



# An outbreak of STEC O26 linked to water

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# Sentinel surveillance of STEC infection in Italy: The Italian HUS Registry



## Pediatric Nephrology Units

(Italian Society for Pediatric Nephrology)

- ✓ Active since 1988
- ✓ Coordinated by ISS since 2012
- ✓ Target population: children (< 15 yrs.)
- ✓ Standardized HUS case definition ([www.iss.it/seu](http://www.iss.it/seu))
- ✓ Cases notified to the Registry with clinical and epidemiological information
- ✓ Stool and serum samples submitted to the NRL for *E. coli* for laboratory diagnosis of STEC infection



INTOBONO PAUSLIPON



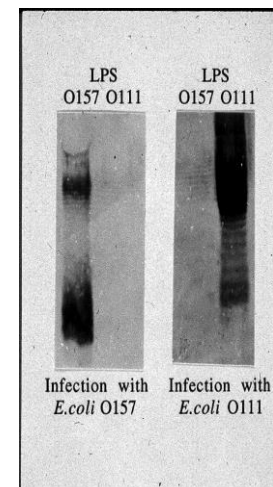
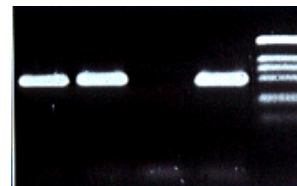
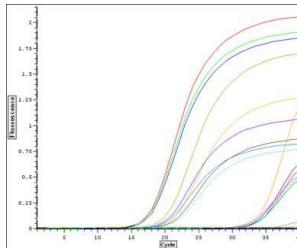
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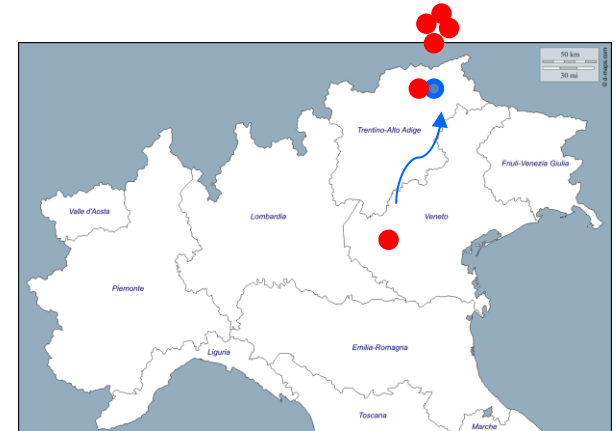
# Diagnosis of STEC infection and characterization of the STEC strains

- Detection of Stx genes and *eae* (Real Time PCR)
- Direct examination of feces for Free Stx (Vero cell assay) and STEC isolation
- Detection of serum antibodies against the LPS of *E. coli* O157, O26, O103, O111, O145
- STEC strain genotyping (*stx1*, *stx2*, *eae*), *stx* subtyping
- Pulsed Field Gel Electrophoresis



# The background

- **10/07/2017**: information from the local health authority of the province of Bolzano (SouthTyrol - North Italy) of **two children with HUS** admitted to the Nephrology Unit of the Hospital in Innsbruck (Austria).
- Patients were both **resident in the same village**
- **Another child with bloody diarrhea** tested positive for STEC at the local public health lab. The child had a history of travel to in late June 2017
- **11/07/2017**: a **case of HUS** was reported to the Registry of HUS by the pediatric unit of the hospital in Verona
- Biological specimen received in ISS on 12/7/2017
- **STEC O26 (stx2+; eae+)** isolated from stool
- Antibodies anti-Lps for E.coli O26 detected in serum sample
- Epidemiological questionnaire received on 15/7/2017 revealed a **history of travel to the same place** in late June 2017
- **A few days later two other cases of HUS** in small children from the same village were reported. Both were hospitalized in Innsbruck again.
- All HUS patients hospitalized in Innsbruck tested positive for STEC O26 stx2+, eae+



***An outbreak was suspected and epidemiological investigation including an enhanced surveillance in the area, was established***

# The Epidemiological investigation:

## *The actors:*

- The Local Health Authority - Unit of Public Health and Hygiene (Bressanone, Italy)
- The Public Health Laboratory of Bolzano (Bolzano, Italy)
- The Nephrology Unit of the Innsbruck Hospital Centre (Austria)
- The National Reference Centre for E.coli (Graz - Austria)
- The National Reference Laboratory (ISS – Rome, Italy)
- The Veterinary office of the Local Health Authority (Bressanone, Italy)
- The Istituto Zooprofilattico delle Venezie, Pordenone (Italy)

