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Detection of foodborne *Salmonella* Typhimurium outbreaks

Detección de brotes de toxiinfecciones alimentarias por Salmonella *Typhimurium*

To the Editor,

We have read with a great interest the valuable editorial by Dr Ballesté-Delapierre and Dr Vila-Estapé[1] in which they ask about the detection of *Salmonella* foodborne outbreaks (FO) in Spain.

In Spain for the period 2012–2014, el Centro Nacional de Epidemiologia[2] reports that 702 FO of *Salmonella* were notified and *S.* Typhimurium (ST) was the etiologic agents in less than 20% of these outbreaks. By microbiologic culture, there were 4329 reported cases of ST and 135 cases of Monophasic *S.* Typhimurium (MST). However, the most frequent agent (over 50%) of FO was *S.* Enteritidis (SE), and a total of 3656 reported cases of SE. In addition, very few studies of FO caused by ST or MST have been published in Spain in the last 10 years,[3–5] despite the fact that the first description of epidemic MST associated with pork products was made in Spain by Echeita and co-authors in 1997.[6]

However, FO caused by ST in Spain probably are more frequent than the official figures reflect. We put forward some epidemiologic arguments that could explain why these outbreaks are more difficult to detect than FO caused by SE (Table 1):

- The food vehicle for FO caused by SE, the principal reservoir being poultry, is frequently eggs and egg products, which are consumed raw or semi-raw in high quantities and which could have high concentrations of *Salmonella*. The ST food vehicle is more variated in its animal reservoirs, which include cattle, chicken, rodents, and swine; the high prevalence of ST and MST in the Spanish pig farms has been highlighted.[7] Concentrations of ST depend on how the food vehicle has been processed. In the case of pork derivatives, some products are cured and ready to eat, consumption may be low each occasion and ST concentrations are like to be small. In addition, dried pork sausage and chorizo were the food vehicle in the two mentioned FO.[4,5]
- Dependent on exposure, the FO caused by SE may affect a high number of people, and may have a point source epidemic curve. Exposed people of all ages can be infected with symptoms and the severity depends on patient's characteristics. The attack rate is high although the hospitalization rate is usually low. Receptions, family celebrations, and popular festivities are places where these FO originate; they have a short duration and an incubation period of 6–72 h. Presentation, frequently takes the form of clusters of cases. These FO could detect by the epidemiologic surveillance before *Salmonella* microbiological characterization.
- In general, FO caused by ST may be of prolonged duration and the epidemic curve could be a continuing common source. The attack rate may be low and the people affected are children, old people, and adults with immuno-deficiencies; the illness is frequently severe with a high hospitalization rate. Because of the low concentrations of ST in the products, infection in healthy adults could be asymptomatic or involve only mild symptoms. The incubation period is longer and can be up 16 days or more. Presentation usually takes form of sporadic cases.[8] However, ST or MST can produce point source FO when the agent's concentration in the food vehicle is high and more than one *Salmonella* serotype may be associated with the same FO. Detecting these FO requires the microbiological characterization of the *Salmonella* strains, including serotypes, phage types, and more advanced

Table 1
Some differential characteristics of foodborne outbreaks of *S.* Typhimurium and *S.* Enteritidis.

Outbreak characteristics	*S.* Typhimurium	*S.* Enteritidis
Animal reservoirs	Swine, cattle, poultry, birds, rodents, reptiles, pets, etc.	Poultry, birds, reptiles, pets, etc.
Predominant food vehicles	Pork and pork products	Egg and egg products
Salmonella concentration	Low	High
Food characteristics	Cured, ready to eat	Raw or semi-raw
Food preparation	Separate portions (e.g., pork sausages)	Whole food (e.g., mayonnaise)
Food consumption	Low each time	Usually high
Incubation period	6 h to 15 days or more	6–72 h
Attack rate	Low	High
Onset	Gradual	Abrupt
Epidemic curve	Continuing common source	Point source
Outbreak duration	Weeks or months	Days
Persons at risk of symptomatic infection and microbiologic diagnosis	Children, old people, individuals with immuno-deficiencies	All exposed people
Illness	Frequently severe	Depend on patient's characteristics
Hospitalization	20–30% patients or more	Less than 10–20% patients
Place	Geographical dispersion affecting several cities and zones	Receptions, family celebrations, popular festivities, etc.
Predominant seasons	All year	Summer
Usual presentation	Sporadic cases	Clusters of cases
Outbreak extension	Community	Collective
Outbreak reported	Low	High
Outbreak detection	Microbiologic characterization and surveillance	Epidemiologic surveillance

