



## Brief report

## *Campylobacter* and *Salmonella* acute gastroenteritis: Epidemiology and health care utilization<sup>☆</sup>



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## ABSTRACT

**Background and objective:** In Catalonia the current surveillance systems do not allow to know the true incidence or the health care utilization of acute gastroenteritis (AGE) caused by *Campylobacter* and *Salmonella* infections. The aim of this study is to analyze these characteristics.

**Patients and methods:** Descriptive study of *Campylobacter* and *Salmonella* infections reported in 2002 and 2012 in Catalonia, Spain. We included cases isolated and reported by the laboratory to a regional Surveillance Unit.

**Results:** The estimated incidence of *Salmonella* and *Campylobacter* AGE decreased by almost 50% and 20% respectively in 2012. Children between one and 4 years old were the most affected in both years. Significant differences in the clinical characteristics and disease duration were observed between *Campylobacter* and *Salmonella*. Visits to the Emergency Department and hospitalization rates were 63.7% and 15%, being more frequent among salmonellosis cases.

**Conclusion:** The estimated incidence of *Campylobacter* and *Salmonella* infections has decreased, however rates are still important, as well as it is the health care utilization in both diseases. Current surveillance systems need appropriateness improvements to reach a better control of these infections.

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### Aspectos epidemiológicos y carga asistencial de gastroenteritis agudas por *Campylobacter* y *Salmonella*

## RESUMEN

**Fundamento y objetivo:** En Cataluña, los sistemas de notificación y vigilancia no permiten conocer la incidencia real ni la carga asistencial de las gastroenteritis agudas (GEA) bacterianas de origen alimentario por *Campylobacter* y *Salmonella*, objeto de este estudio.

**Pacientes y métodos:** Estudio descriptivo de los casos de GEA por *Campylobacter* y *Salmonella* en los años 2002 y 2012 en una región de Cataluña, España, identificados a partir de cultivos microbiológicos.

**Resultados:** La incidencia estimada de GEA por *Salmonella* se redujo un 50% en 2012, y la de *Campylobacter*, un 20%. Los niños entre 1-4 años fueron los más afectados en ambos períodos. Se observaron diferencias significativas según el microorganismo en la presentación clínica de algunos síntomas y en la duración de la enfermedad. Acudieron al Servicio de Urgencias el 63,7% de los casos, y un 15% requirieron hospitalización, siendo más frecuente entre los casos de salmonelosis.

**Conclusión:** La incidencia de GEA por *Campylobacter* y *Salmonella* se ha reducido, pero continúa siendo importante, como lo es la carga asistencial para ambas infecciones. El control de estas dolencias requiere una mayor adecuación de los actuales sistemas de vigilancia epidemiológica.

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## Palabras clave:

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## Introduction

*Campylobacter* spp and *Salmonella typhi* infections are the food-borne zoonoses most frequent in the European Union (EU) and the leading cause of food poisoning acute bacterial gastroenteritis (AGE).<sup>1</sup> These diseases have an impact on the food production chain<sup>1</sup> and in health care because they can cause serious complications and lead to a sick leave.

The EU has developed comprehensive legislation on *Salmonella* prevention and control in the food chain and has promoted the implementation of epidemiological surveillance networks for both *Salmonella* and *Campylobacter*<sup>2</sup> in Catalonia. However, the current data available on these infections have been provided only by voluntary laboratory reporting (Microbiological Notification System of Catalonia), which records basic data (age, sex, strain and date of isolation), as well as from the study of epidemiological outbreaks reported to the epidemiological surveillance units (ESUs). The purpose of this study is to analyze the incidence of *Campylobacter* and *Salmonella* AGE, epidemiological factors and the burden of care in the region of Vallés Occidental, in 2002 and 2012.

## Patients and methodology

Descriptive study of cases of AGE in the region of Vallés Occidental, notified to the ESU in 2002 and 2012 by the CATLAB microbiology laboratory (referral for 93% of this population).

A case of bacterial AGE was defined as a patient with  $\geq 2$  diarrheal stools and/or  $\geq 2$  vomiting in 24 h and positive stool culture for *Campylobacter* or *Salmonella* non-*typhi*.

Data were obtained from laboratory reports sent to the ESU and from telephone interviews to the patient (parents in case of minors) within 15 days after the report. Interviewers used to be nurses or doctors (previously trained by the same person in the 2 periods) using the same standardized questionnaire in both periods. At least 10 cases were randomly selected from the cases reported weekly (simple random sampling). If no response was obtained, the case was replaced by another, also selected randomly.

