National outbreak of Shiga toxin-producing *Escherichia coli* serotype O26:H11 (t5: 1401) July – October 2021

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INTRODUCTION

Shiga toxin-producing *Escherichia coli* (STEC) group;

- Defined by 1 (or more) of bacteriophage encoded Shiga toxin genes (stx) [1]
- Most common serotype: STEC O157:H7
- Other non-O157 serotypes are increasing in prevalence [5]
- Previously associated with under cooked meat, unpasteurised dairy products and raw produce irrigated with contaminated water [2-4]

Increases in STEC O26:H11 (second most common serotype) is likely due to more local microbiology laboratories implementing GI PCR, but a true increase in burden cannot be ruled out

On the 29 July 2021, the PHE STEC enhanced surveillance system identified a cluster of nine cases infected with the same strain of STEC O26:H11, four recent cases and five cases from 2020. Initial investigations of the cluster in 2020 had not identified a likely source.

The aim of this investigation was to identify a common source of infection between cases of STEC O26:H11 (t5: 1401) to inform public health actions and prevent further cases.

METHODS

- Stool samples were cultured locally and/or underwent GI PCR, if available
- Sent to the Gastrointestinal bacteria reference unit (GBRU) for confirmation and sequencing.
- Enhanced surveillance questionnaires (ESQs) are routinely administered to identified STEC O157 and (as of July 2021) STEC O26 cases
- Identified cases were administered a trawling interview by telephone

Case definitions	Confirmed	Probable
	A case of STEC O26:H11 stx1 and stx2 reported by GBRU	
	From 1st Jan 2020 onwards	
	Resident in the UK or Ireland	
	Within the 5 SNP threshold (t5: 1401 OR t5: 1436)	Awaiting WGS results

***Exclusion criteria*:** Any cases with WGS typing not belonging to the t5.1401 OR t5:1436 SNP cluster

- Trawling questionnaires included: demographics, symptoms, exposures, supermarket loyalty card information
- These data were summarised by time, place and person and exposure groups

RESULTS

- 24 August 2020 – 20 October 2021: 25 confirmed cases were identified (**Figure 1**)
  - 16 were female (64%) and 9 were male (36%)
  - Ages ranged from 11 to 79 years of age, with a median of 36 years
- 21 completed ESQs were available
  - Food exposure information found several broad food types with >50% of cases exposed
  - Amongst eight completed trawling interviews, half were related to raw vegetables/salad (**Table 1**)
  - No single exposure could explain all cases
- Cases were geographically dispersed across the UK and Ireland (**Figure 2**)

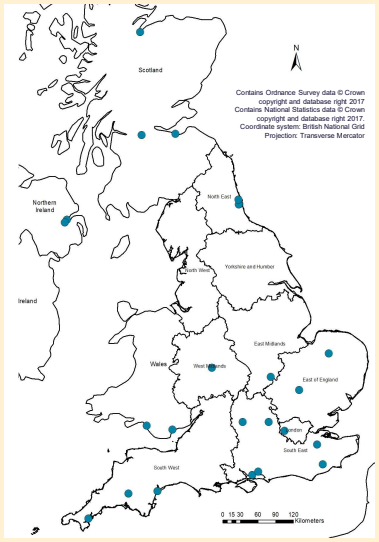

Figure 2. Geographic distribution of confirmed cases of STEC O26 (t5: 1401/1436) August 2020 – October 2021 in England, Scotland, Northern Ireland and Wales (n=24) *[Geographical information unavailable for 1 ROI case]*

