Public Health England

Protecting and improving the nation's health

Investigation of an Outbreak of Gastrointestinal Illness Following 2015 New Year's Events at Crewe Hall Hotel, Crewe

FINAL OUTBREAK REPORT
MAY 2015

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Public Health England
Wellington House

133-155 Waterloo Road
London SE1 8UG
Tel: 020 7654 8000
www.gov.uk/phe
Twitter: @PHE_uk

Facebook: www.facebook.com/PublicHealthEngland

Prepared by: on behalf of the Outbreak Control Team
For queries relating to this document, please contact: candmhpu@phe.gov.uk

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Food Water & Environmental Microbiology Laboratory Preston

Press Officer North West - Communications

Cheshire & Merseyside Public Health England Centre

Cheshire & Merseyside Public Health England Centre

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Environmental Health Department

Environmental Health Department

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EAST CHESHIRE NHS TRUST

Infection Control Nurse

Glossary

Cohort Study	A study in which people who presently have a certain condition are followed over time and compared with another group of people who are not affected by the condition
Confidence Interval	The range around a numeric statistical value obtained from a sample, within which the actual, corresponding value for the population is likely to fall, at a given level of probability
Univariate Analysis	The simplest form of analysing data. "uni" means "one", so in other words your data has only one variable. It doesn't deal with causes or relationships and its major purpose is to describe, summarise data and find patterns in the data.
Fomites	Any object or substance capable of carrying infectious organisms, such as germs or parasites, and hence transferring them from one individual to another.
Incubation Period	The period between exposure to an infection and the appearance of the first symptoms.
Multivariate Regression	A statistical technique that predicts values of one variable on the basis of two or more other variables.
Statistical Significance	A mathematical technique to measure whether the results of a study are likely to be true. Statistical significance is usually expressed as a P-value. The smaller the P-value, the less likely it is that the results are due to chance (and more likely that the results are true). Researchers generally believe the results are probably true if the statistical significance is a P-value less than 0.05 (p<.05).
Polymerase Chain Reaction	A widely used diagnostic test. It is a rapid method which makes many copies of a sequence of DNA (or RNA) to detect microbes in clinical specimen
Relative Risk	Used to estimate exposure to something that could affect health. A comparison of the risk of a particular event for different groups of people. It measures the strength of association between an exposure and the disease.

Executive Summary

A total of 450 guests from several local authority areas across the United Kingdom attended a New Year's event at the Crewe Hall Hotel, consisting of a New Year's Eve dinner on Wednesday 31st December 2014 and New Year's breakfast on Thursday 1st January 2015. The Hotel is under the jurisdiction of Cheshire East Council.

Cases of gastroenteritis in people who had attended the New Year's Eve events at Crewe Hall Hotel were reported. An Outbreak Control Team [OCT] was convened to manage the outbreak.

The outbreak was managed in-line with the Cheshire & Merseyside Multi-Agency Outbreak Plan (PHE, 2014a) which is based on the PHE Communicable Disease Outbreak Management – Operational Guidance (PHE, 2014b).

Methods

Environmental, microbiological and epidemiological investigations were undertaken. Environmental Health Officers [EHOs] from Cheshire East Council inspected and took environmental samples from the Hotel premises. These samples, along with stool samples from four cases, were analysed microbiologically. A retrospective cohort study was conducted using an online questionnaire to obtain information from guests. Univariable and multivariable logistic regression analyses were undertaken to estimate the Relative Risk [RR] which is a measure of the strength of association between an exposure and the disease.

Results

There were 162 valid responses to the survey, with an age range of six to 77 years and a median age of 53 years; 95 respondents were symptomatic, equating to an attack rate of 59% among respondents and at least 21% of all those attending the New Year event (95/450). The majority of the respondents attended the breakfast on 1st January (120/162), and the attack rate for the breakfast guests who responded to the survey was 66%. The epidemic curve was consistent with a point source exposure of infection. Thirteen guests reported symptoms of diarrhoea and vomiting starting before breakfast; eight of these and symptomatic staff   were present at breakfast on 1st January 2015. The predominant symptoms were lethargy, nausea, diarrhoea, abdominal pain and vomiting. Median duration of illness was two days. Eight cases were seen by a GP. None of the cases were hospitalised.

Environmental investigation identified issues with maintenance of staff toilets, hand contacted surfaces and adherence to the sickness policy operated by the premises.

Epidemiological investigation showed that attendance at breakfast was associated with illness, (Risk Ratio, RR: 1. 73 [CI: 1.15, 2.59]), but no association was found between illness and attendance at the New Year's Eve events in any of the three rooms (RRs: Continental Room 1.12 [CI: 0.87, 1.46]; Ranulph & Oak Parlour 0.92 [CI: 0.61, 1.38]; State Room 0.93 [CI: 0.72, 1.21]). None of the food items served at the three dinners, in any of the rooms or at breakfast appeared to be associated with an increased risk of becoming ill.

Of the four stool samples tested, one tested positive for Norovirus. Another sample tested positive for campylobacter on PCR [Polymerase Chain Reaction] but was negative on culture. There were no other positive microbiological findings from any other stool samples. 25 environmental swabs were also negative for Norovirus and other gastrointestinal [GI] pathogens.

Discussion & Conclusion

This was a large outbreak of gastrointestinal illness and the clinical presentation of those affected appeared to suggest that the possible pathogen could have been viral. The epidemic curve also fits with the infective period of Norovirus (24 to 48 hours, but less often, 12 hours). Microbiological investigation detected Norovirus in one stool sample, a second sample tested equivocal for campylobacter. There were no other positive stool or environmental samples which can substantiate any pathogen as the cause of this outbreak or link the outbreak to any specific source.

Attendance at breakfast was associated with becoming ill. However none of the food items served at any of the three dinners or at breakfast appeared to be associated with an increased risk of becoming ill. The analysis found no conclusive evidence of foodborne transmission.

The OCT was initially aware of the occurrence of symptoms of gastroenteritis in   staff on 1st January 2015, whilst at work. Subsequently the epidemiological investigation revealed that 13 guests reported onset of symptoms (diarrhoea and vomiting) that started before the time of the breakfast and eight of these guests also attended the breakfast on 1st January. This means that it is possible that other Hotel guests may have been exposed to the presumptive viral infection via person-to-person contact before breakfast, during breakfast or via contamination of objects in the breakfast room including the serving utensils rather than from food.

The effect of exposures on illness could have been underestimated given the low response rate (36%), the majority of whom reported symptoms (66%). The investigation was also limited by the delay in notification to PHE and Environmental Health Department and paucity of stool samples submitted. By the time the outbreak was notified, all guests had left the Hotel and dispersed, and the majority had recovered from their symptoms.

Recommendations

- The Hotel has been advised to report any future incidents to the Cheshire East Council Environmental Health Department as early as it is brought to their notice in order to facilitate prompt and effective investigation
- The Hotel should ensure that all staff involved with food handling are aware of, and adhere to, the required exclusion from work whilst they have symptoms of diarrhoea and vomiting and further exclusion for a period of 48 hours following resolution of symptoms
- The Hotel should ensure that all equipment and facilities within the Hotel, including staff facilities, are maintained to a high standard of hygiene
- There is a need for PHE to consider the best way(s) of reminding GPs to investigate cases of food poisoning and diarrhoea with stool tests in as many cases as possible, to aid outbreak and general investigations

1. Background

On Wednesday 31st December 2014, 450 guests from Cheshire, Merseyside and other counties in the UK attended three different New Year Eve's events held at the Crewe Hall Hotel. Several guests stayed at the Hotel overnight and 220 guests also ate breakfast at the Hotel on the 1st of January 2015.

Crewe Hall Hotel is a 4-star rated Hotel located in the Cheshire countryside. It is used for leisure breaks, business meetings, conferences and weddings. The Crewe Hall Hotel falls under the jurisdiction of Cheshire East Council.

2. History of Outbreak & Timeline of Events

On the 5th January 2015, Cheshire & Merseyside PHE Centre [CMPHEC] received information from Public Health Wales that   people from   who had attended the New Year's Eve function at Crewe Hall Hotel had become ill with GI symptoms. The CMPHEC Health Protection Team [HPT] notified the EHOs from Cheshire East Council of the incident on the same day and requested them to investigate this further.

On the 6th January 2015, the EHOs visited the Hotel initially, followed by a second visit to the Hotel on 7th January 2015 where they inspected the premises and interviewed staff. Their initial investigation revealed that a total of 450 guests had attended three different functions for New Year's Eve event at the Hotel. The New Year's Eve dinners took place in three different Halls: the State Room; Ranulph & Oak Parlour; and Continental Suite. The three functions had completely separate menus. On the 1st January 2015, 220 guests all of whom had had dinner at the Hotel the night before had breakfast in the Continental Suite. The breakfast was served between 8.00am and 10.00am.

The Hotel had been contacted by 18 guests complaining of symptoms of gastroenteritis following the New Year's Eve events. Some of the guests had also put comments on "Trip Advisor" expressing their disappointment with the cold food that was served at the New Year's Eve dinner; it was not clear if these were the same guests that had contacted the Hotel to report their GI symptoms or different guests.

On interviewing staff, the EHOs identified that   staff   did not report for work on New Year's Eve due to illness and therefore had no contact with the guests or the New Year's Eve events. EHOs also identified that   staff became ill with gastroenteritis on 1st January 2015 while at work and   sent home   staff   reported feeling better in the evening of the same day and   allowed to return to work the next morning, contrary to the Hotel's "sickness policy".

The EHOs obtained contact phone numbers and made phone calls to 30 guests to establish symptoms and complaints and to help inform the development of the GI questionnaire. Of the 30 guests interviewed, 11 reported vomiting and some also had diarrhoea after attending the Crewe Hall New Year's Eve events. Symptoms started approximately 10 to 36 hours after the events and lasted for a few days. None of these symptomatic guests reported being ill at the Hotel and none had visited their GP or hospital. Guests who were ill were spread across the three function rooms. Subsequently some other symptomatic guests were identified and these too were investigated by the EHOs and the CMPHEC HPT.

It was clear at this time that there was an outbreak of gastroenteritis linked to the New Year's Eve events at Crewe Hall Hotel.

On Thursday 8th January 2015, an OCT meeting was convened to assess the situation and decide on the appropriate actions to investigate and manage the outbreak. The OCT included representation from the CMPHEC, Microbiology, Cheshire East Council and PHE FES North West.

