



Implementation of PulseNet in the Middle East

A collaborative effort to promote **FOOD
SAFETY** in the region

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Presentation contents:



❖ What Is **PulseNet (PN)** ?

- PulseNet Goals and Food Safety
- Basic Elements of PN
- How Does It Work?
- What Is a PN Cluster?
- Examples on How PN Has Made a Difference

❖ **PulseNet Middle East (PNME)**

- History
- Goals
- Present Situation
- Future Efforts



What is PN & Why was it developed?

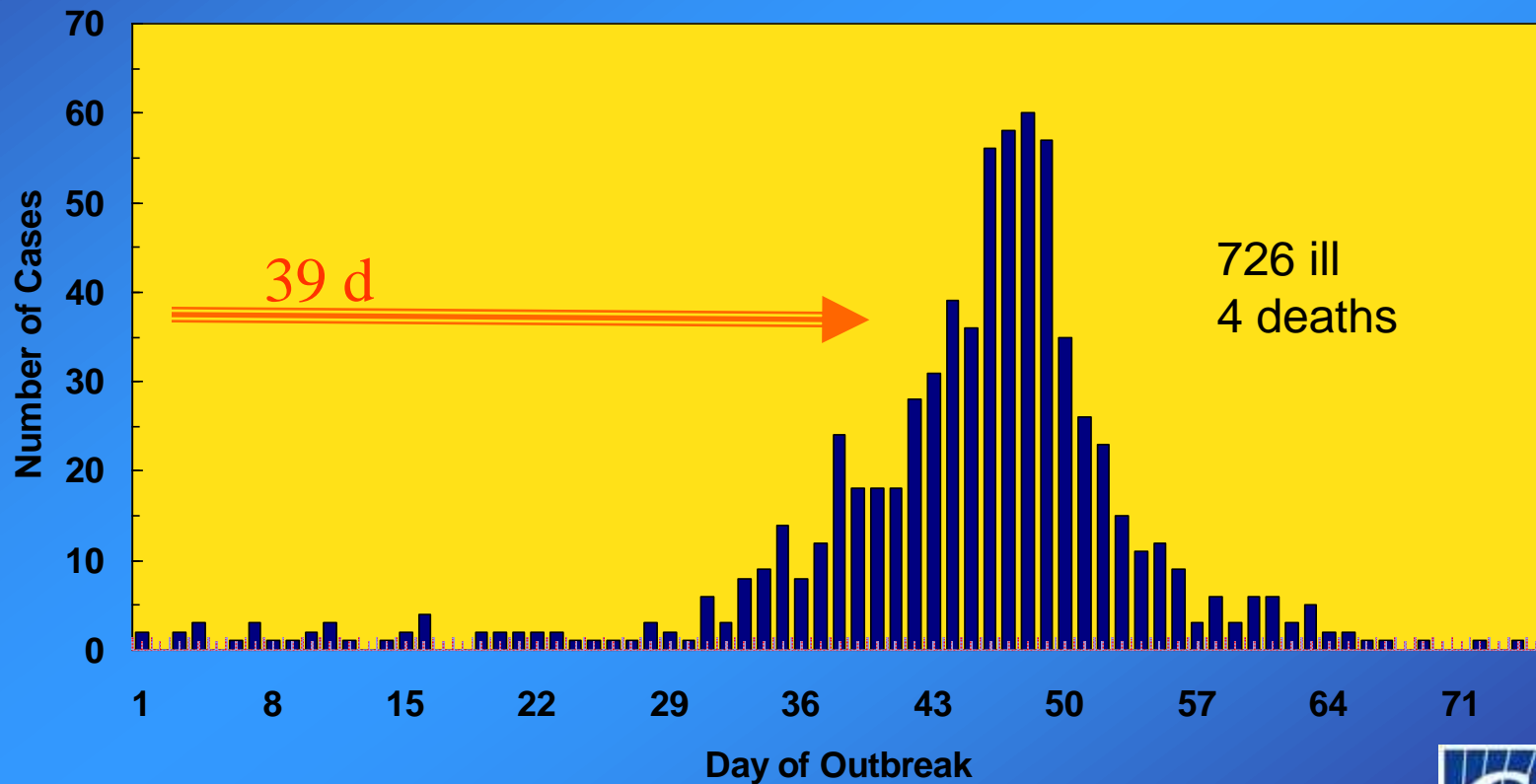


PN = Molecular Subtyping Network for Foodborne Disease Surveillance

- *Escherichia coli* 0157: H7 major illness outbreak in 1993, Western United States (Hamburger patties- large fast Food Chain- *E. coli*)
- Outbreak resulted in an estimate of 800 illnesses.