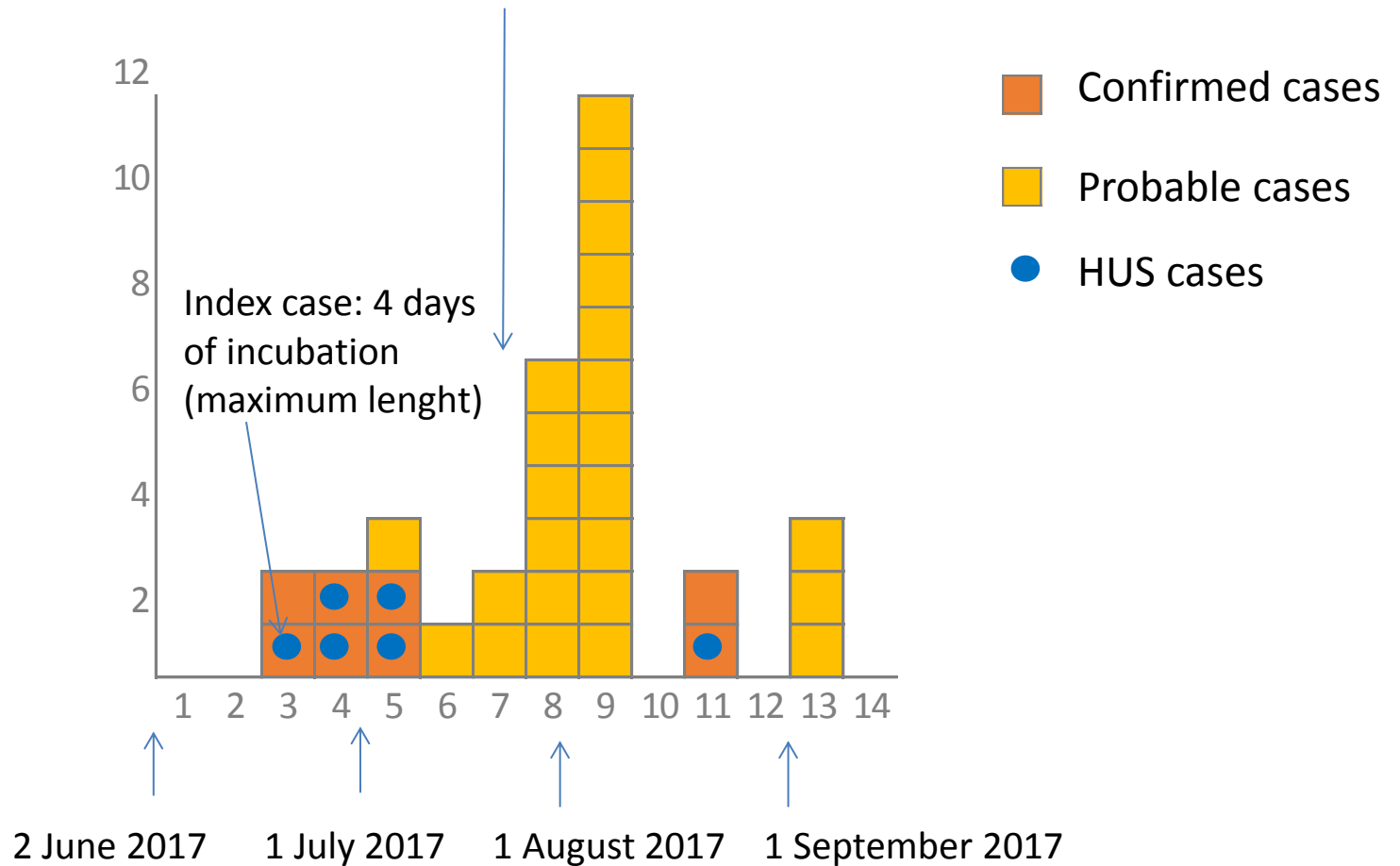
## Case definition (adopted by ISS for outbreak description)

- **Confirmed** cases: any person with a isolation of **STEC O26 (stx2+, eae+)** resident or with a travel history to the Bolzano province
- **Probable**: any person with a lab confirmed diagnosis of any STEC infection after 15 June 2017, resident or with a travel history to the Bolzano province