3. Methods of Investigation

The outbreak was managed in-line with the Cheshire & Merseyside Multi-Agency Outbreak Plan (PHE, 2014a) which is based on the PHE Communicable Disease Outbreak Management – Operational Guidance (PHE, 2014b).

The OCT meeting was convened with the following objectives:
- To review the background of the incident and the evidence available
- To identify the source of infection
- To ensure control measures are put in place to prevent any further cases
- To agree on further investigations
- To communicate appropriate information effectively and efficiently to relevant individuals and organizations

OCT meetings were held on 8th and 30th January 2015. EHOs maintained regular contact with the Hotel regarding any further guests/staff that may become symptomatic.

3.1 Environmental Investigation

EHOs made several visits to the Hotel during this investigation. The first visit to the Hotel took place on 6th January 2015, during which a preliminary inspection of the premises, including the kitchens, was made. During the visit, the EHOs were satisfied with the overall cleanliness of the Hotel including the standards of the guest rooms and the Hotel's cleaning policy. They established that the Hotel had separate toilet facilities for staff and customers and rules for use. Whilst staff may use the guest toilets, the converse is not allowed. The EHOs reported the following issues with the staff toilets, witnessed at the time of the visit:
- The hand soap dispenser to the wash hand basin in the male staff toilet was empty
- The toilets only had a hot hand dryer and the dryer in the male toilet was turned off
- There were no paper towels available which is the preferred method for drying hands
- The hot and cold running water taps are operated manually which is not ideal
- They also established that the staff toilets were only cleaned once a week, unlike the customer toilets which are checked every hour

During a further inspection carried out on 7th January 2015, food suppliers, food preparation, handling and cooking, methods of food storage and distribution were all investigated. Fridge and freezer temperature records were obtained. EHOs also reviewed the Hotel's Hazard Analysis & Critical Control Points [HACCP] and staff training records. During their interviews, EHOs found that the staff seemingly unaware of the Hotel's "sickness policy". The EHOs questioned kitchen staff to enquire if any other members of staff had been ill and not reported this to the Hotel management and also if they were aware of the Hotel's "sickness policy".

Environmental swabs were taken from the Hotel for microbiological analysis.

Full menu details for the New Year's Eve party and New Year's breakfast were obtained to inform the GI questionnaire. Contact details for guests were also obtained from the Hotel to facilitate the investigation, i.e. mainly names, email addresses or phone numbers.

3.2 Microbiological Investigations

One stool specimen was analysed microbiologically at the PHE regional laboratory at Manchester Royal Infirmary. Subsequently three further stool samples from guests living outside the Cheshire and Merseyside area were analysed in their local microbiological laboratories.

Environmental samples taken by EHOs included:
- 17 Norovirus detection swabs
- 8 hygiene indicator swabs

The samples were taken from wash hand basin taps and tables in the public area; wash hand basin taps, work tops, chopping boards, light switches, door handles and fridge door handles in the kitchens; and the staff toilet flush handle. These samples were analysed microbiologically at the PHE Food, Water & Environment Laboratory in Preston.

None of the food prepared for the New Year's Eve events was available for testing, which is not unusual given the timescales involved.

symptomatic guests who stayed at the Hotel after the New Year's events (did not fit the case definition) and therefore were not considered part of the outbreak, were nonetheless investigated by the EHOs, supplied with specimen pots and encouraged to submit a stool sample for investigation.

3.3 Epidemiological Investigations: Cohort Study

As stated earlier, initially 11 out of 30 guests interviewed by EHOs had been identified as suffering from gastroenteritis after attending New Year's Eve events at Crewe Hall Hotel. In the early stages of the investigation the hypothesis was that guests suffered from food poisoning after attending and eating at the New Year's Eve events/breakfast at the Hotel.

It was therefore agreed by the OCT to carry out a retrospective cohort study. The objectives of the epidemiological study were to describe the outbreak in terms of place, person and time and identify exposures associated with illness among attendees. The study population consisted of the cohort of guests who attended the New Year's Eve events, including the breakfast. The PHE FES North West supported the OCT in carrying out this study.

3.3.1 Case Definition

A case was defined as any individual who attended the New Year's dinner on 31st December 2014 and/or the breakfast on 1st January 2015 at the Hotel and became unwell with diarrhoea and/or vomiting with symptom onset between 1st and the 4th January 2015.

3.3.2 Exclusion Criteria

Prior symptoms (diarrhoea and/or vomiting) in the seven days before the events of 31st December 2014.

3.3.3 Data Collection

a. Questionnaire Development

A focussed online questionnaire was developed using Select Survey. The questionnaire asked for information on demographics, symptoms and exposures among those who attended the New Year's Eve events. The questionnaire was designed to include questions about all the foods served at the New Year's Eve events and also at breakfast on the 1st January 2015 (Appendix A).

b. Data Gathering

An attempt was made to send the questionnaire to all 450 guests who attended the New Year's Eve events. Crewe Hall provided contact details of attendees of the New Year's Eve dinner and the guests staying over, with email addresses known for most guests. A link to the survey was circulated with a covering email by the FES team to all attendees for whom an email address had been obtained. They were requested to forward the email to other members of their party or group. The remaining guests, for whom there were contact telephone numbers were contacted by the FES North West and CMPHEC staff, and asked to provide an email address. If they did not have an email, or preferred not to disclose it, the questionnaire was administered by telephone.

3.3.4 Statistical Analysis

Demographics and illness history of cases and non-cases were described and compared. A comparison was made between the attack rate in people exposed to each individual food item served at the three dinner events and at the breakfast to that of people not exposed to those food items by calculating relative risks (RR), (and 95% confidence intervals). P-values were calculated using Fisher's exact test. All those items found in univariable analysis to be statistically significant at p<0.05 were then included in a multivariable Poisson regression model with robust standard errors, including attendance to the breakfast as a possible confounder, to determine whether any food item was independently associated with illness.

4. Control Measures

The following control measures were taken:

- A letter was written to the Hotel by the EHO on 9th January 2015 highlighting the areas for concern following the initial inspection and the necessary remedial actions. The Hotel was advised to:
  - o Remind all staff engaged in food handling operations of their legal duty to report illness to their employer, with the recommendation that staff should be re-trained in the "fitness for work" policy
  - o Undertake regular checks to ensure that there are sufficient supplies of soap available at all wash hand basins
  - o Undertake regular checks to ensure that there are sufficient hand drying facilities available at all wash hand basins
  - o Ensure that all wash hand basins are maintained and easily accessible at all times to facilitate good hygiene
  - o Review the frequency at which high contact areas, for example refrigerator doors, are cleaned and to ensure that attention is paid to the cleaning of all hand contact surfaces
  - o Notify current guests about incidents of food poisoning or diarrhoea and vomiting, either by a notice displayed at Reception, verbal information on arrival, or through room information packs. Guests should be given advice about the Hotel's sickness procedures. This will facilitate early identification of abnormal levels of sickness within the Hotel, and enable early introduction of control measures to minimise the spread of infection

The EHOs also advised:

- Staff and managers were reminded regarding sickness reporting and the "48 hour" exclusion rule which requires all staff to stay off work until 48 hours after their last episode of GI symptoms
- Disposable paper towels to be made available in the toilets
- The wash hand basin taps are replaced with ones that do not require hand contact operation

5. Results of the Investigation

5.1 Environmental Results

a. General Inspection

Following the outbreak, the EHOs visited the Hotel on the 6th and 7th January 2015 and were satisfied with the overall cleanliness, including the standards of the guest rooms and the Hotel's cleaning policy. The EHOs reported a number of issues with the staff toilets, witnessed at the time of the visit which have been referenced earlier in the report.

b. Kitchen & Function Room Inspection

The New Year's Eve functions took place in three different rooms which were served by two kitchens and had separate menus. The "State Room" and the "Ranulph & Oak Parlour" share a kitchen, whilst the "Continental Suite" has a separate Brasserie kitchen. The function rooms are operated by separate staff, who do not work across the kitchens and therefore there was no indication of the possibility of cross-contamination between the kitchens. The Hotel bars also function separately for each room with no mixing of staff. The breakfast is prepared in the Brasserie kitchen.

The EHOs were satisfied with the cleaning products being used. However, the following two issues were raised with regards to the kitchen/s:

- Hand contact surfaces, such as fridge doors, wash hand basin taps in the kitchen were observed to have a build-up of physical dirt/staining. There was some debris on the fridge door
- Access to some wash hand basins was impeded by kitchen equipment and some wash hand basins were poorly maintained, with a number having loose taps

c. Food Handling

- The food processing and cooking methods, and food storage, including temperatures were satisfactory
- All food served at the Hotel is prepared in on-site kitchens. Some food, such as the Hot Pot and Beef Stew, was prepared a day before and reheated shortly before serving
- Considering the complaints about cold food served at the New Year's Eve dinner, the EHOs established that the Hotel has equipment that can be used to quickly heat food before serving to appropriate temperature

d. Sickness Policy

The Hotel's sickness policy requires food handlers to immediately inform their supervisor before starting work if they are suffering from certain illnesses including, any symptoms such as diarrhoea and/or vomiting. The supervisor is then required to carry out a number of steps including the immediate exclusion of the staff member.

There had been no enforcement issues with the Crewe Hall Hotel prior to this incident and the EHOs did not identify any ongoing risk to the public. As a result, the Hotel was allowed to continue trading as usual. The EHOs maintained daily communication with the Hotel during the outbreak investigation.

5.2   Microbiological Results

Only four (4) stool samples were submitted from persons who met the case definition.

- One stool sample submitted on the   tested positive for Norovirus but negative for bacterial pathogens
- Two stool samples submitted on   (received by the laboratory on the   ) tested negative for bacterial pathogens, Rotavirus and Norovirus
- The fourth stool sample submitted on the   tested positive initially for Campylobacter on PCR [Polymerase Chain Reaction]. However no Campylobacter species was cultured. This result is inconclusive as it could indicate either a false positive PCR or indeed a false negative culture (failed culture). Another stool sample from the same guest tested negative for Norovirus
- A fifth sample was submitted and tested for a symptomatic guest from   who did not meet the case definition. The stool sample was submitted on   and tested abroad. No virus, bacteria or any suspicious pathogen were detected

Microbiological results of environmental samples were as below:

- All environmental swabs tested negative for Staphylococcus aureus, Enterobactereaceae, E. coli and Norovirus
- Swabs from two chopping boards recorded high Aerobic Colony Counts [ACC] (the ACC is the microbial indicator used to assess hygiene and gives the total number of bacteria able to grow in an oxygenated or aerobic environment). A high ACC therefore may indicate poor hygiene

5.3   Epidemiological Results

Overall, a total of 175 online questionnaires were completed (out of 450). Of these, 11 were duplicates; one contained too little information; and one participant did not attend any of the events. As a result, there were 162 valid individual responses for analysis (36% response rate).

