Using routine emergency care data for public health surveillance in Europe

Conference “Making an Impact: what's new in emergency pre-hospital care research”, Cardiff/UK
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Contents

• Introduction to “syndromic surveillance”

• Syndromic surveillance activities in the UK

• Syndromic surveillance based on routine pre-hospital emergency care data

• SIDARTHa
IMPORTANT INFORMATION ABOUT SWINE FLU

This leaflet contains important information to help you and your family - KEEP IT SAFE

SWINE FLU INFORMATION
0800 1 513 513
www.nhs.uk
www.direct.gov.uk/swineflu
As the filthy flood waters begin to subside, they are revealing a scene of devastated homes. Now there are warnings of a mounting health risk from toxic chemicals and fatal bugs left behind in the wake of the deluge.
A Case for Syndromic Surveillance

- Detecting (re)emerging diseases
- Situational awareness during disasters & mass gatherings
- Timely and reliable health reporting
- Human and animal health data
- Surveillance of communicable & non-communicable health threats
- Health care management and planning
- Surveillance of natural and man-made events
Syndromic Surveillance

- Health surveillance using information generated prior to laboratory confirmed diagnoses to buy time
- Based on existing data sources, e.g., calls to NHS Direct, GP visits, pharmacy sales
- Emergency data one main source for syndromic surveillance

* $t = \text{time between detection by syndromic (prediagnostic) surveillance and detection by traditional (diagnosis-based) surveillance}$

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Syndromic Surveillance in the UK

- **One of the longest established syndromic surveillance system in Europe (since 1999)**
- **Data sources:** NHS Direct/NHS 24, emergency departments, GP visits, unscheduled care, pilot: school absenteeism
Syndromic Surveillance in the UK

- Used for various events with (potential) public health impact
- Usefulness especially during unexpected events for which no other information is rapidly available (situational awareness)
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- Syndromic surveillance activities in the UK
- Syndromic surveillance based on routine pre-hospital emergency care data
- SIDARTHa
Who is using pre-hospital data for syndromic surveillance?

- **USA**: First Watch, New York City
- **Denmark**: Bioalarm
- **Austria (Tyrol)**: SIDARTH
- **India**: SEED
- **Australia, Canada, Italy, Switzerland**: single studies
...for what?

• **Influenza-like illness**: Australia, Austria, Denmark, USA
• **Heat waves**: Australia, Canada, Italy, Switzerland
• **Gastroenteritis**: Austria
• **Mass gathering, situational awareness**: Austria, France, USA
• **Fever/other infectious diseases**: India
Example: Denmark, Influenza-like illness

**Figure 3**
Ambulance dispatch activity compared to National influenza Surveillance Reporting Systems, Denmark, October 2003 – May 2004

- **Standardised intensity**
  - Central I
  - Central II
  - Central III
  - Central IV
  - Central V
  - Central VI

- **Influenza surveillance (sentinel)**
  - Observed
  - Expected
  - Threshold

*In order to compare the data from the centrals the intensities have been scaled by dividing with the average number of transports for each central during the period 1 January 2002 to 31 March 2006. The vertical lines indicate the period where the observed number of influenza cases exceeded the threshold, i.e., the Sentinel system indicated an influenza epidemic.*
Example: Switzerland, Heat wave
Example: India, Dengue outbreak

Weekly data for syndromic surveillance indicates an outbreak during 2\textsuperscript{nd} week of September 2010.

Model Phase: April 2007 to July 2009

Test Phase: August 2009 to September 2010
Example: USA, Wildfires
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Our research activities at the interface of emergency care and public health

<table>
<thead>
<tr>
<th>Year</th>
<th>Project Description</th>
<th>Funding Source</th>
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</thead>
<tbody>
<tr>
<td>2002-2006:</td>
<td>European Emergency Data Project III: European Emergency Data-based Health Monitoring Indicators (co-funded by European Commission)</td>
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<td>2004-2007:</td>
<td>Emergency care indicators for the EU Injury Data Base (co-funded by European Commission)</td>
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<td>2008-2010:</td>
<td>SIDARTHa - European Emergency Data-based Syndromic Surveillance System (co-funded by European Commission)</td>
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<tr>
<td>2009-2011:</td>
<td>SEED I – SIDARTHa@INDIA (co-funded by Indian Council Medical Research &amp; German Ministry Education/Research)</td>
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<td>2011-2014:</td>
<td>SEED II – SIDARTHa@TIROL (co-funded by Leitstelle Tirol Gesellschaft mbH)</td>
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<td>2011-2013:</td>
<td>SAM@EMR - SIDARTHa@Euregio Maas-Rhine</td>
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<td>2010-2013:</td>
<td>Triple S-AGE –Syndromic Surveillance Systems in Europe (co-funded by European Commission)</td>
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Faculty of Health, Medicine and Life Sciences
SIDARTHa: European emergency data-based syndromic surveillance at regional level

**Partners:** Regional consortia of emergency care services and public health authorities from 12 European countries

**Co-funded by European Commission (DG Sanco), 2008-2010**

**Project elements:**

- **Assessment** of emergency data utility for syndromic surveillance in Europe
- **Conceptualisation** of a European-wide regional syndromic surveillance approach and system
- **Implementation, test and evaluation** of the syndromic surveillance system SIDARTHa in four regions in Europe

[www.sidartha.eu](http://www.sidartha.eu)
SIDARTHa Approach

Routine data from (i) emergency medical dispatch centres, (ii) ambulance run-sheets and (iii) emergency department information systems is analysed for spatial and temporal aberrations at the local level.