1993 Western States *E. coli* O157 Outbreak





Result...

PulseNet Was Created **in 1996** By The Centers For Disease Control and Prevention (**CDC, Atlanta**)



PN GOAL

Assist epidemiologists in outbreak investigations by improving outbreak detection. Rapid detection leads to faster intervention and establishment of control measures that could prevent additional individuals from becoming infected



establish interactive surveillance networks monitoring foodborne diseases

How Is The Goal Achieved :



- By detecting foodborne disease **CLUSTERS** by PFGE
- By assisting Epidemiologists in:
 - Separating outbreak-associated cases from other sporadic cases.
 - Rapid identification of outbreaks & their sources.
 - Providing real-time molecular surveillance of the most important bacterial foodborne diseases

The 3 Basic Elements of PN :



1. Data Acquisition

“PFGE”



2. Data Analysis

“Bionumerics”: Clusters Search



3. Data Exchange between Public Health Labs



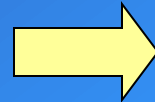
PulseNet Process



1- Participants perform pulsed-field gel electrophoresis (**PFGE**) on disease-causing bacteria isolated from patients.

➤ **PFGE** is done by following standardized procedures strictly developed by CDC

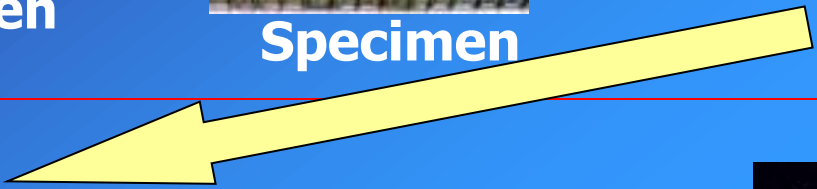




Patient Specimen Collection

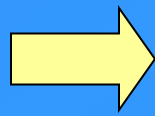
Specimen

14-18hrs



+

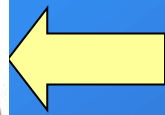
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**Cell Suspension
1 hr**

**Agarose
15in**

**Cells Trapped in Plug
-Lyses cells 2hrs
-Wash with H2O
and buffer 2hrs**

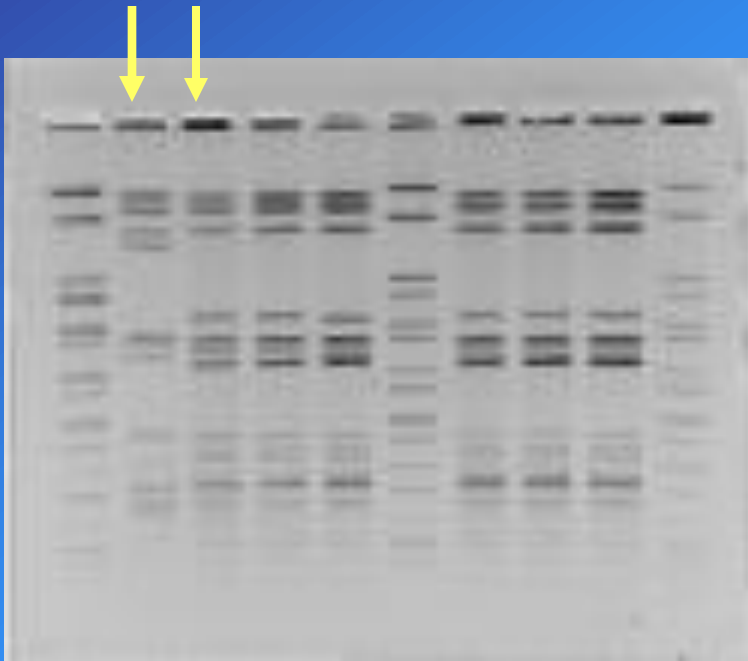


**Restriction
Prep: 1hr,
Incubate: 2-5hrs
Rinse: 10min**

19-21hrs

PFGE, DNA fingerprinting process

PulseNet Process (continued)



- 2- Patterns are generated.
- 3- Images uploaded to Bionumerics and databases created.
- 4- Band pattern comparative analyses performed.
- 5- Searches are done looking for **clusters**.

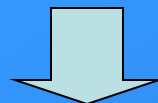
What is a PulseNet Cluster ?