There were no respondents who fitted the exclusion criteria (onset of diarrhoea and/or vomiting in week prior to events).

Six of the attendees reported feeling "unwell", but did not report symptoms of diarrhoea or vomiting. These respondents did not meet the case definition and were therefore assigned to the group of non-cases.

5.3.1 Descriptive Epidemiology Results

The age-sex distribution of the study population is presented in Figure 1. In total, 91 women and 71 men completed the questionnaire, with most respondents being between 56 and 65 years old. Information for 13 children (<16 years) was available.

Figure 1: Age-Sex Distribution of Study Population (n=162)
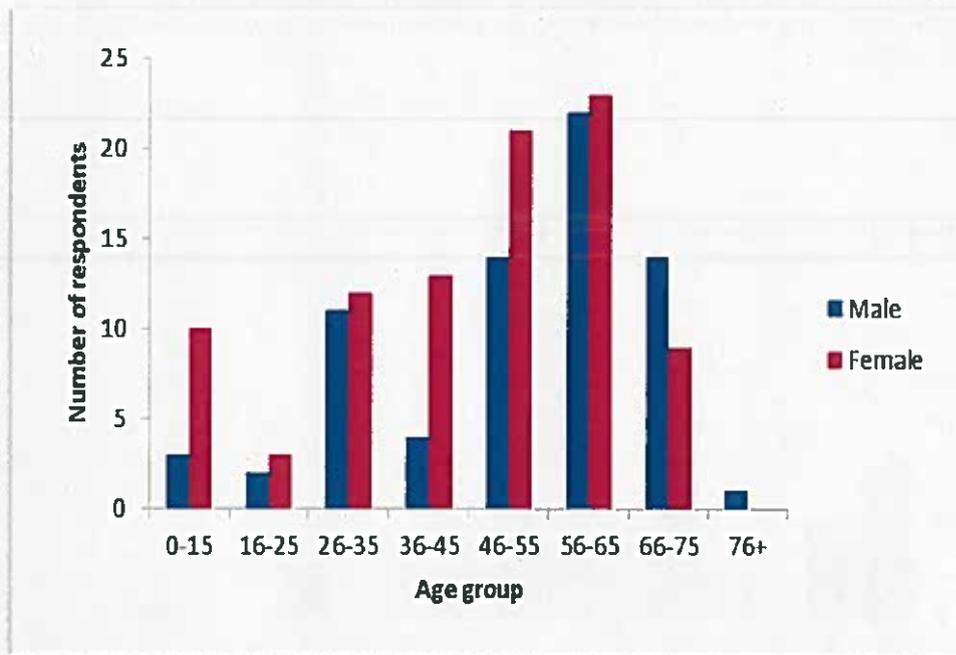
In total, 95 respondents were classified as cases and 67 as non-cases according to the case definition. The 95 cases represented an attack rate of 59% of those included in the study, and at least 21% of all those attending (95/450).

The epidemic curve (Figure 2) best fits with a point source exposure of infection, (a clear rise and fall in cases, no plateauing, most cases occurring within one incubation period) fitting with the infective period of Norovirus (24 to 48 hours, but less often 12 hours). The first person became ill between midnight and 1:00am on 1st January, however illness peaked on 2nd January between 6:00pm and midnight, and the last person became ill on the 4th January between 12:00 midday and 6:00pm. In total, 13 guests reported symptoms starting before breakfast. and eight of these guests were present at breakfast on the 1st January.

Figure 2: Epidemic Curve (date and time of onset of cases (n=80)*)
Two cases did not report a date of onset and 13 did not report a time of onset (four on 01/01, four on 02/01 and five on 03/01)
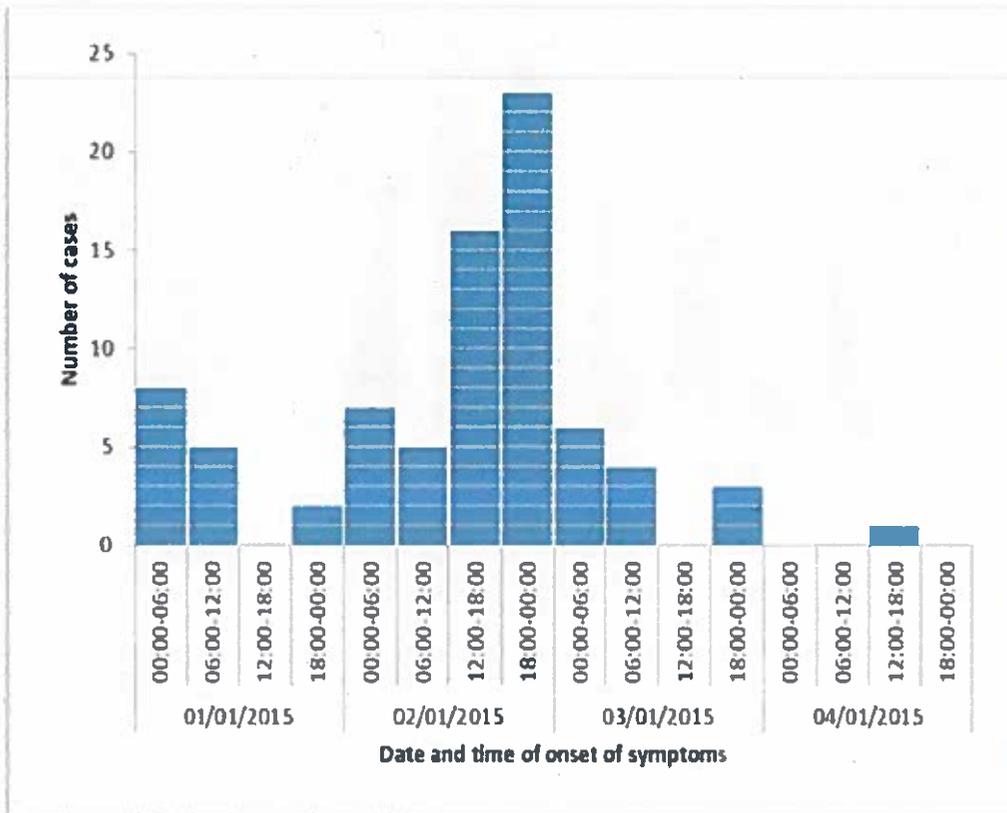
The predominant symptoms were lethargy and nausea, reported by 88% and 81% of cases respectively. Diarrhoea, abdominal pain and vomiting were also reported by over 70% of cases (Table 1).

Table 1: Frequency of Symptoms

Symptoms	Number of Cases	%
Lethargy/Tiredness	84	88
Nausea	77	81
Diarrhoea	75	79
Abdominal Pain	73	77
Vomiting	71	74
Body Ache	60	63
Headache	47	49
Fever	35	37
Bloody Diarrhoea	<5	<5

Cases reported feeling unwell for between six hours and 10 days at the time of reporting, with a median duration of symptoms of two days (Figure 3). Eight cases went to see their GP.

Figure 3: Duration of Symptoms of Cases (n=94)*
* One case did not report a duration of symptoms.
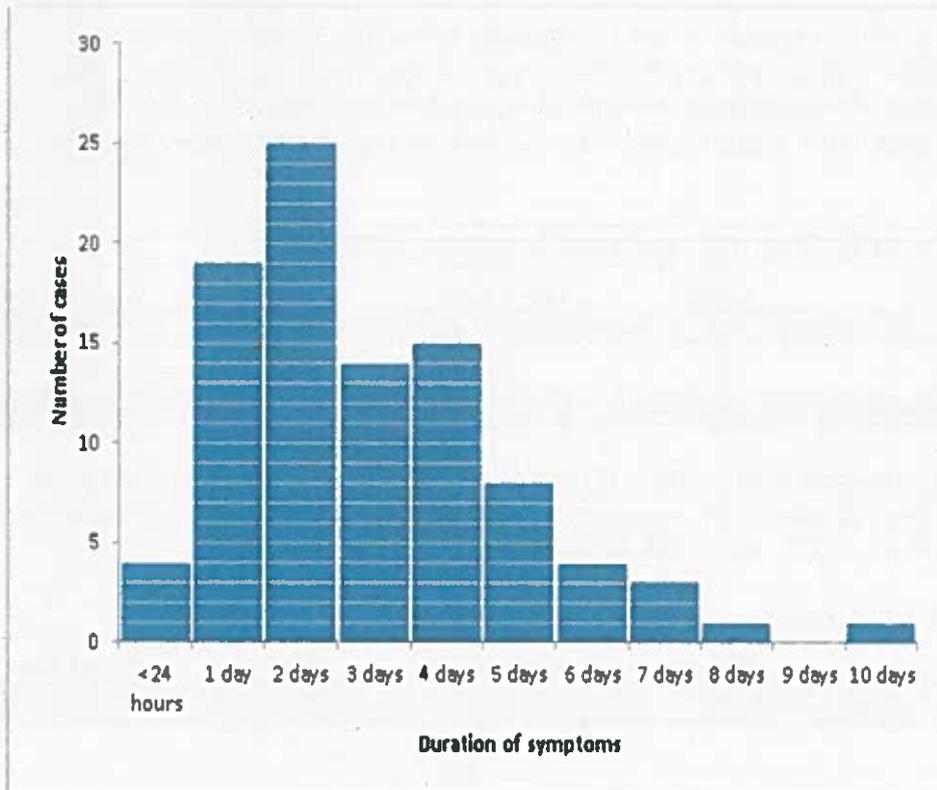
Fifty-five cases were female, and forty were male. The attack rate was 56% and 60% respectively which was not significantly different (p=0.627). The attack rates by sex are presented in Table 2.

Table 2: Attack Rates by Sex (n=162)

	Cases	Non-Cases	Total	Attack Rate
Male	40	31	71	56.3%
Female	55	36	91	60.4%
Total	95	67	162	58.6%

Amongst the 162 respondents (both cases and non-cases), the age range was 6 to 77 years with a median age of 53 years (Table 3). No difference was seen between the median age of cases compared to non-cases (p-value from Wilcoxon rank-sum test = 0.307).

