Extension to the IID2 study: identifying the proportion of foodborne disease in the UK

Area of research interest: Foodborne pathogens
Study duration: 2011-04-04
Planned completion: 1 March 2012
Project code: FS231043 (Extension)
Conducted by: University of Liverpool

Background

Many cases of food poisoning go undetected or unreported. For a number of years our organisation have drawn on the infectious intestinal disease (IID) study and related work by Public Health England to estimate and monitor the burden of foodborne disease, based on the number of laboratory confirmed cases.

The original IID study (IID1) was carried out in the mid 1990s, and was the first of its kind to estimate the total number of cases of infectious intestinal disease (diarrhoea and vomiting) in England (both food and non-food related). More recently, a second infectious intestinal disease study (IID2) updated this work, and looked at the UK as a whole. The IID2 study, which was published in 2011, was designed to estimate the overall rate of IID in the UK in 2009, to assess whether the overall level of IID had changed since the original study, as well as determining estimated rates for individual pathogens.

Research Approach

Given that more recent figures are available, our organisation commissioned an extension to the IID2 study to incorporate the contemporary data from the IID2 study with other sources (outbreaks and results from a systematic literature review) using a new approach to update UK-wide estimates for foodborne disease. (Currently this is only available for England and Wales.)

The IID2 study extension aimed to estimate the burden of UK-acquired foodborne disease in 2009, when the IID2 study was carried out, and to quantify the contribution of different pathogens and various food commodities to total foodborne disease burden.

To meet the first objective, a model was developed to estimate the number of cases, general practice (GP) consultations and hospital admissions of indigenous foodborne disease, due to the major enteric pathogens. Several different data sources were used to obtain information on model parameters and their associated uncertainty. Data on pathogen-specific rates of disease were obtained from the IID1 and IID2 studies. Data were also used from reported outbreaks in the UK and the published literature, obtained from a systematic review that was conducted to inform estimates of the proportion of IID cases attributable to foodborne transmission. The IID1 and IID2 studies and outbreak data also provided information on pathogen-specific hospitalisation rates.

Information on these parameters was incorporated into models to estimate pathogen-specific numbers of cases, GP consultations and hospital admissions in 2009. Two modelling approaches

were used: a Monte Carlo simulation, which is the standard method as used by several research groups worldwide, and a Bayesian approach, which is novel in this field. Three modelling simulations were generated – one using Monte Carlo and two using Bayesian methods.

To meet the second objective, the food attribution model was extended to estimate: the number of cases, GP consultations and hospital admissions attributable to different food commodities. Information on the proportion of cases attributable to different pathogens and food commodities was obtained from an analysis of UK outbreak surveillance data and published food attribution studies. Twelve food commodity groups were used. These were seafood, dairy, eggs, red meat, game, beef and lamb, pork, poultry, grains and beans, oils and sugars, produce, complex and other foods.

Results

The IID2 extension study estimated that there were more than 500,000 cases of foodborne disease in the UK in 2009 due to known pathogens (from the 13 pathogens tested). The study did not estimate cases from other pathogens/unknown agents, or hospital occupancy and deaths, due to this data being limited in the sources available. We will be undertaking further work based on this study and other data sources to produce annual estimates including estimates for unknown agents, hospital occupancy and deaths.

Pathogen

Campylobacter remains the most common foodborne pathogen in the UK with an estimated 280,000 cases and 39,000 GP consultations. Other common foodborne pathogens include Clostridium perfringens (an estimated 80,000 cases), norovirus (an estimated 74,000 cases) and salmonella (an estimated 33,000 cases). Salmonella was ranked first in terms of hospital admissions (about 2,500) indicating the severity of illness.

Food commodity

Poultry was also found to be the most common food commodity associated with foodborne disease in the UK with an estimated 244,000 cases, 34,000 GP consultations and 870 hospital admissions. This demonstrates that poultry accounts for a considerably higher number of cases compared with other food commodities. Other important food vehicles included produce (the produce group included salad vegetables, cooked vegetables, fruit, nuts, seeds (including sprouting seeds), produce dishes, almonds, halva, nuts/dry fruits, peanut butter, peanuts, sesame seeds and tahini -. an estimated 48,000 cases), beef and lamb (an estimated 43,000 cases), seafood (an estimated 32,000 cases) and eggs (an estimated 26,000 cases). Complex and other foods included those consisting of ingredients from two or more categories and all other foods that are not listed above, including sandwiches, pre-packed mixed vegetable salads, rice/beans/stuffing/pasta dishes, sauces, other multi-ingredient foods, home canned goods, confectionery, spices, and desserts.

Published Papers

Modelling study to estimate the health burden of foodborne diseases: cases, general practice consultations and hospitalisations in the UK, 2009

Related media

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