A PN Cluster is a group of patterns that are indistinguishable by PFGE



ONLY IF epidemiological links are found between cases, then

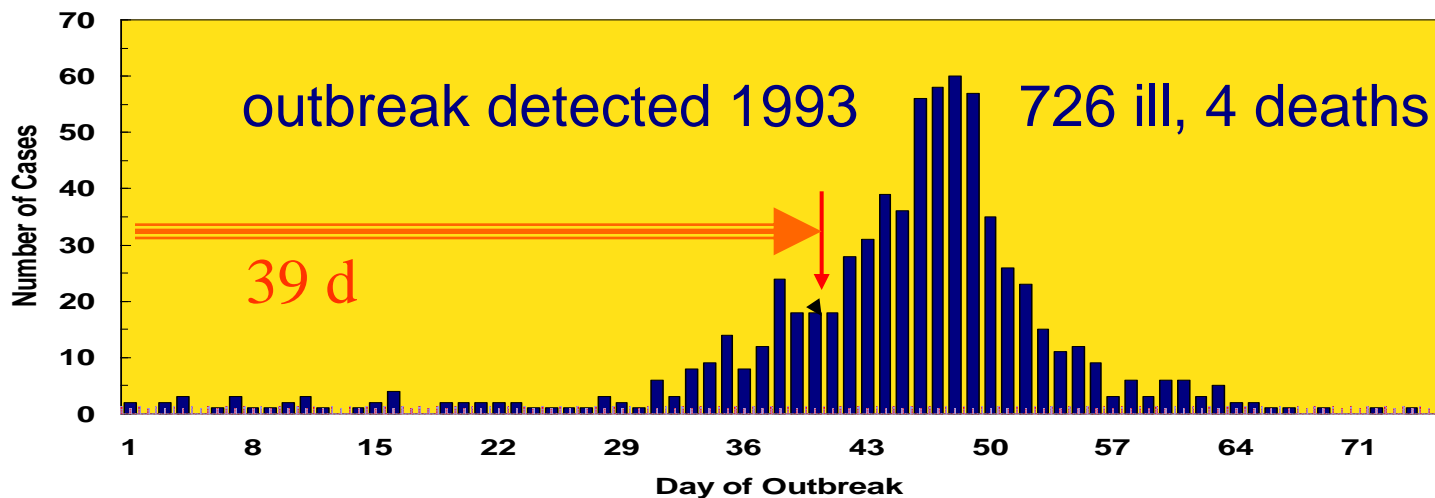


Cluster is classified as an **Outbreak**

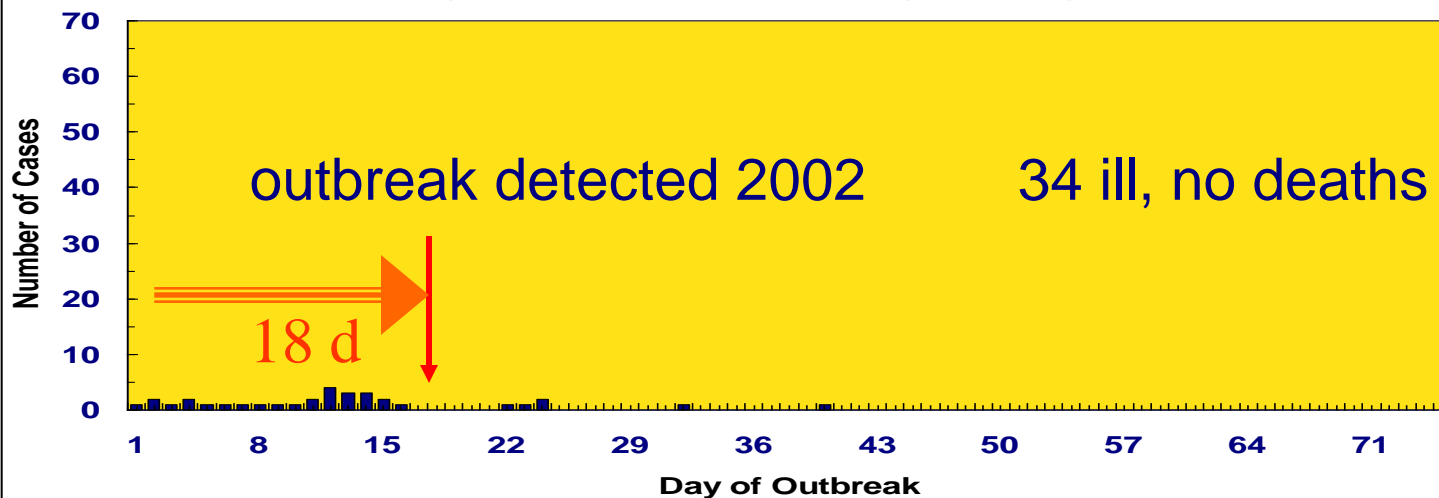
Example of a *Salmonella typhi* Cluster From Jordan:



1993 Western States *E. coli* O157 Outbreak



2002 Colorado *E. coli* O157 Outbreak



Other Examples Illustrating the Great Difference PN-USA Made

- ❖ **Late 2006: 199 cases of *E. coli 0157* in 26 states were linked together by PN “Fingerprinting” and traced to fresh baby Spinach.**

- ❖ **Early 2007: 714 cases of Salmonella in 48 states were linked and traced by PN to Peanut Butter produced at a single factory.**

PulseNet Is International

PN International includes:



- PN-USA
- PN-Canada
- PN-Europe
- PN-Asia Pacific
- PN-Latin America & Caribbean
- PN-Middle East



PNME History



- **December 2006:**

- First Consultation Meeting held at WHO Eastern Mediterranean Regional Office (EMRO)
- Meeting included:
 - CDC, Atlanta
 - NAMRU-3
 - Representatives from the participating countries

Conclusions:

- PulseNet Middle East Established.
- A **Training Center** for PFGE & Bionumerics was established at **NAMRU-3, Egypt**
- And The **Network Coordinator Center** was established in **CPHL, Oman**



PNME History Cont.

- May 2007:
 - **1st Regional PFGE training workshop** was held in conjunction with the **2nd Consultation meeting** hosted and organized by **NAMRU-3**
- December 2008:
 - **1st Regional Bionumerics training workshop**, held in conjunction with the **3rd Consultation meeting**
 - Training was provided by **NAMRU-3/ CDC**
 - hosted and organized by **Jordanian CPHL and CDC**
- **Individual Country Trainings on Both PFGE & Bionumerics** were provided by NAMRU-3 & hosted by NAMRU-3 or by the country requesting the training.

(PNME-GFN) Joined Workshop, March 2012



PNME Objectives:



- Implementation of the **PulseNet System** at the **country level**
- Providing trainings & workshops on **STANDARDIZED** PFGE protocols & data analysis by Bionumerics.
- Providing QA/QC for all participating labs.
- All participating countries must be **CERTIFIED** by stringent PulseNet standards
- All certified countries must pass annual **PROFICIENCY TESTING**



PNME Objectives (Cont.):



- Each country should establish **NATIONAL** foodborne pathogens databases to identify and track intra-country clusters
- Inter-Countries exchange of data is essential as well as communicating with the epidemiologists as soon as a cluster is detected.





PNME Current Status



EMR Geographical Area



"Eastern Mediterranean Geography"

- Afghanistan
- Bahrain**
- Djibouti
- Egypt**
- Iran
- Iraq
- Jordan**
- Kuwait**
- Lebanon**
- Libya
- Morocco
- Oman**
- Pakistan
- Palestine**
- Qatar**
- Saudi Arabia
- Somalia
- Sudan
- Syria
- Tunisia
- United Arab Emirates
- Yemen

- Countries involved in PNME but no activity shown yet.
- Countries who already bought the equipments, Trained.
- Countries who are ready to start Certification process.
- Countries who started certification process and got certified on Salmonella &/or Shigella.



PNME Future Efforts

- Strengthening the skills & abilities of current participants
- Helping all countries to get certified
- Providing continuous support individually and regionally.
- Encouraging inter-countries data exchange
- Promoting & increasing local epidemiological support for a better surveillance system
- Expanding current network

A Glimpse on some Active PNME Countries...Progress?

Lebanon



- Acquisition of certification for Salmonella
- Gels sent to NAMRU-3 for certification for Shigella.
- A number of foodborne diseases outbreaks were confirmed by PulseNet Laboratory, one detected by PulseNet.
- Training workshops to all medical laboratories nationwide, were jointly given by the Ministry of Public Health (MOPH) of Lebanon & the PulseNet Laboratory at the American University of Beirut (AUB).
- • Regular meetings are held between concerned Drs. and staff from MOPH and AUB for ongoing work.

Bahrain



- Acquisition of certification for Salmonella
- Gels sent to NAMRU-3 for certification for Shigella.
- A total of 88 Salmonella isolates received from several governmental and private Health Institutes. 22 of them analyzed by PFGE (6 Salmonella typhi, 2 Salmonella paratyphi and 12 Salmonella typhimurium).
- A total of 100 PFGE Gels were run by the lab.
- Salmonella database is established and surveillance system is being established.

JORDAN



- Acquisition of certification for Salmonella
- Acquisition of certification for Shigella.

Real progress made

- Databases built for;
 - Salmonella enteritidis
 - Salmonella typhimurium
 - Salmonella Typhi
 - Shigella sonnei
- Unique Jordan patterns identified and named
- A total of 140 PFGE Gels were run by the lab.

CONCLUSION:



**PN + Epidemiology + Public
Health Authorities Support**

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**Outbreaks determined in DAYS
rather than WEEKS**



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THANK YOU

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