Table 3: Cases & Non-Cases by Age (n=162)

	Cases	Non-cases	Total
Range (years)	6 – 77	7 – 71	6 – 77
Mean	50	47	49
Median	54	53	53
Inter-Quartile Range	36 – 61	34 – 61	36 – 61

The guests ate dinner either at the Continental Suite, the State Room or the Ranulph & Oak Parlour. Although cases could be found across all rooms, the highest number of reported cases had dinner in the State Room (n=47). The attack rate among the respondents for the three rooms was between 55-63% (Table 4).

Table 4: Attack Rates by Room Dinner was Served (n=162)

	Cases	Non-Cases	Total	Attack Rate
Continental Suite	36	21	57	63%
State Room	47	36	83	57%
Ranulph & Oak Parlour	12	10	22	55%

The majority of respondents (120/162) also attended the breakfast at the Hotel on 1st January; 16 cases did not report having the breakfast. The attack rate for the breakfast was 66% as shown in Table 5.

Table 5: Attack Rate - Breakfast (n=120)

	Cases	Non-Cases	Total	Attack Rate
Breakfast	79	41	120	66%

5.3.2 Analytical Epidemiology Results Events

An analysis was undertaken as to whether there were any associations between illness and attending any of the evening dinner events or the breakfast by calculating RR, 95% confidence intervals and p-values (Table 6).

Table 6: RR Associated with Attendance to the New Year's Eve Dinner Events and the Breakfast

Exposure	Cases / Non-exposed (%)	AR Non-exposed (%)	Cases / Exposed	AR Exposed (%)	RR	Lower CI	Upper CI	p-value
Continental Suite	59/105	56.19	36/57	63.16	1.12	0.87	1.46	0.390
State Room	48/79	60.76	47/83	56.63	0.93	0.72	1.21	0.593
Ranulph & Oak Parlour	83/140	59.29	12/22	54.55	0.92	0.61	1.38	0.675
Attending breakfast	16/42	38.10	79/120	65.83	1.73	1.15	2.59	0.002

* P-value method: Fisher exact

Relative risk measures the association between being ill amongst those who were exposed to an event (i.e. any of the 3 New Year's Eve events or breakfast) as compared to those who were not exposed to the event. A RR of greater than 1 shows a positive association. However the result is statistically significant (a result that is not attributed to chance) where the confidence intervals for the RR do not include 1 and p-value is <0.05.

Table 6 above shows that there appears to be no association between illness and attendance at the evening events in any of the three rooms (the confidence intervals for the RR include 1, P is greater than 0.05). Attendance at breakfast is significantly associated with illness (RR >1, the confidence intervals for the RR does not include 1, P is less than 0.05)

Each of the events were looked at separately to check where there was any association between food items consumed at the dinner events or the breakfast with illness.

a. Continental Suite Dinner Event
Chicken Liver Parfait, Lancashire Hotpot and New Potatoes had statistically significant association with illness in the initial univariable analysis. These were further analysed by including them in a multivariable analysis taking into account attendance at breakfast. The use of this technique explores if multiple risk factors are independently related to an outcome (being ill) and not via another variable (attendance at breakfast). In multivariable analysis none of the food items appeared to be independently associated with illness (Table 7 & 8 in Appendix B).

b. Ranulph & Oak Parlour Dinner Event
For the Ranulph & Oak Parlour dinner menu there were no statistically significant associations between illness and any particular food items in the

initial univariable analysis. No multivariable analysis was conducted as a result (Table 9 in Appendix B).

c. State Room Dinner Event

For the State Room dinner event, eating the Jerusalem Artichoke Soup, Pickled Mushroom, Roast Beef Fillet and the Petit Fours had statistically significant association with illness in the initial analysis. However, none of the food items appeared again to be independently associated with illness when they were further analysed by including them in a multivariable analysis which also took into account attendance to the breakfast (Table 10 & 11 in Appendix B).

d. Breakfast

For the New Year breakfast, Soya Milk, Vanilla Crowns, Pastries and Nutella were associated with illness in the initial (univariate) analysis (p-value < 0.05). However, none of the food items appeared to be independently associated with an increased risk of illness when they were further analysed by including them in a multivariable analysis. However, the attack rate among those who had Soya Milk appeared to be lower than among those who did not, although few participants consumed Soya Milk (Table 12 &13 in Appendix B).

5.3.3 Limitations of the Epidemiological Study

Approximately a third of those who attended the New Year's events responded to the study questionnaire; two thirds of which reported symptoms. This could be due to the fact that those who were well did not feel the need to respond and this possible underrepresentation may lead to bias in the study, with potential to underestimate the effect of exposures on illness.

6. Communications

All relevant professionals and organisations were informed regarding the outbreak investigation, control and management. Eleven other HPTs covering the local authorities outside the Cheshire and Merseyside area were informed. The OCT communicated well and functioned smoothly.

6.1 Guests

Communication with the guests was essential for investigation and to encourage participation. Although several days had already passed since the onset of the outbreak, the guests were given the opportunity to contact the team with any questions. Several guests contacted the CMPHEC HPT for various enquiries. They were responded to appropriately.

6.2 The Hotel

The EHOs sent a letter to the Hotel drawing attention to the issues identified during their inspection of the premises and remedial measures needed to address the issues identified (Appendix C). The letter also highlighted the fact that the Hotel did not contact the EHOs directly to report the outbreak.

The EHOs maintained daily contact with the Hotel during the outbreak investigation and conveyed the advice of the OCT to the Hotel management.

6.3 Other Health Protection Teams

Guests who reported illness came from several local authorities across the UK. Eleven HPTs were notified about the outbreak (Appendix D). Two of these teams supported the outbreak by following up some cases from their geographical area.

6.4 Media

As contact tracing of guests had begun it was agreed that a proactive press release was not needed. Instead a reactive holding statement was drafted by PHE's Communication Team and agreed by the agencies involved in the outbreak investigation. The statement was shared with and jointly approved by Cheshire East Council's Communications Team. This was not used as there was no press interest.

7. Discussion

In the UK, GI infections affect 1 in 5 people every year with symptoms such as diarrhoea, vomiting, blood or mucus in stool, fever or malaise (PHE, 2014c). GI infections can be caused by viruses, bacteria or protozoa, usually by the organisms themselves or sometimes by the toxins that they produce. Some common causes of GI infections include Norovirus, Salmonella, and Campylobacter. To reduce the risk of outbreaks of GI illness, people are required to stay off work, school or nursery respectively while they have diarrhoea or vomiting, and for at least 48 hours after the last episode of diarrhoea or vomiting (NICE, 2014).

This report describes an outbreak of gastroenteritis that occurred following New Year's Eve events at the Crewe Hall Hotel. It is very likely that the number of people affected were much higher than the 95 cases that responded to the online survey. The low response rate to the questionnaire can be attributed to the fact that email addresses were not available for everyone who attended the event; rather contact details were available for individuals who booked the events on behalf of their group. Reliance was therefore placed on these individuals to forward links to the survey to the other members of their party. Judging from a contact with one of such individuals, it is not unlikely that only the individuals who received emails directly from PHE completed the questionnaire.

Only 8% (1 out of 12) of cases in this outbreak visited their GP (8/95). This is in keeping with 7% (1 out of 15) reported by Tam et al, 2012, but lower than 17% (1 out of 6) reported by Wheeler et al, 1999. The low rate of GP consultation reflects the fact that most gastroenteritis, particularly due to a viral cause are usually self-limiting but could also have been facilitated by the fact that the incident occurred during a holiday period which was immediately followed by a weekend.

The epidemic curve fits best with a point source outbreak, with a quick rise and fall in the number of cases with no plateauing and most cases occurring within one incubation period. This fits well with the incubation period of common causes of gastroenteritis such as Norovirus. A point source outbreak suggests that persons are exposed to the same source over a brief time. The epidemic curve for this outbreak does not suggest that there were secondary cases. This helped to bring a relatively quick resolution to the outbreak and it is a good reflection of the personal hygiene and infection control practices of the cases involved.

The clinical presentation of those affected appeared to suggest that the possible pathogen may have been viral because of the high attack rate, rapid onset and short duration of illness.

Microbiological investigation detected Norovirus in one stool sample, a second sample tested positive for Campylobacter on PCR but not on culture, hence this was an inconclusive result. There were no other positive stool samples or environmental samples which can substantiate any pathogen as the cause of this outbreak or link the outbreak to any specific source.

The estimated attack rates were 59% (among the 162 valid survey respondents), 66% for the breakfast guests who responded to the survey (79/120) and at least 21% of all those attending the New Year event (95/450). These figures are broadly in keeping with other reported outbreaks of a viral nature (Norovirus: 33% of 21 - Repp & Keene, 2012 & 73% of 26 - Vivancos et al, 2009).

The investigation showed that people who attended breakfast on the 1st January 2015 were more likely to become ill, compared with attending the evening events. However, when the risk associated with individual food items served in each of the events and breakfast were examined, initially a handful of items appeared to increase the risk of becoming ill. However after further analysis (multivariable analysis) taking into account attendance at breakfast, no associations remained. The analysis found no conclusive evidence of foodborne transmission.

The OCT was initially aware of the occurrence of symptoms of gastroenteritis in staff on 1st January 2015 while at work (and this was highlighted in the letter that was sent to the Hotel). However subsequently our epidemiological investigation revealed that 13 guests reported onset of symptoms (diarrhoea and vomiting) that started before the time of the breakfast and eight of these guests also attended the breakfast on 1st January. This means that it is possible that other Hotel guests may have been exposed to the presumptive viral infection via person-to-person contact before breakfast, during breakfast or via contamination of objects in the breakfast room including the serving utensils rather than food.

The effect of exposures on illness could have been underestimated given the low response rate (36%), the majority of whom reported symptoms (66%). The investigation was also limited by the delay in notification to PHE and Environmental Health Department and paucity of stool samples submitted. By the time the outbreak was notified, all guests had left the Hotel and dispersed, and the majority had recovered from their symptoms.

This outbreak investigation also highlighted the role of GPs in investigating cases with GI infections. A stool sample was obtained for microbiological investigation in only 12.5% (1 out of 8) of cases who visited their GP. In contrast, in the study by Wheeler et al, 1999, stool samples were obtained for testing in 25%, (1 out of 4) of patients presenting to their GP with GI symptoms in the UK. This has implications for public health investigations, particularly in terms of giving a true picture of the likely organism responsible for the outbreak and the source of the infection. This is also vital to support analytical epidemiological investigation. For instance if at least two positive results for the same organism had been obtained, further typing could have been used to determine whether they were likely from the same source. We however appreciate that GPs may not be aware that a patient has been involved in an outbreak.