# The epidemic curve

Date of onset of symptoms or stool sampling

Mid July: start of enhanced surveillance and active sampling

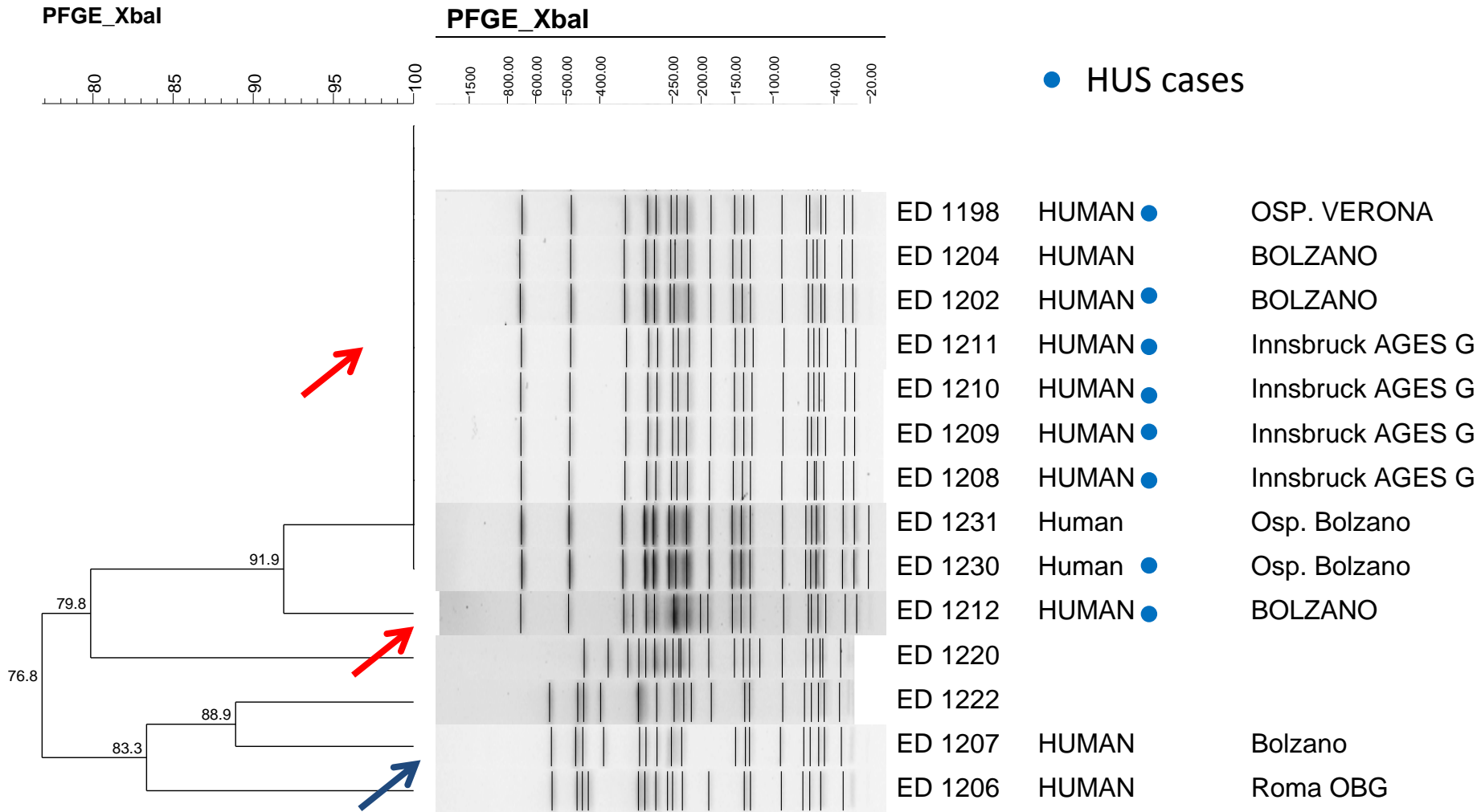


# The outbreaks cases

- Total cases: 33 (18 females; 15 males)
- **9 confirmed** cases (all cases < 3 years; median age: 20 months)
  - 6 HUS
  - 2 Bloody Diarrhea
  - 1 Watery diarrhea
- **24 probable** cases (median age: 4 years)
  - 2 diarrhea
  - 5 asymptomatic (catering employees + family members actively screened)
  - 17 Unknown
- 3 family clusters identified:
  - A: 5 probable cases (clinical symptoms unknown)
  - B: 2 confirmed cases (symptomatic) + 1 probable (asymptomatic)
  - C: 3 probable cases (1 HUS, 1 BD, 1 Asymptomatic)