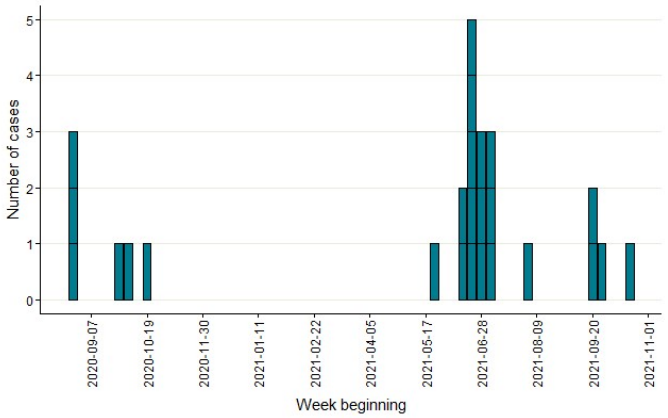

Figure 1. Epidemiological curve of confirmed cases of STEC O26:H11 (t5: 1401/1436) between August 2020 and October 2021 by symptom onset week, or specimen week if unavailable (n=25)

Table 1. Food exposures reported by at least 50% cases completing a trawling interview and their corresponding frequencies from ESQs, compared with overall frequencies reported by complete ESQs (n=21)

Exposures^		Trawling Questionnaires (%, N = 8)	ESQ (of trawled) (%, N = 8)	All England ESQs (%, N =15)	All ESQs (%, N=21)
Dairy products	Hard white cheese	100.0	75.0	60.0	50.0
	Milk	87.5	50.0	53.3	42.8
Raw vegetables	Carrots	87.5	12.5	13.3	15.7
	Peppers	87.5	0.0	0.0	0.0
	Tomatoes	87.5	12.5	20.0	21.1
	Cucumber	75.0	0.0	0.0	10.5
	Onions	75.0	0.0	0.0	0.0
	Peas	75.0	0.0	6.7	5.3
	Potatoes	75.0	0.0	0.0	0.0
Salad leaves	Iceberg lettuce	62.5	25.0	33.3	26.3
Drinks	Orange juice	75.0	0.0	0.0	22.2
Food handling at home	Sausages	62.5	12.5	13.3	10.0
	Chicken	62.5	50.0	33.3	30.0
	Potatoes	62.5	12.5	13.3	10.5
	Carrots	62.5	25.0	20.0	21.1
Fish and seafood	Fish	62.5	62.5	60.0	50.0

^Garlic (75.0%), pork sausages, sweet corn, butter, breakfast cereal, margarine, bread/ rolls and snack food (62.5%) were not shown in the above table as they were only captured in the trawling questionnaires

DISCUSSION

- **Point-source outbreak**
  - The epidemic curve for the 2021 cases suggested a point-source outbreak, although ESQs did not identify a common source between cases
  - Further trawling questionnaires provided information that suggested exposure to raw vegetables and salad leaves was common, fitting with the seasonal profile of cases (summer food item)
  - A higher proportion of young, adult female cases was consistent with findings from past outbreaks related to these exposures [6-8]
  - Small geographically dispersed outbreaks are difficult to investigate and are becoming more common due to the use of routine WGS. The information gained from this investigation, though inconclusive, will inform similar outbreaks in any future reoccurrence of the strain.
- **Purchasing information**
  - We attempted to get information on cases' purchases by requesting receipts and loyalty card information
  - There were difficulties regarding the type and the detail of information that supermarkets were able to provide
- **GI PCR testing**
  - Non-uniform PCR testing for GI pathogens at local laboratories meant an extended time between onset and identification due to having to send samples to the national reference laboratory
  - This was compounded by logistical delays in laboratory processing at the reference laboratory
  - Ultimately, this affected case-finding, recall bias and the effectiveness of any attempts at trace-back investigation

RECOMMENDATIONS

- Encourage widespread implementation of GI PCR at the local and regional hospital level to improve the detection of non-O157 STEC and plug the surveillance gap
- Continue to monitor the WGS surveillance data for further cases in this cluster and for the detection of other clusters
- Timely analysis of ESQ data and activation of more detailed, bespoke trawling questionnaires for hypothesis generation
- Better engagement and improved communication with national retailers to encourage timely release of loyalty card data for more robust analytical studies e.g. pre-agreement with national chains
- Better consistency between ESQs for comparison between nations.

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