The Hotel responded well to control measures and co-operated with the investigating team.

8. Conclusion

This was a large outbreak of GI illness related to attending New Year's Eve events at Crewe Hall Hotel. Illness in those attending the New Year's Eve events appears associated with attending the breakfast but not with any particular food items consumed in either the evening dinner events or the breakfast. Transmission is unlikely to be foodborne but it is possible that guests may have been exposed via person-to-person contact, contamination of fomites or the serving utensils rather than food.

The clinical presentation of those affected and the epidemic curve appeared to suggest that the possible pathogen may have been viral.

The microbiological results from stool and environmental samples could not substantiate any pathogen as the cause of this outbreak or link the outbreak to any specific source.

9. Recommendations

- The Hotel has been advised to report any future incidents to the Cheshire East Council Environmental Health Department as early as it is brought to their notice to facilitate prompt and effective investigation
- The Hotel should ensure that all staff involved with food handling are aware of, and adhere to, the required exclusion from work whilst they have symptoms of diarrhoea and/or vomiting and further exclusion for a period of 48 hours following resolution of symptoms
- The Hotel should ensure that all equipment and facilities within the Hotel, including staff facilities, are maintained to a high standard of hygiene
- There is a need for PHE to consider the best way(s) of reminding GPs to investigate cases of food poisoning and diarrhoea with stool tests in as many cases as possible, to aid outbreak and general investigations

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11. List of Abbreviations

ACC	Aerobic Colony Counts
AR	Attack Rate
CI	Confidence Interval
CMPHEC	Cheshire & Merseyside Public Health England Centre
EHOs	Environmental Health Officers
FES	Field Epidemiology Service
GI	Gastrointestinal
HPT	Health Protection Team
OCT	Outbreak Control Team
PCR	Polymerase Chain Reaction
PHE	Public Health England
RR	Relative Risks

Appendices

Appendix A: Questionnaire Used in Epidemiological Study

Personal details

1. Please specify:

Surname:	
Forename:	
Email:	
Telephone:	
Postcode:	

2. Age:* The value must be between 0 and 120, inclusive.

3. Gender:*
   - ◯ Male
   - ◯ Female

4. Did you attend Crewe Hall for the New Year's Eve dinner on 31st December and/or the breakfast on 1st January?*
   - ◯ Yes
   - ◯ No

5. Were you unwell after attending Crewe Hall for the New Year's Eve dinner on 31st December and/or the breakfast on 1st January? *
   - ◯ Yes
   - ◯ No

Illness details

6. Please specify the date your symptoms started:*

7. Please specify the time your symptoms started (using the 24 hour clock):
If you don't remember exactly, please give a best guess.

8. Please specify which symptoms you experienced?*
Please answer 'yes' or 'no' for each symptom.

	Yes	No
Vomiting	○	○
Diarrhoea	○	○
Bloody diarrhoea	○	○
Abdominal Pain/Cramps	○	○
Nausea	○	○
Fever/High temperature	○	○
Headache	○	○
Body ache	○	○
Lethargy/Tiredness	○	○

9. Did your symptoms start during your stay at Crewe Hall?

   ○ Yes
   ○ No

10. How many days did your symptoms last for?
If you still have symptoms at the moment, please specify the number of days you have had the symptoms for.

11. If your symptoms lasted less than a day, how many hours did your symptoms last for?
If you don't remember exactly, please give a best guess.

12. Did you consult a Doctor about your symptoms after the events?

   ○ Yes
   ○ No

13. Did you go to A&E or were you admitted to hospital due to the illness?

○ Yes

○ No

14. Did you submit a stool sample while you were ill?

○ Yes

○ No

15. What date was the stool sample given?

16. If you know the result of your stool sample, please provide details of the result below:

17. Please provide contact details of the Doctor who organised for you to submit a sample (name, address, phone number, if known):
We require this information to check the stool sample results.

18. Are you now free of symptoms?

○ Yes

○ No

19. Were you unwell with diarrhoea and/or vomiting symptoms in the 7 days **before** attending the events?

○ Yes

○ No

20. Did anyone in your household have diarrhoea and/or vomiting symptoms in the 7 days before the events?

   ◯ Yes

   ◯ No

21. Did you travel abroad in the 7 days **before** attending the events?

   ◯ Yes

   ◯ No

22. If yes, please specify which country you travelled to:

   ┌─────────┐
   │   │
   └─────────┘

23. Did you eat the New Year's Eve dinner at Crewe Hall on 31 December and if so, in what room did your dinner take place? *

   ◯ No, I did not have dinner

   ◯ Yes, I had dinner in the State Rooms

   ◯ Yes, I had dinner in the Ranulph & Oak Parlour

   ◯ Yes, I had dinner in the Continental Suite

Dinner in the State Rooms

24. Please specify if you ate the following food items in the **soup** dish:
   If left blank, it will be assumed you did not eat the food item.

	Yes	No
Jerusalem artichoke soup	◯	◯
Truffle oil	◯	◯
Pickled mushrooms	◯	◯

25. Please specify if you ate the following food items in the **terrine** dish:
   If left blank, it will be assumed you did not eat the food item.

	Yes	No
Corn fed chicken and foie gras terrine	◯	◯
Port poached fig	◯	◯
Melba toast	◯	◯

26 Please specify if you ate the following food items in the **salmon** dish:
. *If left blank, it will be assumed you did not eat the food item.*

	Yes	No
Smoked salmon	○	○
Potato salad	○	○
Capers	○	○
Shallots	○	○
Buttered brown bread	○	○

27 Please specify if you ate the following food items in the **beef** dish:
. *If left blank, it will be assumed you did not eat the food item.*

	Yes	No
Roast beef fillet	○	○
Braised savoy cabbage	○	○
Dauphinoise potatoes	○	○
Roasted parsnips	○	○

28 Please specify if you ate the following food items in the **chickpea pancake**
. dish:
If left blank, it will be assumed you did not eat the food item.

	Yes	No
Chickpea pancakes	○	○
Olive tapenade	○	○
Caponata	○	○
Grilled halloumi	○	○

29 Please specify if you ate the following food items in the **Scotch duck egg** dish:
. *If left blank, it will be assumed you did not eat the food item.*

	Yes	No
Sage and chive Scotch duck egg	○	○
Toasted barley	○	○
Broccoli	○	○
Red sorrel	○	○

30. Please specify if you ate the following food items in the **risotto** dish:
If left blank, it will be assumed you did not eat the food item.

	Yes	No
Black rice risotto	○	○
Roasted butternut squash	○	○
Cavolo nero	○	○

31. Please specify if you ate the following **desserts**:
If left blank, it will be assumed you did not eat the food item.

	Yes	No
Bitter sweet citrus fruit, orange gel and fennel	○	○
Dark chocolate tart, chocolate and gold	○	○
Selection of British and Continental cheeses	○	○
Chutney	○	○
Oak cakes	○	○
Petit fours	○	○

32. Did you have coffee or tea after the meal?

	No	Yes, without milk or cream	Yes, with milk	Yes, with cream
Coffee	○	○	○	○
Tea	○	○	○	○

33. Did you drink any water during the dinner?

○ Yes

○ No

34. Did you eat any other items that have not been listed? (please specify)

35. Did you notice anything unusual about the food items you ate?

36. Did you eat out in any other venues during the **2 days before** attending the events?

○ Yes

○ No

37. If yes, where did you eat out?
Please specify name, approximate location and date of meal for each establishment.

Establishment 1

Establishment 2

Establishment 3

Establishment 4

Establishment 5

38. Did you eat out in any other venues during the **2 days after** attending the events?

○ Yes

○ No

39. If yes, where did you eat out?
Please specify name, approximate location and date of meal for each establishment.

Establishment 1

Establishment 2

Establishment 3

Establishment 4

Establishment 5

40. Please us this text box for any additional comments you may have.

Dinner in the Ranulph & Oak Parlour

41. Please specify if you ate the following food items in the **soup** dish:
    If left blank, it will be assumed you did not eat the food item.

	Yes	No
Roast tomato soup	○	○
Grilled tomberries	○	○
Basil foam	○	○

42. Please specify if you ate the following food items in the **chicken & sweetcorn** dish:
    If left blank, it will be assumed you did not eat the food item.

	Yes	No
Compression of chicken leg	○	○
Confit yolk	○	○
Crispy skin	○	○
Textures of sweetcorn	○	○

43 Please specify if you ate the following food items in the **fish & chips** dish:
If left blank, it will be assumed you did not eat the food item.

	Yes	No
Butter poached cod	○	○
Chips	○	○
Peas	○	○
Batter scraps	○	○
Salsa verde	○	○

44 Please specify if you ate the following food items in the **cottage pie** dish:
If left blank, it will be assumed you did not eat the food item.

	Yes	No
Cottage pie	○	○
Fillet of beef	○	○
Red cabbage	○	○
Vegetables	○	○

45 Please specify if you ate the following food items in the **vegetable black pudding** dish:
If left blank, it will be assumed you did not eat the food item.

	Yes	No
Vegetable black pudding	○	○
Confit egg yolk	○	○
Textures of sweetcorn	○	○

46 Please specify if you ate the following food items in the **tofu** dish:
If left blank, it will be assumed you did not eat the food item.

	Yes	No
Battered tofu	○	○
Chips	○	○
Peas	○	○
Salsa verde	○	○

47. Please specify if you ate the following food items in the **vegetable pie** dish:
    If left blank, it will be assumed you did not eat the food item.

	Yes	No
Vegetable cottage pie	○	○
Root vegetable carpaccio	○	○
Onion crisps	○	○
Red cabbage	○	○
Vegetables	○	○

48. Please specify if you ate the following **desserts**:
    If left blank, it will be assumed you did not eat the food item.

