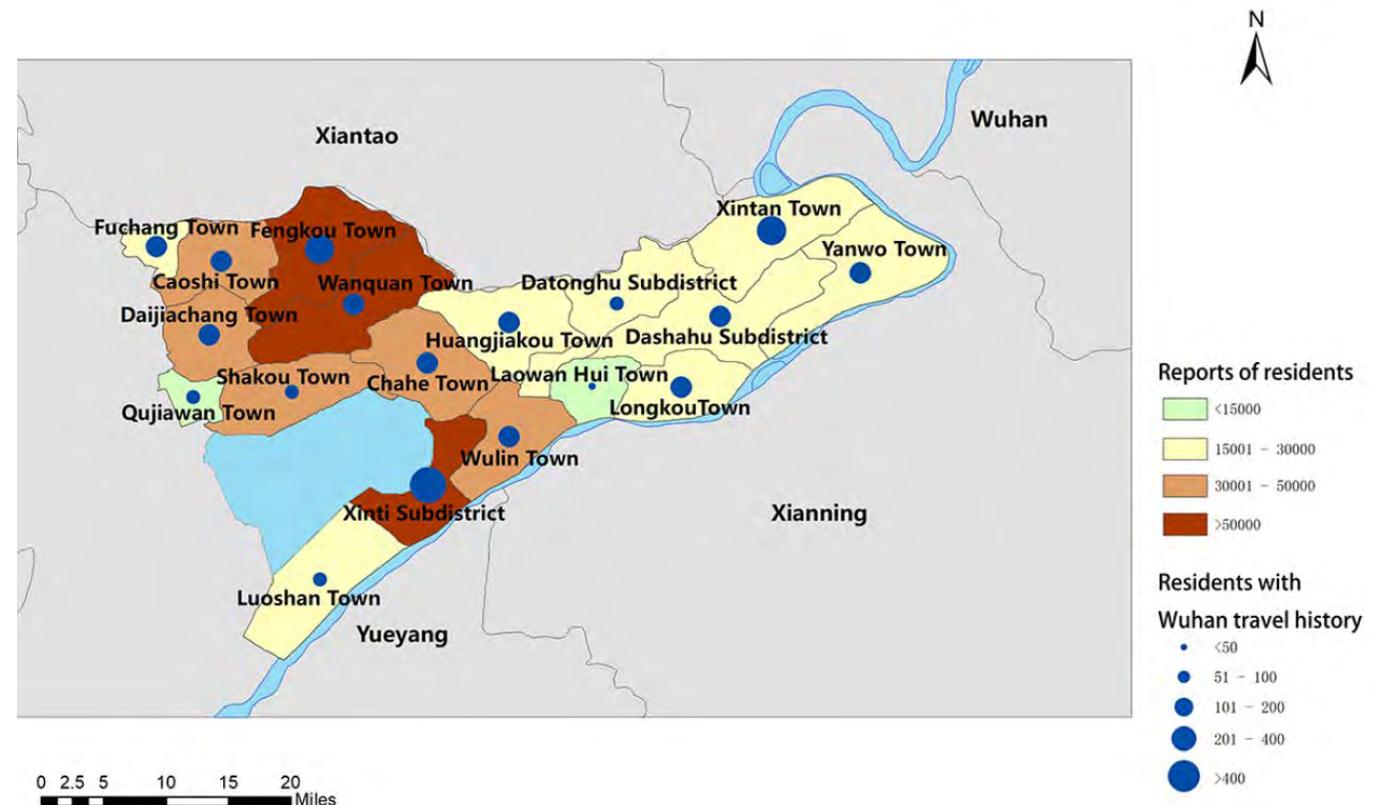
Public Health Surveillance

China – Public Health (COVID-19) Surveillance in Honghu, Hubei.

- The high coverage (over 95% of the residents) and daily active reports (up to 900,000 person-times) demonstrated the feasibility of intense monitoring during the COVID-19 epidemic.

Policy Making Decision Support

- Monitoring the fluctuation and trends analysis of the syndromic surveillance data supported policy-related decision making. **The large population size, plus the stability and fluctuation of the trends provided strong evidence for local authorities to evaluate the effectiveness of disease management and make timely adjustments** accordingly. Spatial analyses also played a critical role as clustering of exposed residents indicated by the concentration of patients in a part of the city further illustrated high risk for local outbreaks and would then trigger home visits by social workers.





Case Study #9

Public Health Surveillance

China – Public Health (COVID-19) Surveillance in Honghu, Hubei.

Clinical Decision Support and Resource Management

- A clinical decision support system based on an in-hospital mortality prediction system was built for patients with COVID-19 to **improve the clinical care, decrease death risk**, and **prioritize limited medical resources**. Based on the Multilobular Infiltration, Hypo-Lymphocytosis, Bacterial Coinfection, Smoking History, Hyper-Tension and Age (MuLBSTA) scoring system, which is a partially validated prediction system for the in-hospital mortality of patients with COVID-19. About 10% of patients were classified as high-risk (MuLBSTA score ≥ 12). They were either relocated to the single hospital in the area that had an intensive care unit or screened with important biochemical markers more frequently.

Follow-up of Discharged Patients

- We used the social media platform to register the discharged patients and required the patients to report their symptoms daily in the 2 months after discharge. After the follow-up system was initiated, **100% coverage was achieved within 3 days**. The reported recurrence of symptoms such as high fever was linked with home visits by social workers inside communities and readmission to hospital.

Conclusion

- Based on the field study in Honghu city, the Honghu Hybrid System has been observed to be effective and feasible for COVID-19 surveillance and control. It helped strengthen the checkpoints on the full chain of **COVID-19 control, including “early test, early report, early isolation, and early treatment”** during the outbreak.



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