

# *Shigella* outbreak among students from a student society in the Netherlands

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## INTRODUCTION

On the 30<sup>th</sup> of March 2017 a cluster of *shigella flexneri* infections was identified among students from a student society, starting with three microbiologically confirmed cases. Initial investigation suggested that more students were affected, and an association with food consumed at the society was suspected. An outbreak investigation was initiated to determine the extent of the outbreak, and to look for possible sources.

## METHODS

An electronic questionnaire-based cohort study was conducted among the 1971 members (63% male, 37% female) of the student society.

Cases were defined as members of the student society who visited the student society between the 10<sup>th</sup> and 17<sup>th</sup> of March 2017, and suffered gastrointestinal complaints starting within a week after the visit. Controls visited the society in the same period, though did not develop gastrointestinal complaints. Statistical analyses was performed with SAS.

## RESULTS

The response rate was 26%. 32% (n=162) of the respondents had suffered gastrointestinal complaints between the 10<sup>th</sup> of March and the 26<sup>th</sup> of April, showing a peak around the 17<sup>th</sup> and 18<sup>th</sup> of March (including seven microbiologically confirmed cases) and a smaller peak around the 4<sup>th</sup> and 5<sup>th</sup> of April. Of the students who consumed food or drinks on the student society on the 15<sup>th</sup> of March (n=43), a large percentage (70%) developed gastrointestinal complaints. Though, cases had occurred beforehand. Other analyses on use of toilets, food handling, and bar tendering showed significant associations. Only food consumption on the 15<sup>th</sup> remained significant in the multivariate analysis (p=0,000). The investigations showed insight in practices that impose transmission risks: students and staff attending the society while having gastrointestinal complaints; using the toilet of kitchen staff, bar tenders serving used glasses without washing; students helping with food serving.

### Epidemic curve

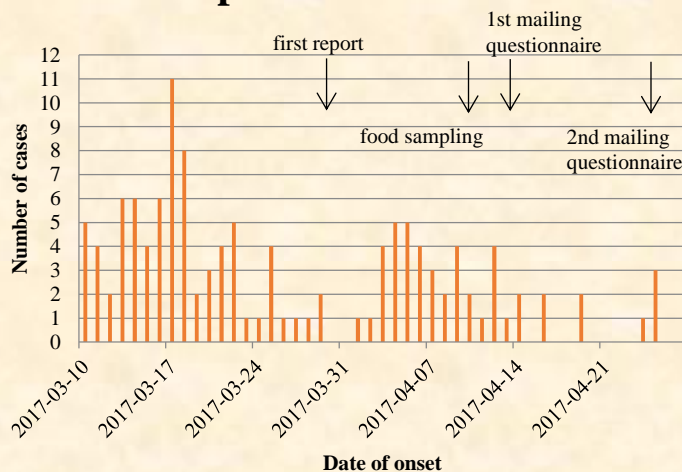


Table 1. Univariate analysis of risk factors for developing gastrointestinal complaints

|                                   | Gastrointestinal complaints (%) |
|-----------------------------------|---------------------------------|
| <b>Visiting the society</b>       |                                 |
| Yes                               | 35,4*                           |
| <b>Consumption of food/drinks</b> |                                 |
| No                                | 23,3*                           |
| Yes                               | 38,2*                           |
| Not certain                       | 22,8*                           |
| <b>Use of toilets</b>             |                                 |
| Yes                               | 37,3*                           |
| Not certain                       | 24,8*                           |
| <b>Food consumption 10 March</b>  |                                 |
| Yes                               | 44,6*                           |
| <b>Food consumption 14 March</b>  |                                 |
| Yes                               | 38,7*                           |
| <b>Food consumption 15 March</b>  |                                 |
| No                                | 28,4*                           |
| Yes                               | 69,8*                           |
| <b>Bar tendering</b>              |                                 |
| No                                | 34,7*                           |
| Not certain                       | 22,7*                           |
| <b>Food handling lunch</b>        |                                 |
| No                                | 34,8*                           |
| Not certain                       | 22,7*                           |

\*Only significant results are shown

Norovirus can be ruled out as a cause. 14 % of the respondents reported vomiting. In case of norovirus this is known to be 70%.<sup>1</sup> The Dutch food and consumer product safety authority (NVWA) has taken food samples the 10<sup>th</sup> of April. No pathogens were found. Limitations were: delay in conducting the questionnaire, which could cause recall bias. Anonymity was ensured, though double entries could not entirely be ruled out. Questions were not mandatory; not structured by risks per day; and the time frame (10<sup>th</sup> – 17<sup>th</sup> of March) was too limited in hindsight.

## CONCLUSIONS

This has been an unusually large outbreak. The outcome of the questionnaire indicates attending the society, and consumption of food on 15<sup>th</sup> of March were risk factors. However, several cases had already occurred beforehand. The initial source of introduction could therefore not be traced. Most likely, multiple transmission routes have been involved, through use of toilets, food handling, and bar tendering. Exposure may have been increased through food handling, explaining the first peak.

## REFERENCES

- Kirby A.E. et al. (2016). Vomiting as a Symptom and Transmission Risk in Norovirus illness: Evidence from Human Challenge Studies. PLoS ONE 11(4): e0143759. doi:10.1371/journal.pone.0143759