	Yes	No
Apple parfait	○	○
Crumble	○	○
Trifle	○	○
Bread and butter	○	○
Chocolate	○	○
Mint	○	○
Cheese	○	○
Mini Eccles cakes	○	○
Biscuits	○	○
Petit fours	○	○

49. Did you have coffee or tea after the meal?

	No	Yes, without milk or cream	Yes, with milk	Yes, with cream
Coffee	○	○	○	○
Tea	○	○	○	○

50. Did you drink any water during the dinner?

○ Yes

○ No

51. Did you eat any other items that have not been listed? (please specify)

52. Did you notice anything unusual about the food items you ate?

53. Did you eat out in any other venues during the **2 days before** attending the events?

    ○   Yes

    ○   No

54. If yes, where did you eat out?
Please specify name, approximate location and date of meal for each establishment.

Establishment 1

Establishment 2

Establishment 3

Establishment 4

Establishment 5

55. Did you eat out in any other venues during the **2 days after** attending the events?

    ○   Yes

    ○   No

56. If yes, where did you eat out?
Please specify name, approximate location and date of meal for each establishment.

Establishment 1 [　　　　]

Establishment 2 [　　　　]

Establishment 3 [　　　　]

Establishment 4 [　　　　]

Establishment 5 [　　　　]

57. Please us this text box for any additional comments you may have.

[text box]

Dinner in the Continental Suite

ADULTS' MENU

58. Please specify if you ate the following food items as **starter**:
If left blank, it will be assumed you did not eat the food item.

	Yes	No
Fresh bread	○	○
Chicken liver parfait	○	○
Red onion marmalade	○	○
Ham hock and parsley terrine	○	○
Piccalilli	○	○
Smoked/cured fish	○	○
Pickles	○	○
Cured/roast meats	○	○
Salad	○	○
Olives	○	○

59. Please specify if you ate the following food items as **main**:
. *If left blank, it will be assumed you did not eat the food item.*

	Yes	No
Lancashire hot pot	○	○
Pickled red cabbage	○	○
Braised beef bourguignon	○	○
Roast loin of pork stuffed with apple & sage	○	○
Cod fillet	○	○
Grain mustard crumb	○	○
Herb brioche	○	○
Spinach and ricotta cannelloni	○	○
Duck fat roasted new potatoes	○	○
Seasonal vegetables	○	○
Panache of green vegetables	○	○

60. Please specify if you ate the following food items as **dessert**:
. *If left blank, it will be assumed you did not eat the food item.*

	Yes	No
Fresh fruit	○	○
Dark chocolate tart	○	○
Raspberry compote	○	○
Bread & butter pudding	○	○
Cheese	○	○
Biscuits	○	○

CHILDREN'S MENU

61. Please specify if you ate the following food items as **starter**:
If left blank, it will be assumed you did not eat the food item.

	Yes	No
Garlic bread slices	○	○
Melon	○	○
Berries	○	○

62 Please specify if you ate the following food items as **main**:
. *If left blank, it will be assumed you did not eat the food item.*

	Yes	No
Salad	○	○
Penne pasta	○	○
Tomato sauce	○	○
Basil	○	○
Meat pizza	○	○
Veg pizza	○	○
Crispy chicken goujons	○	○
Salmon fish fingers	○	○
Mini cheese burgers	○	○
French fries	○	○
New potatoes	○	○
Carrots	○	○
Peas	○	○

63 Please specify if you ate the following food items as **dessert**:
. *If left blank, it will be assumed you did not eat the food item.*

	Yes	No
Doughnuts	○	○
Fresh fruit	○	○
Chocolate	○	○
Marshmallows	○	○

64. Did you have coffee or tea after the meal?

	No	Yes, without milk or cream	Yes, with milk	Yes, with cream
Coffee	○	○	○	○
Tea	○	○	○	○

65. Did you drink any water during the dinner?

   ○ Yes

   ○ No

66. Did you eat any other items that have not been listed? (please specify)

67. Did you notice anything unusual about the food items you ate?

68. Did you eat out in any other venues during the **2 days before** attending the events?

   ○ Yes

   ○ No

69. If yes, where did you eat out?
   Please specify name, approximate location and date of meal for each establishment.

   Establishment 1

   Establishment 2

   Establishment 3

   Establishment 4

   Establishment 5

70. Did you eat out in any other venues during the **2 days after** attending the events?

   ○ Yes

○ No

71. If yes, where did you eat out?
Please specify name, approximate location and date of meal for each establishment.

Establishment 1	
Establishment 2	
Establishment 3	
Establishment 4	
Establishment 5	

72. Please us this text box for any additional comments you may have.

73. Did you attend the breakfast at Crewe Hall on 1st January?*
    ○ Yes
    ○ No

Breakfast

74. Please specify if you ate the following food items in the **Classic British breakfast**:
If left blank, it will be assumed you did not eat the food item.

	Yes	No
English butcher-style pork sausages	○	○
Pork & herb sausages	○	○
Grilled back bacon	○	○
Fried eggs	○	○
Scrambled eggs	○	○
Roasted tomatoes	○	○
Hash browns	○	○

	Yes	No
Grilled field mushrooms	○	○
Buttered baked beans	○	○

75 Please specify if you ate the following food items in the **Bread, toast and preserves**:
. *If left blank, it will be assumed you did not eat the food item.*

	Yes	No
White split tin	○	○
Malted brown bread	○	○
Oxford sourdough loaf	○	○
French bloomer loaf	○	○
Butter	○	○
Jam	○	○
Marmalade	○	○
Nutella	○	○
Marmite	○	○
Honey	○	○

76. Please specify if you ate the following food items in the **Viennoiserie and patisserie**:
If left blank, it will be assumed you did not eat the food item.

	Yes	No
Pure butter croissants	○	○
Chocolate butter croissants	○	○
Soft fruit Danish pastries	○	○
Vanilla patisserie crowns	○	○
Muffins	○	○

77. Please specify if you ate the following food items in the **Yoghurt, fruits and cereals**:

If left blank, it will be assumed you did not eat the food item.

	Yes	No
Fresh melon	○	○
Fresh pineapple	○	○
Fresh mango	○	○
Fresh orange	○	○
Fresh pink grapefruit	○	○
Natural yoghurt	○	○
Bio fruit yoghurt	○	○
Mixed fruit coulis	○	○
Homemade seasonal muesli	○	○
Dried fruits	○	○
Nuts	○	○
Weetabix	○	○
Cereal	○	○
Whole milk	○	○
Semi-skimmed milk	○	○
Skimmed milk	○	○
Soya milk	○	○

78. Please specify if you ate the following food items in the **Cooked to order**:
If left blank, it will be assumed you did not eat the food item.

	Yes	No
Poached egg	○	○
Boiled egg	○	○
Vegetarian sausages	○	○
Porridge with milk	○	○
Porridge with water	○	○
Omelette cheddar	○	○
Omelette ham	○	○
Omelette mushroom	○	○
Omelette tomato	○	○
Soft cheese	○	○
Matured English cheddar	○	○
Cured ham	○	○
Milano salami	○	○
Cured chorizo	○	○
Oak smoked salmon	○	○

79. Please specify if you ate the following food items in the **Beverages and juices**:
If left blank, it will be assumed you did not eat the food item.

	Yes	No
Freshly brewed coffee	○	○
Tea	○	○
Hot chocolate	○	○
Apple juice	○	○
Orange juice	○	○
Fruits of the forest & cranberry juice	○	○
Ruby grapefruit juice	○	○
Still water	○	○
Sparkling water	○	○

Appendix B: Statistical Analysis Tables

Table 7: RR Associated with Foods Served at the Continental Room Event - P-value method: fisher.exact

Exposure	Cases Non-Exposed	Total Non-Exposed	Attack Rate [AR] Non-Exposed (%)	Cases Exposed	Total Exposed	AR Exposed (%)	RR	Lower	Upper	P-Value
Coffee	3	9	33.3	29	42	69	1.73	0.67	4.45	0.0625
Tea	4	11	36.4	31	45	68.9	1.65	0.738	3.7	0.0798
Chicken Liver Parfait	24	43	55.8	12	14	85.7	1.51	1.07	2.12	0.0584
Onion Marmalade	31	51	60.8	5	6	83.3	1.35	0.889	2.06	0.397
Ham Hock Terrine	24	41	58.5	12	16	75	1.26	0.859	1.85	0.362
Piccalilli	30	49	61.2	6	8	75	1.21	0.765	1.91	0.697
Smoked & Cured Fish	23	41	56.1	13	16	81.2	1.42	0.993	2.04	0.126
Pickles	32	51	62.7	4	6	66.7	1.05	0.574	1.92	1
Cured & Roast Meats	24	40	60	12	17	70.6	1.16	0.778	1.72	0.555
Salad	24	38	63.2	12	19	63.2	0.985	0.647	1.5	1
Olives	31	49	63.3	5	8	62.5	0.977	0.548	1.74	1
Lancashire Hotpot	22	41	53.7	14	16	87.5	1.6	1.14	2.24	0.0304
Pickled Red Cabbage	27	44	61.4	9	13	69.2	1.11	0.723	1.71	0.748
Braised Beef Bourguignon	20	34	58.8	16	23	69.6	1.16	0.785	1.71	0.576
Roast Loin of Pork	20	34	58.8	16	23	69.6	1.16	0.785	1.71	0.576
Cod Fillet	34	53	64.2	2	4	50	0.771	0.284	2.1	0.62
Grain Mustard Crumb	35	55	63.6	1	2	50	0.778	0.192	3.15	1
Herb Brioche	34	54	63	2	3	66.7	1.05	0.459	2.39	1
Spinach & Ricotta Cannelioni	31	47	66	5	10	50	0.75	0.39	1.44	0.473
New Potatoes	5	14	35.7	31	43	72.1	1.8	0.871	3.73	0.0243
Vegetables	11	22	50	25	35	71.4	1.37	0.858	2.18	0.158

