Heat waves: a challenge for national public health institutes in the context of climate change

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On behalf of the teams implied in preparedness and response to heat waves at the French institute for public health surveillance
Context in France: pre-2003

Before 2003, risks not perceived in France despite noteworthy episodes:

- July 1911: 40,000 excess deaths including 29,000 young children

- Marseille, July 1983
  - Increase of the number of emergency visits for elderly people, high mortality
    - 500 excess deaths between 14 July – 2 August
    - Among all death certificates 10% hyperthermia and dehydration
  - Implementation of local prevention

Before 2003, several HW occurred but their impact remained largely unnoticed
Context in France: the 2003 heat wave
The hottest summer since 1950

Prevention messages broadcasted 8-11 August but unnoticed / not followed

Mortality increased rapidly (15,000 excess deaths)

First health signals

First met info

Source: rapport d’étape « Surmortalité liée à la canicule d’août 2003 » de M. Denis Hémon et de M. Eric Jougla - Inserm
August 2003

• Political and social crisis, sometimes compared to a “climatic earthquake”

• Political consequences
  – Change in Health ministry in March 2004, as part of a cabinet reshuffle
  – Demission of the General Director of Health (18/08/2003)

• Consequences for the French institute for public health surveillance (InVS)
  – Criticisms directed to the institute (and its director) : “why weren’t you able to raise the alarm regarding the health impact of the heat wave (whereas ER doctors and undertakers did)”
  – August 8th: Ministry of Health asks for surveillance of the health impact
    • 6 epidemiological studies are implemented between August 13th and 21st
    • First results published August 29th
  – Development of a syndromic surveillance system aiming to detect health events and assess the health impacts of epidemics or other events : first data collected in July 2004
  – Development of a heat wave watch-warning system (in collaboration with Meteo-France : operational in June 2004
Lessons learnt from the 2003 crisis

- For InVS:
  - Major pressure (and boost) on activities in the fields of syndromic surveillance and environmental epidemiology: recruitment of new profiles, development of methods and tools
  - Reinforcement of the framework defining the role of InVS, and its interaction with the Ministry of Health, in such emergency situations

- At the national level, coordination of all the actors and implementation of a national HW plan in 2004
  - Objective: avoid an important excess mortality due to heat
  - Means:
    - Promote adapted behaviors
    - Prepare and plan measures to be taken in case of HW toward vulnerable populations…
    - Design and implement a watch warning system
French HW-WW system: definition of criteria for “heat wave alert”

- **Aim:** trigger the implementation of preventive measures at the national and local levels

- **Constraints**
  - minimize false alerts / maximize real alerts
  - easy to forecast (anticipation)
  - easy to understand by actors

- **Methods:** analysis of the relationship between different T°C indicators and mortality, 14 pilot cities, 30 years

- **Results**
  - Thresholds on running mean on 3 days of min and max temperatures
  - Extended to all France using p99.5
Example: Summer 2015 in Rhône (Rhône-Alpes)

3 days-running mean of min. temperatures

3 days-running mean of max. temperatures

![Graph showing temperature trends for Summer 2015 in Rhône (Rhône-Alpes) with highlighted periods of interest and temperature thresholds for min. and max. temperatures.]

Min Thresholds: 10°C, 20°C, 30°C
Max Thresholds: 10°C, 20°C, 30°C, 40°C
French HW-WW system: surveillance of health impacts during a heat wave

Based on InVS syndromic surveillance system

- **Aim:** During the alert, to help decision-making
  - Adaptation of measures
  - Extend alert if temperatures decrease but there is a health impact

- **Choice of health indicators**
  - Link with heat in literature
  - Short lag exposure / impact (24h)
  - Good sensitivity / specificity
  - Data easily available / reliable

- **Analysis of health data**
  - Signals validated and discussed (if necessary) with health professionals
  - Two statistical methods to detect an impact: control charts and historical limits
The alert process

Meteorological alarm

Health surveillance

Alert bulletin if health impact

Local authorities

ACTION
French HW-WW system: surveillance of health impacts during a heat wave

Intrinsic limits

- Do not enable enough anticipation, contrary to met indicators
- Morbidity indicators can be comforting even if mortality increases (e.g. in 2006, 2015)
- Mortality
  - Insufficient reactivity, mainly due to delay for transmitting data
    - Available at D+1 for 3000 cities
    - ~80% of all deaths
    - Data partially consolidated after 7-10 days
    - 95% of data available after 3 weeks
  - Whereas only indicator clearly linked with heat increase during HW in literature
  - Anyway, best indicator after a HW to summarize the impact

Figures provided by syndromic surveillance could be improved, but are despite their limits relevant for public health. However, do they meet decision makers communication needs?
Example: Morbidity indicators from the syndromic surveillance system in Rhône-Alpes, Summer 2015
Available on-line: August 13, 2015


Indicateurs des Services d’Urgence du réseau OSCOUR®
Heat-related ER consults

Indicateurs des associations SOS Médecins
Heat-related emergency doctors’ house calls

Tous âges

75 ans et plus
Example: Mortality indicators from the syndromic surveillance system in France (September, 30 2015)


Weekly number of deaths for 100,000 inhabitants

*N.B. Last week data are not consolidated*
Challenges posed to the 11 y. old national HW plan by the 2015 heatwave

• The plan is « updated » every year, however its main orientations and functional schemes are similar since the beginning

• The 2003 “earthquake” was fresh in the memories in 2004… was it in 2015 ?

• The 2015 heat wave raised some issues
  – The geographic heterogeneity of heat-waves and their impacts: importance of regional and local tailored surveillance analysis and planning
  – How to keep everyone involved in the plan (decision makers, field workers, MD,…) motivated and ready every summer?
  – How to maintain population awareness toward health risks posed by extreme heat?
  – Communications challenges

⇒ Role of the future “Santé publique France”
  ⇒ Review the plan at national and local level
  ⇒ Improve the plan in areas relevant to its missions: revise public health surveillance, alert indicators, prevention programs and health prevention
Challenges posed to NPHI by HW in the context of climate change

- Huge health impacts, if no control measures are taken
- Involvement of NPHI in HW related activities is part of their “core functions” (Public Health Surveillance, Epidemiologic investigations, Outbreak response, Prevention Programs and Health Promotion, Social participation and empowerment of citizens in health)
- Frequency and intensity of HW will increase in the future
- HW related activities in NPHI are time and energy consuming
  - Resources are limited
  - Other factors threaten the health of the population
- Knowledge (content and timing) needed for public health decision may differ from the one needed for communication

How to get the right balance?
Thank you for your attention