molecular methods such as pulsed field electrophoresis, multiple-locus variable-number tandem repeat analysis, and whole-genome sequencing.

Following studies in the United States (U.S.), one *Salmonella* isolate case in a culture may represent 38.6 cases in the community.[9] In the period 2012–2014, Spain reported an annual mean of 5600 cases of *Salmonella*[2] and following this estimation more than 200,000 cases could have occurred; indeed Spain is already the European country with the second highest rates of Salmonella infections.[10] When we consider that most *Salmonella* infections are transmitted by foods, the implementation of a specific surveillance by a foodborne diseases network such as those in the U.S. and other countries could usefully to increase detection, control, and prevention of *Salmonella* and other etiologic agents of FO.[9]

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Antimicrobial therapy in septic patients in Emergency units: Right from the outset☆

Tratamiento antibiótico de los pacientes con sepsis en los servicios de urgencias: acertar desde el principio

Dear Editor,

We have read the manuscript published by González del Castillo et al.[1] with interest and would like to make a few comments. This was a retrospective study that evaluated the impact of appropriate antimicrobial therapy on hospital stay and mortality in patients attending the Emergency Unit due to an infection. It concluded that inappropriate antimicrobial therapy prolongs the hospital stay but does not increase mortality. The small number of severely ill patients (only 1.1% had septic shock) may perhaps explain why there is no correlation between inappropriate treatment and mortality. It is also striking that mortality was lower in patients prescribed an inappropriate treatment, although this difference was not significant due to the small sample size (4.8% *vs* 12.6%).

The impact on prognosis of the early administration of antimicrobial therapy to sepsis patients in Emergency Units has also been questioned by other authors.[2] However, there is a vast array of evidence supporting the need to initiate appropriate treatment early in sepsis patients.[3,4]

Some years ago, we conducted a prospective study in patients admitted to the ICU with sepsis. The primary conclusion was that the administration of appropriate empirical antimicrobial therapy before admittance to the ICU was a protective factor for mortality.[4] We have re-analysed our data to ascertain the impact of appropriate treatment in patients referred from the Emergency Unit. 421 patients were enrolled (median age 63 years). The most common foci were: abdomen (39.5%), lung (22.8%), skin and soft tissue (13.7%) and urinary system (12.8%). The multivariate analysis found appropriate treatment administered in the Emergency Unit to be a protective factor for hospital mortality: odds ratio (OR) of 0.26; 95% confidence interval: 0.15–0.45; $p < 0.001$.

Sepsis and septic shock account for a growing number of ICU admissions in Spain.[5] Despite the fact that more and more elderly patients and patients with debilitating diseases are being admitted, a significant decrease in sepsis-related mortality has been seen in recent years.[5–7] The early care of patients with sepsis is key to reducing its high mortality. Emergency Units are known to be extremely busy, which makes identifying certain sepsis patients particularly challenging.[8,9]

For this reason, we feel the results from González del Castillo et al. should be interpreted with caution. Having said that, we do of course agree with the authors regarding the need to improve knowledge on sepsis management and the quality of antibiotic prescribing throughout the healthcare system, particularly in Emergency Units.[10] In doing so, we will help to increase appropriate antimicrobial therapy and reduce sepsis-related mortality.

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