Real Time Influenza Surveillance in community

GIHSN Annual Meeting 2016
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Transform Health Data into meaningful information

Agenda

Health Data Analytics: a new paradigm in public health
The design of the indicator - Methodology
Real-time influenza surveillance in community
Real-time monitoring of seasonal flu vaccination
Health Data Analytics: a new paradigm in healthcare

- The availability of massive volumes of healthcare data from various sources, combined with new capabilities in their treatment is generating a new paradigm in our healthcare system.

- This is opening up large horizons in public healthcare: detecting drug interactions and serious side effects, identifying risk factors, improving care for the chronic diseases, preventing re-hospitalization, assessing public policies.

- Real-time data combined with mathematical modelisation methods can help in detecting and tracking epidemics and health crisis.

- Methodological and ethical issues are at stake: analysis of this voluminous data must lead to conclusions of trustable validity.

These topics are at the very heart of OpenHealth.
Who we are

A leading company in real-time analysis of healthcare data
10 years experience in the collection and processing of healthcare data in real time
Providing state of the art data analysis & consulting services for both the industry and health authorities

Multi-sources data
2.5 million lines of anonymized health care data processed every day
Various data sources:
- Healthcare Professionals repository
- Sales data from community pharmacies
- Longitudinal data
- Clinical data
- International data

A multidisciplinary team of 50
- Physicians
- Pharmacist
- Epidemiologists
- Data scientists
- E-health specialists
OpenHealth supports scientific projects in the field of healthcare data

Created in 2015, the OpenHealth Institute contributes to public interest projects which create scientific value. It helps promote the use of healthcare data and Big Data from the medical world.

**Chairman:** Marius Fieschi MD, PhD, is an honorary professor of public health at Faculty of Medicine of Marseilles. In the same university, he created and managed the Teaching and Research Laboratory for Medical Data Processing. He served as consultant to the French Ministry of Health (Directorate for Hospitals) from 1989 to 1994, he has written several reports for Health Ministers.

**Scientific Advisory Board Chairman:** Jacques Demongeot MD is a Doctor in Mathematics and Medicine. He founded the Public Health Unit at Grenoble Hospital and the Doctoral Engineering School for Health and the Environment at Grenoble University.

The OpenHealth Institute offers call for projects to build partnerships and identify directions for promoting health data. The Scientific Council instructs the themes for these calls for projects and selects the most innovative project applications. Projects can come from public or private organizations or people, as long as they move knowledge about health data analysis forward.
The OpenHealth model: Real time and auditability

Heterogenous DATA
3V
D Day

Data processing

Analytic

Visualization
D + 1

Pharmaceutical

Medical (ambulatory / hosp.)

Biology

Socio-éco.

Geography / environment

International

…

Pseudonymization

Aggregation

Interoperability

Analytic

Visualization

Statistic

Algorithm

Counsel

Visualization

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Agenda

Health Data Analytics: a new paradigm in public health

The design of the indicator - Methodology

Real-time influenza surveillance in community

Real-time monitoring of seasonal flu vaccination
OpenHealth real-time syndromic surveillance indicators based on the monitoring of drug purchases in community pharmacies

**Rationale**

- Real-time sales data from community pharmacies are a source of information allowing the development of real-time “big data” syndromic surveillance indicators

**Methods & Materials**

- The field network consists of 4,600 community pharmacies located throughout France (21% of French pharmacies)
- They continuously transmit anonymous information on drug sales to our secure data treatment centre
- The information includes co-deliveries (multiple purchases by the same patient), the type of prescription (on prescription or over the counter) and the age of the patient (purchases on prescription)
- Statistical processing algorithms are run every night and the results are published before 8am the following day on OpenHealth website
- The entire process is automated
The Design of the indicator - Overview

- Selecting drug candidates
- Algorithm
- Validation
- Real Time Publication

Experts
Literature
The Design of the indicator – Available data

- Selecting drug candidates
- Algorithm
- Validation
- Real Time Publication

- Date
- Quantity
- OTC vs. On Prescription
- Co-deliveries
- Age of the patient
The Design of the indicator – Adaptive bandwidth distance

Why? To allow the same statistical precision in all the territory despite of spatial heterogeneity of population density
Agenda

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The design of the indicator - Methodology

Real-time influenza surveillance in community

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ILI surveillance Q1 2015 vs Q1 2014

Q1 - 2014
- 01/01/2014
- Cas pour 100 000 hab. / jour
  - National 10.1

Q1 - 2015
- 01/01/2015
- Cas pour 100 000 hab. / jour
  - National 26.0
  - Local
    - >350
    - 35 - 350
    - 3.5 - 35
    - < 3.5
Agenda

Health Data Analytics: a new paradigm in public health

The design of the indicator - Methodology

Real-time influenza surveillance

Real-time monitoring of seasonal flu vaccination
Monitoring of seasonal Flu vaccination

People over 65s – 2009 to 2015

Number of persons vaccinated by week

Vaccination coverage (%)

- 2009
- 2014
- 2015
Vaccination coverage: Daily release, One day lag, Open data

Objective: 15/10/2016:
75% 17%

Coverage 2015-2016: 53%
Rate on 15/10/2015: 11%
Monitoring of seasonal Flu vaccination – Validation of the indicator

Comparison over five years of the vaccination rate at end of the campaign between the OpenHealth Co real-time indicator and the gold-standard (CNAMTS)
The Design of the indicator - OpenHealth vs Google vs Sentinelle Network

Detection of the crossing of the epidemic threshold - 2014-2015 Epidemic

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Discussion & Conclusion

Next step Improvement: Using linked patient centric data should allow to estimate vaccine effectiveness (incidence of ILI in large cohorts of vaccinated and not vaccinated people)

Weakness: The lack of clinical and virological data not available in France for this type of studies.

Conclusion:
Massive data analysis from drugs sales allows a trustable :
- ILI surveillance system
- Vaccination campaign effectiveness evaluation

in real time...
at a cost of almost zero
Thank you for your attention

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