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Panache of Green Vegetables	17	28	60.7	19	29	65.5	1.06	0.709	1.57	0.787
Fresh Fruit	31	51	60.8	5	6	83.3	1.35	0.889	2.06	0.397
Dark Chocolate Tart	24	37	64.9	12	20	60	0.912	0.594	1.4	0.778
Raspberry Compote	35	54	64.8	1	3	33.3	0.509	0.102	2.55	0.548
Bread & Butter Pudding	32	48	66.7	4	9	44.4	0.66	0.309	1.41	0.266
Cheese	28	47	59.6	8	10	80	1.32	0.897	1.95	0.295
Biscuits	29	48	60.4	7	9	77.8	1.27	0.837	1.93	0.461
Garlic Bread	30	47	63.8	6	10	60	0.929	0.536	1.61	1
Melon	33	53	62.3	3	4	75	1.19	0.652	2.18	1
Berries	35	54	64.8	1	3	33.3	0.509	0.102	2.55	0.548
Salad 2	36	55	65.5	0	2	0	0	0	NaN	0.132
Penne Pasta	32	50	64	4	7	57.1	0.883	0.45	1.73	0.701
Tomato Sauce	32	52	61.5	4	5	80	1.28	0.789	2.09	0.642
Basil	36	56	64.3	0	1	0	0	0	NaN	0.368
Meat Pizza	32	50	64	4	7	57.1	0.883	0.45	1.73	0.701
Vegetable Pizza	34	53	64.2	2	4	50	0.771	0.284	2.1	0.62
Crispy Chicken Goujons	29	45	64.4	7	12	58.3	0.894	0.529	1.51	0.744
Salmon Fish Fingers	34	54	63	2	3	66.7	1.05	0.459	2.39	1
Mini Cheese Burgers	33	53	62.3	3	4	75	1.19	0.652	2.18	1
French Fries	29	44	65.9	7	13	53.8	0.808	0.468	1.39	0.518
New Potatoes 2	34	53	64.2	2	4	50	0.771	0.284	2.1	0.62
Carrots	33	51	64.7	3	6	50	0.765	0.335	1.75	0.659
Peas	36	55	65.5	0	2	0	0	0	NaN	0.132
Doughnuts	30	43	69.8	6	14	42.9	0.608	0.322	1.15	0.11
Fresh Fruit 2	31	50	62	5	7	71.4	1.14	0.679	1.91	1
Chocolate	31	47	66	5	10	50	0.75	0.39	1.44	0.473
Marshmallows	31	49	63.3	5	8	62.5	0.977	0.548	1.74	1
Breakfast	9	19	47	27	38	74.1	1.42	0.849	2.38	0.0918

* P-value method: Fisher exact

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Table 8: Resulting Multivariable Poisson Regression Model (start AIC = 111; final AIC =106.6)

	IDR (95%CI)	P (Wald's test)	P (LR-test)
New Potatoes: Yes vs No	2.02 (0.78,5.19)	0.145	0.114

CI – Confidence Interval

Table 9: RR Associated with Foods Served at the Ranulph & Oak Parlour Room Event

Exposure	Cases Non-Exposed	Total Non-Exposed	AR Non-Exposed (%)	Cases Exposed	Total Exposed	AR Exposed (%)	RR	Lower	Upper	P-Value
Coffee	4	6	66.7	4	9	44.4	0.622	0.247	1.57	0.608
Tea	4	9	44.4	6	9	66.7	1.33	0.562	3.16	0.637
Roast Tomato Soup	2	6	33.3	10	16	62.5	1.46	0.442	4.81	0.348
Grilled Tomberries	4	11	36.4	8	11	72.7	1.75	0.738	4.13	0.198
Basil Foam	4	8	50	8	14	57.1	1.03	0.449	2.35	1
Compression of Chicken Leg	3	8	37.5	9	14	64.3	1.45	0.545	3.84	0.378
Confit Yolk	3	9	33.3	9	13	69.2	1.73	0.642	4.67	0.192
Crispy Skin	3	9	33.3	9	13	69.2	1.73	0.642	4.67	0.192
Textured Sweetcorn	3	9	33.3	9	13	69.2	1.73	0.642	4.67	0.192
Butter Poached Cod	3	8	37.5	9	14	64.3	1.45	0.545	3.84	0.378
Chips	3	8	37.5	9	14	64.3	1.45	0.545	3.84	0.378
Peas	3	8	37.5	9	14	64.3	1.45	0.545	3.84	0.378
Batter Scraps	3	8	37.5	9	14	64.3	1.45	0.545	3.84	0.378
Salsa Verde	3	9	33.3	9	13	69.2	1.73	0.642	4.67	0.192
Cottage Pie	2	8	25	10	14	71.4	2.14	0.617	7.44	0.0743
Fillet of Beef	2	8	25	10	14	71.4	2.14	0.617	7.44	0.0743
Red Cabbage	2	7	28.6	10	15	66.7	1.78	0.522	6.05	0.172
Vegetables	2	8	25	10	14	71.4	2.14	0.617	7.44	0.0743
Vegetable Black Pudding	10	18	55.6	2	4	50	0.864	0.298	2.5	1
Confit Yolk 2	9	17	52.9	3	5	60	1.08	0.464	2.51	1
Textured Sweetcorn 2	9	17	52.9	3	5	60	1.08	0.464	2.51	1
Battered Tofu	8	16	50	4	6	66.7	1.26	0.596	2.66	0.646
Chips 2	9	17	52.9	3	5	60	1.08	0.464	2.51	1

Exposure	Cases Non-Exposed	Total Non-Exposed	AR Non-Exposed (%)	Cases Exposed	Total Exposed	AR Exposed (%)	RR	Lower	Upper	P-Value
Peas 2	9	17	52.9	3	5	60	1.08	0.464	2.51	1
Salsa Verde 2	9	17	52.9	3	5	60	1.08	0.464	2.51	1
Vegetable Cottage Pie	11	19	57.9	1	3	33.3	0.556	0.107	2.88	0.571
Root Vegetable Carpaccio	11	19	57.9	1	3	33.3	0.556	0.107	2.88	0.571
Onion Crisps	11	19	57.9	1	3	33.3	0.556	0.107	2.88	0.571
Red Cabbage 2	11	20	55	1	2	50	0.875	0.207	3.7	1
Vegetables 2	11	19	57.9	1	3	33.3	0.556	0.107	2.88	0.571
Apple Parfait	7	9	77.8	5	13	38.5	0.481	0.222	1.04	0.0991
Crumble	7	9	77.8	5	13	38.5	0.481	0.222	1.04	0.0991
Trifle	8	12	66.7	4	10	40	0.578	0.245	1.36	0.391
Bread & Butter Pudding	6	8	75	6	14	42.9	0.551	0.267	1.14	0.204
Chocolate	7	10	70	5	12	41.7	0.573	0.262	1.25	0.231
Mint	8	13	61.5	4	9	44.4	0.691	0.296	1.61	0.666
Cheese	5	10	50	7	12	58.3	1.07	0.489	2.34	1
Mini Eccles Cakes	7	15	46.7	5	7	71.4	1.43	0.698	2.92	0.381
Biscuits	7	14	50	5	8	62.5	1.17	0.554	2.48	0.675
Petit Fours	5	11	45.5	7	11	63.6	1.27	0.58	2.79	0.67
Breakfast	2	6	33.3	10	16	62.5	1.46	0.442	4.81	0.348

P-value method: Fisher exact

Table 10: RR Associated with Foods Served at the State Room Event

Exposure	Cases Non-Exposed	Total Non-Exposed	AR Non-Exposed (%)	Cases Exposed	Total Exposed	AR Exposed (%)	RR	Lower	Upper	P-Value
Coffee	6	12	50	9	21	42.9	0.796	0.376	1.69	0.731
Tea	24	44	54.5	17	31	54.8	0.987	0.65	1.5	1
Jerusalem Artichoke Soup	3	10	30	44	73	60.3	1.66	0.632	4.35	0.0933
Truffle Oil	8	20	40	39	63	61.9	1.44	0.816	2.56	0.12
Pickled Mushroom	9	27	33.3	38	56	67.9	1.9	1.08	3.34	0.00437
Corn fed Chicken Foie Gras	9	22	40.9	38	61	62.3	1.43	0.836	2.46	0.131
Port Poached Fig	17	35	48.6	30	48	62.5	1.25	0.834	1.87	0.264
Melba Toast	15	31	48.4	32	52	61.5	1.23	0.807	1.88	0.262

Food										
Smoked Salmon	13	30	43.3	34	53	64.2	1.42	0.9	2.24	0.106
Potato Salad	17	34	50	30	49	61.2	1.19	0.795	1.78	0.371
Capers	20	41	48.8	27	42	64.3	1.29	0.874	1.89	0.187
Shallots	18	38	47.4	29	45	64.4	1.32	0.887	1.97	0.128
Buttered Brown Bread	17	36	47.2	30	47	63.8	1.31	0.873	1.97	0.18
Roast Beef Fillet	2	10	20	45	73	61.6	2.26	0.646	7.91	0.0175
Braised Savoy Cabbage	6	14	42.9	41	69	59.4	1.27	0.674	2.4	0.376
Dauphinoise Potatoes	4	11	36.4	43	72	59.7	1.43	0.641	3.2	0.196
Roasted Parsnips	7	16	43.8	40	67	59.7	1.27	0.704	2.29	0.274
Chickpea Pancake	40	66	60.6	7	17	41.2	0.673	0.369	1.23	0.177
Olive Tapenade	40	68	58.8	7	15	46.7	0.785	0.441	1.4	0.406
Caponata	40	66	60.6	7	17	41.2	0.673	0.369	1.23	0.177
Grilled Halloumi	41	67	61.2	6	16	37.5	0.607	0.314	1.18	0.0999
Sage & Chive Scotch Egg	34	60	56.7	13	23	56.5	0.985	0.646	1.5	1
Toasted Barley	36	63	57.1	11	20	55	0.951	0.606	1.49	1
Broccoli	36	65	55.4	11	18	61.1	1.09	0.71	1.67	0.79
Red Sorrel	36	64	56.2	11	19	57.9	1.02	0.655	1.58	1
Black Rice Risotto	44	75	58.7	3	8	37.5	0.633	0.254	1.58	0.284
Roasted Butternut Squash	45	77	58.4	2	6	33.3	0.565	0.179	1.78	0.396
Cavolo Nero	45	77	58.4	2	6	33.3	0.565	0.179	1.78	0.396
Citrus Fruit, Orange Gel & Fennel	16	30	53.3	31	53	58.5	1.07	0.712	1.6	0.654
Dark Chocolate Tart	7	18	38.9	40	65	61.5	1.46	0.794	2.69	0.11
Selection of Cheeses	28	51	54.9	19	32	59.4	1.06	0.728	1.56	0.821
Chutney	40	71	56.3	7	12	58.3	1.02	0.609	1.72	1
Oatcakes	36	58	62.1	11	25	44	0.702	0.432	1.14	0.152
Petit Fours	22	47	46.8	25	36	69.4	1.45	0.997	2.11	0.0467
Breakfast	5	17	29.4	42	66	63.6	1.91	0.894	4.08	0.0144

* P-value method: Fisher exact

Table 11: Resulting Multivariable Poisson Regression Model (start AIC = 148.8; final AIC = 146.9)

	Crude IDR (95%)	adj. IDR (95%CI)	P (Wald's test)	P (LR-test)
Breakfast: Yes vs No	2.16 (0.86,5.47)	1.95 (0.77,4.95)	0.161	0.127
Mushroom: Yes vs No	2.04 (0.98,4.21)	1.89 (0.91,3.93)	0.088	0.07