SIDARTHa alerts emergency care professionals and local public health authorities if a threshold is exceeded; Via national authorities the European Commission, ECDC and WHO are informed about local and cross-border alerts; SIDARTHa only complements but does not replace any existing system.
SIDARTHa Partners

- Capital Region of Denmark
- Province of Buskerud
- County of Goeppingen
- Belgium
- Department des Hauts-de-Seine
- Autonomous Region of Cantabria
- Province of Genoa
- District of Kuopio
- City of Prague
- State of Tyrol
- City of Budapest (Central Region)
- City of Antalya
SIDARTHa - Basis

Max. time until emergency data is electronically available (in days)
(n=32 emergency institutions representing regions of SIDARTHa consortium - no nat)

AT  BE  CZ  DE  DK  ES  FI  FR  HU  IT  NO  TR

Emergency medical dispatch centre (computer database)
Patient documentation of ambulance crew
Patient documentation of emergency physician
Emergency department (hospital information system)
SIDARTHa - Basis

- Influenza-like-illness
- Gastrointestinal Syndrome
- Environmental Syndrome
- Respiratory Syndrome
- Unspecific Syndrome (volume)
## SIDARTHNa - Basis

<table>
<thead>
<tr>
<th>Variables</th>
<th>Dispatch</th>
<th>Ambulance</th>
<th>Hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date/Time</td>
<td>Receiving call time</td>
<td>Alarm time</td>
<td>Access time</td>
</tr>
<tr>
<td>Place of event/patient address</td>
<td>Event address; x/y coordinates</td>
<td>Event and patient address; GPS signals</td>
<td>Patient address/ZIP code</td>
</tr>
<tr>
<td>Syndrome</td>
<td>Chief complaint (free text), dispatch codes</td>
<td>Working diagnosis, ICD9/ICD10</td>
<td>Complaint from triage (free text)/ICD9/ICD10</td>
</tr>
<tr>
<td>Patient age &amp; gender</td>
<td>Age &amp; gender</td>
<td>Age &amp; gender</td>
<td>Age &amp; gender</td>
</tr>
<tr>
<td>Severity of case</td>
<td>Priority of response</td>
<td>Priority of response</td>
<td>Triage codes</td>
</tr>
</tbody>
</table>

**SIDARTHNa Data Set**
SIDARTHa – Two active automated systems
SIDARTHa – Case study results

- **Region:** Tyrol (Austria)
- **Event:** Norovirus Outbreak (in tourists)
- **Data Source:** Ambulance Service (staffed with emergency physicians)
- **Strength:** Sensitivity (space-time algorithm)
- **Weakness:** Sensitivity: rare disease in emergency care - only severe or large clusters of gastrointestinal cases can be detected
SIDARTHα – Case study results

- **Region**: Cantabria (Spain)
- **Event**: Seasonal influenza
- **Data Source**: Emergency Department
- **Strength**: Timeliness, Specificity (specific case definition, treatment seeking behaviour), Sensitivity (CUSUM Algorithm)
- **Weakness**: Transferability (case definition not as specific in other emergency departments/countries or other data sources)
SIDARTHa – Case study results

Case Study: Volcanic Ash Plume
Implementation Site: Austria (Tyrol)
Detection Algorithm: CUSUM and EARS
Syndrome: Traffic Accidents (n = 16), Respiratory cases (n = 21),
Unspecific cases (n = 514)
Data Source: Emergency Medical Dispatch Centre
Alert Period: 15 April 2010 - 21 April 2010

- **Region:** Tyrol (Austria)
- **Event:** Volcanic Ash Plume 2010 (Respiratory syndrome, cardiac syndrome, traffic accidents)
- **Data Source:** Emergency Medical Dispatch Data
- **Strength:** Flexibility (new syndromes), Timeliness (reporting)
- **Weakness:** Specificity: cases cannot be related to ash cloud
Future Plans

• Implementation sites are further developing SIDARTHa (e.g., “from signal to alert”, communication strategies)

• Dutch dispatch centres using Advanced Medical Priority Dispatch Systems are interested to install SIDARTHa

• Chinese Center for Disease Control and Prevention is interested in SIDARTHa and we are exploring potential areas of joint collaboration
Pre-hospital emergency data in public health

Routine data emergency care
- Operational data
- Demographic data
- Geographic data
- Treatment data
- Patient condition data

Analysis
- Demand
- Technical performance
- Clinical performance
- Patient condition

Application area in public health
- Health reporting
- Early warning
- Surveillance
- Benchmarking
- Prevention
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www.maastrichtuniversity.nl/inthealth
www.syndromicsurveillance.eu
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