# STEC O26: confirmed cases – PFGE (N=7)



Undistinguishable PFGE profiles of strains from outbreak

**Outbreak Confirmed !!!**

# STEC evidence: probable cases (N= 24)

Real Time PCR (ISS) and Multiplex PCR (Lab of Bolzano)

stx1	stx2	eae	O26	ISS (N=17)	Lab of Bolzano (N= 7)	Total (N= 24)
	■	■	■	9	3	12
■	■	■	■	2	2	4
■	■	■		-	1	1
	■	■		2	1	3
■		■		2	-	2
■	■			1	-	1
	■			1	-	1

- 5 cases (3 asymptomatic restaurant employees) with repeated evidence of STEC infection: median interval between sampling: 12 days

# Outbreak source tracking

- No common exposures (food, restaurant, catering) could be found among cases geographically linked to the area !!
- Few cases with epi questionnaire available at ISS (investigation still ongoing)


ID #	Cluster Family	date of onset	age (months)	Symptoms	Case	Geo_link	family member	Cattle	River	public drinking water
2		28/06/2017	23	HUS	confirmed	yes	no	no	yes	yes
1		28/06/2017	29	HUS	confirmed	yes	?	?	?	?
3		01/07/2017	16	HUS	confirmed	yes	?	?	?	?
4		01/07/2017	24	HUS	confirmed	yes	?	?	?	?
5		10/07/2017	12	HUS	confirmed	yes	?	?	?	?
6		12/07/2017	17	HUS	confirmed	yes	?	?	?	?
8	B	23/08/2017	18	BD	confirmed	yes	no	no	no	yes
7	B	25/08/2017	18	HUS	confirmed	yes	no	no	no	yes
9		03/09/2017	8	D	probable	no	no	no	yes	no
10	A	05/09/2017	4	BD	probable	no	yes	no	yes	yes
11	A	08/09/2017	4 years	D	probable	no	yes	no	yes	yes
34	B		3 years	Asy	probable	yes	yes	no	yes	yes



## Urgent inquiry and responses

### Epidemiological and microbiological information

### Authoring information

<input type="checkbox"/> Country/ Institution/ Role	Sector	Modified	Number of human cases	Epidemiological information and suspected vehicles	Microbiological information
Italy	PH	29/09/2017 02:25 PM	8	<p>A community-wide outbreak of infection by Shigatoxin-producing E.coli O26 (stx2+, eae+) has been identified in North Italy (Rodengo - Val Badia, province of Bolzano – Bozen) starting in early July 2017. Date of symptom onset in the index case was 28/06/2017. Patients involved in the outbreak developed mainly bloody diarrhea and hemolytic uremic syndrome (N=5). Outbreak cases were mainly geographically linked as they were either resident or visiting the same area in the week before the symptom onset. First line microbiological investigation was carried out by the local laboratory of the Health Authority of Bolzano. Most of the Italian patients with HUS were hospitalized in Innsbruck (AT) and in this case the diagnostic investigations for STEC were carried out by the Institut für Medizinische Mikrobiologie und Hygiene in Graz (AT). Epidemiological investigation is still ongoing and food, animal and environmental specimens have been collected and examined at the IZS delle Venezie. Based on microbiological evidence drinking water is the suspected the source of STEC.</p> <p>As the area is a point of touristic interest, we invite EPIS participants to report information on any cases possibly linked to the current outbreak.</p>	<p>Ten STEC O26 strains from 8 patients involved in the outbreak, including all the HUS cases, were all sent to the NRL for E. coli at the ISS in Rome for further typing. All strains possessed the stx2 (subtyped as stx2a) and eae genes and all but one showed indistinguishable PFGE profiles (file attached). The PFGE profiles of the STEC strains will be soon available in the molecular TESSy.</p> <p>STEC O26 (stx2+, eae+) strains have been so far isolated from cattle pasturing in the area and from drinking water. Subtyping by PFGE showed that two strains isolated from two different drinking water tanks had PFGE profiles indistinguishable from those of the STEC O26 isolated from human cases.</p> 

# Conclusions

- A **prolonged community-wide outbreak of STEC O26** infection was confirmed in North Italy
- The investigation of the outbreak is still ongoing
- Based on available information the outbreak was limited to a restricted area which appears to be compatible with a persistent local source of STEC infection (compatible with an environmental source: livestock? Wild ruminant populations? Contaminated soil? Water? Other environmental source?).
- HUS confirmed to be a very effective sentinel event of STEC circulation
- Development of HUS highly dependent on age of patients
- Importance of coordination among actors involved in an outbreak investigation
  - Easy coordination when collaborations are already established  
e.g. human/vet laboratory networking was very efficient also at the international level
  - More difficult to share the rationale for the cases' exposure investigation and the sampling strategies → importance of continuing establishing a common background and support preparedness in peace time

# Acknowledgment

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