Table 12: RR Associated with Foods Served at the Breakfast

Exposure	Cases non-exposed	Total non-exposed	AR Non-exposed (%)	Cases exposed	Total exposed	AR Exposed (%)	RR	Lower	Upper	p-value
Pork Sausages	36	61	59	43	59	72.9	1.22	0.941	1.58	0.126
Pork & Herb Sausages	49	77	63.6	30	43	69.8	1.09	0.84	1.41	0.551
Grilled Back Bacon	17	33	51.5	62	87	71.3	1.35	0.942	1.92	0.0531
Fried Egg	31	46	67.4	48	74	64.9	0.953	0.733	1.24	0.844
Scrambled Eggs	67	104	64.4	12	16	75	1.16	0.844	1.59	0.573
Roasted Tomatoes	53	81	65.4	26	39	66.7	1.01	0.771	1.33	1
Hash Browns	36	53	67.9	43	67	64.2	0.937	0.724	1.21	0.702
Grilled Mushrooms	35	57	61.4	44	63	69.8	1.13	0.866	1.46	0.343
Baked Beans	33	45	73.3	46	75	61.3	0.83	0.645	1.07	0.234
White Split Tin Toast	51	81	63	28	39	71.8	1.13	0.875	1.47	0.413
Brown Bread Toast	60	88	68.2	19	32	59.4	0.866	0.629	1.19	0.39
Sourdough Loaf	78	118	66.1	1	2	50	0.753	0.187	3.03	1
French Bloomer Loaf	76	115	66.1	3	5	60	0.904	0.437	1.87	1
Butter	42	64	65.6	37	56	66.1	0.999	0.771	1.29	1
Jam	73	110	66.4	6	10	60	0.9	0.533	1.52	0.734
Marmalade	67	101	66.3	12	19	63.2	0.947	0.654	1.37	0.797
Nutella	78	115	67.8	1	5	20	0.294	0.0506	1.7	0.0459
Marmite	78	117	66.7	1	3	33.3	0.498	0.1	2.48	0.269
Honey	77	117	65.8	2	3	66.7	1.01	0.448	2.27	1
Croissant	74	108	68.5	5	12	41.7	0.606	0.306	1.2	0.105
Chocolate Croissant	75	112	67	4	8	50	0.743	0.367	1.5	0.443
Soft Fruit Danish Pastries	75	109	68.8	4	11	36.4	0.526	0.238	1.16	0.0444

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Vanilla Patisserie Crowns	78	113	69	1	7	14.3	0.206	0.0334	1.27	0.00635
Muffin	76	115	66.1	3	5	60	0.904	0.437	1.87	1
Melon	65	100	65	14	20	70	1.07	0.777	1.48	0.799
Pineapple	63	95	66.3	16	25	64	0.96	0.692	1.33	0.817
Mango	68	104	65.4	11	16	68.8	1.05	0.731	1.5	1
Orange	60	92	65.2	19	28	67.9	1.03	0.77	1.39	1
Grapefruit	69	104	66.3	10	16	62.5	0.938	0.626	1.4	0.782
Natural Yoghurt	64	101	63.4	15	19	78.9	1.24	0.941	1.63	0.291
Bio Fruit Yoghurt	78	119	65.5	1	1	100	1.52	1.33	1.73	1
Mixed Fruit Coulis	74	111	66.7	5	9	55.6	0.83	0.456	1.51	0.489
Muesli	73	112	65.2	6	8	75	1.15	0.751	1.75	0.714
Dried Fruits	78	118	66.1	1	2	50	0.753	0.187	3.03	1
Nuts	78	118	66.1	1	2	50	0.753	0.187	3.03	1
Weetabix	76	113	67.3	3	7	42.9	0.635	0.267	1.51	0.229
Cereal	67	100	67	12	20	60	0.891	0.607	1.31	0.609
Whole Milk	73	111	65.8	6	9	66.7	1.01	0.624	1.63	1
Semi-Skimmed Milk	62	92	67.4	17	28	60.7	0.896	0.644	1.25	0.506
Skimmed Milk	78	117	66.7	1	3	33.3	0.498	0.1	2.48	0.269
Soya Milk	79	117	67.5	0	3	0	0	0	NaN	0.038
Poached Egg	72	112	64.3	7	8	87.5	1.35	1.01	1.82	0.262
Vegetarian Sausages	78	118	66.1	1	2	50	0.753	0.187	3.03	1
Porridge with Milk	77	117	65.8	2	3	66.7	1.01	0.448	2.27	1
Porridge with Water	78	119	65.5	1	1	100	1.52	1.33	1.73	1
Omelette – Cheddar	78	119	65.5	1	1	100	1.52	1.33	1.73	1
Omelette Mushroom	78	119	65.5	1	1	100	1.52	1.33	1.73	1
Omelette – Tomato	78	119	65.5	1	1	100	1.52	1.33	1.73	1
Cured Ham	77	118	65.3	2	2	100	1.53	1.34	1.74	0.546
Salami	78	119	65.5	1	1	100	1.52	1.33	1.73	1
Coffee	44	68	64.7	35	52	67.3	1.03	0.797	1.34	0.847
Tea	44	63	69.8	35	57	61.4	0.873	0.672	1.13	0.343
Hot Chocolate	78	119	65.5	1	1	100	1.52	1.33	1.73	1
Apple Juice	73	108	67.6	6	12	50	0.736	0.412	1.32	0.335

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Orange Juice	34	58	45	62	58.6	72.6	1.22	0.939	1.59	0.126
Fruit of the Forest & Cranberry Juice	73	112	6	8	65.2	75	1.15	0.751	1.75	0.714
Grapefruit Juice	76	113	3	7	67.3	42.9	0.635	0.267	1.51	0.229
Still Water	72	111	7	9	64.9	77.8	1.19	0.82	1.74	0.717
Sparkling Water	78	119	1	1	65.5	100	1.52	1.33	1.73	1

*P-value method: Fisher exact

NB. Boiled Egg, Ham Omelette, Soft Cheese, Cheddar Cheese, Cured Chorizo and Smoked Salmon were removed from the above analysis as none of the respondents had these items.

Table 13: Resulting Multivariable Poisson Regression Model (start AIC = 224.8; final AIC = 221.5)

	Crude IDR(95%CI)	Adj. IDR (95% CI)	Adj. RR (Robust 95% CI)	P (LR-test)
Soya Milk: Yes vs No	0 (0,Inf)	0 (0,Inf)	0.43×10^{-7} (0.14×10^{-7}, 0.13×10^{-6})	0.04
Vanilla Patisserie Crowns: Yes vs No	0.21 (0.03,1.49)	0.2 (0.03,1.45)	0.2(0.03,1.3)	0.033

Appendix C: Cheshire East Council's Letter to Hotel Chain Head Office

NB. Some information redacted to preserve confidentiality

The Company Secretary
Q Hotels
Wellington House
Cliffe Park
Bruntcliffe Road
Morley
Leeds
LS27 0RY

Regulatory Services and Health

Tel:
Fax:

Email:

DATE:09/01/2015   OUR REF: YOUR REF:

Please Contact:
Direct Dial:

Dear Sir/Madam

Food Safety Act 1990 and Associated Legislation
Q Hotel – Crewe Hall Hotel, Weston Road, Crewe, Cheshire.
Alleged Food Poisoning Incident 1st January 2015

I write further to the allegation of a food poisoning outbreak received from a member of the public on Monday 6th January 2015, which prompted a visit on Tuesday 7th January 2015 by   and   of this Department and an outbreak telephone conference with Public Health England on 8th January 2015.

Whilst I understand that you were not aware of any allegation until Monday 7th January 2015, and it is not a legal requirement to do so, it was disappointing that you did not contact this Department directly to inform us that the incident had occurred.

Below is a summary of items observed at the visit on 7th January 2015, with action points, and items discussed during the telephone conference.

        who   suffering from food poisoning symptoms, whilst at work, continued to work until   sent home.   then reported for duty the next day, this presented an obvious risk to food safety and is contra to your own working procedures.

Action to be taken – All staff engaged in food handling operations should be reminded of their legal duty to report illness to their employer and staff should be re-trained in your "fitness for work" policy

The soap dispenser to the wash hand basin in the staff male WC area was found to be empty at the time of the visit.

Action to be taken – whilst I understand that you have now filled the dispenser, regular checks must be carried out to ensure that there are sufficient supplies of soap available at all wash hand basins.

The electric hand dryer in the staff male WC area was switched off at the time of the visit.

Action to be taken - whilst I understand that you have now switched on the hand dryer, regular checks must be carried out to ensure that there are sufficient hand drying facilities available at all wash hand basins. It is recommended that disposable paper towels are used.

Generally the maintenance of the wash hand basins and access to them was found to open to discussion. A number of taps were found to be loose and access to a number of wash hand basins was found to be impeded by kitchen equipment.

Action to be taken- easy access to well-maintained wash hand basins is essential to ensure that good hygiene practices are followed. You must ensure all wash hand basins are maintained and easy accessible at all times. It is recommended that the wash hand basin taps are replaced with ones that do not require hand contact operation.

Hand contact surfaces, such as fridge doors, wash hand basin taps in the kitchen were observed to have a build-up of physical dirt/staining.

Action to be taken – The frequency at which such areas are cleaned must be reviewed and attention must be paid to the cleaning of hand contact surfaces.

Whilst I appreciate that you may not want to advertise incidents of food poisoning symptoms within the Hotel, it is helpful to make guests aware of incidents, so that they are clear of what to do should they have symptoms. It is recommended that either a notice is displayed at reception, guests are told verbally on arrive, or your room information pack gives advice to guests about the Hotel's sickness procedures. This information will provide a mechanism to highlight any abnormal levels of sickness within the Hotel, at an early stage, and then hopefully allow you to introduce measures to minimise the spread.

If you have any general queries about the contents of this letter, please do not hesitate to contact me on the above telephone number.

Yours sincerely

Commercial Team Leader

Cheshire East Council is the brand name of Cheshire East Borough Council

CC –   Crewe Hall Hotel
                              Group Safety and Food Hygiene Manager

Appendix D: Health Protection Teams Covering Symptomatic Cases Usual Residence

	Health Protection Team
1	Avon, Gloucestershire & Wiltshire
2	Cheshire & Merseyside
3	Cumbria & Lancashire
4	Essex
5	Greater Manchester
6	North Wales
7	South Midlands & Hertfordshire
8	South Yorkshire
9	Thames Valley
10	West Midlands East
11	West Midlands North
12	West Midlands West