The incidence was analyzed taking as reference population the local population census (2002: 751,049 h; 2012: 898,173 h); the clinical and epidemiological data (type and duration of symptoms and antibiotic use); the burden of care: medical visits to primary care center or a hospital emergency room, hospitalization ( $\geq 1$  overnight), days of hospitalization and school or work sick leave ( $\geq 1$  day).

## Results

In 2002 1610 cases of AGE were notified, and in 2012, 1286. The microorganism incidence and characteristics are described in Table 1. Of the reported cases, 287 were interviewed in 2002 (18%), and in 2012, 278 (22%). Table 2 shows the epidemiology and burden of care shown by microorganism and year. Among patients surveyed aged  $\geq 15$ , risk factors for the transmission of the disease were detected as follows: 1% worked as food handler, 2% were health personnel, 3% were caregivers of children or elders, and 1.8% worked in child day care. No differences between *Campylobacter*

and *Salmonella* were reported. Among the cases requiring hospitalization, 1.4% were aged under 1, 38% ranged from 1 to 4, and 26% were aged  $\geq 65$ . No deaths were reported.

## Discussion

In this study we have analyzed the AGE caused by *Campylobacter* and *Salmonella* in the region of Vallés Occidental in 2002 and 2012.

Regarding incidence, cases of *Salmonella* might have fallen due to the prevention and control in the food production chain promoted by the EU<sup>2</sup> and implemented in Spain.<sup>3</sup> These measures have not resulted in the same effect for *Campylobacter*. Eating undercooked chicken is the main source identified of sporadic cases and outbreaks of campylobacteriosis, although cross-contamination appears to have a significant role.<sup>4</sup>

The decreasing incidence of *Campylobacter* infection observed from 2002 to 2012 does not match what was reported by other surveillance programs in the EU, which tend to increase.<sup>1</sup> In recent years etiologic diagnosis might have decreased and this might have affected *Campylobacter* infections more compared to *Salmonella* infections, for reporting milder symptoms than salmonellosis, as previously described.

Surveillance systems tend to underestimate the impact of AGE.<sup>5</sup> This study is based on the reporting of microbiological cultures, so the true incidence of campylobacteriosis and salmonellosis may be higher, since not all patients visit the doctor and stool culture is not performed to all patients.<sup>6</sup>

The higher involvement of children aged 1–4 can be explained by the increasing diversity of food and increased exposure to transmission mechanisms (child daycare, contact with animals, etc.) that occur in this age. In adults, the incidence of AGE might be underestimated if they do not attend health services regularly and they are not required stool culture. Age, previous disease or severity of symptoms have been shown to influence the demand for health care.<sup>7</sup>

As for the observed clinical differences, the largest number of diarrheal stools reported in *Salmonella* may pose a higher involvement of the patient's health and increased risk of transmission. This might also explain the increased number of visits to the emergency room and hospitalizations.

In our study it is noteworthy that although consumption of antibiotics in 2012 was higher, the frequency of diarrhea with or without blood does not vary between the two periods, although a significant reduction in other symptoms were observed. This reduction might be due to a higher drug use by the patient, including antibiotics, although it might also be explained by the distribution of AGEs, since *Salmonella*, which causes more symptoms, decreased in 2012. However, this hypothesis should be tested in further studies.

The burden of care is no different between the periods studied, but it is different depending on the microorganism. Therefore, cases of salmonellosis have visited the emergency room more frequently and have required more hospitalizations. This is consistent with the easier perception of symptoms observed in cases of *Salmonella*. The type and intensity of symptoms might help the differential

**Table 1**  
Incidence and predominant strain by year and microorganism among the reported cases (n = 2896).

	2002		2012	
	<i>Campylobacter</i>	<i>Salmonella</i>	<i>Campylobacter</i>	<i>Salmonella</i>
Cases reported	904	706	859	427
Incidence, cases/100,000 inhab (95% CI)	120.4 (112.52–128.21)	94 (87–100.94)	95.64 (89.24–102)	47.54 (43–52)
Predominant strain (%)	<i>Jejuni</i> (99)	<i>Enteritidis</i> (43)	<i>Jejuni</i> (100)	<i>Typhimurium</i> (67)

CI: confidence interval.

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