E. coli Outbreak
Emergency Response Plan

United Kingdom Food Standards Agency
London, England

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III PREFACE

London has had frequent outbreaks of *Escherichia coli* (*E. coli*) in recent years. Between 2014 and 2018 England saw more than a 20% increase in *E. coli* cases.[1] *E. coli* has become a risk to public health since it can cause death or lead to serious medical problems such as permanent kidney or brain damage, even after recovery from the infection.[2] *E. coli* cases also tend to have high hospitalization rates. In the UK, from 2015-2020, there were a total of 673 confirmed *E. coli* cases, of which 31% were hospitalized.[3]

E. coli outbreaks can originate from food, water supplies, and external conditions. Anyone who comes into contact with *E. coli* can become sick. It is essential to put strong protocols in place to stop, identify, and lessen the spread of the *E. coli* infection. Symptoms for *E. coli* include diarrhea, abdominal pain, nausea, and vomiting. These symptoms will start to present themselves three to four days after exposure to the bacteria.[4] No current treatments can cure the infection, relieve symptoms, or prevent complications.[5] For most people, treatment will consist of rest and relaxation.[5] Serious infections are treated with IV fluids, blood transfusions, and kidney dialysis.[5]

By following the proper procedures, *E. coli* can be prevented. This Food Standards Agency Emergency Response Plan outlines the recommended procedures to effectively manage responses and mitigate risks during food safety emergencies like *E. coli* outbreaks.

IV SIGNATURE PAGE

By signing below, I have reviewed and agree with the implementation of the Foodborne Illness Disaster Plan in London, England:

Signature: _____ Date: _____
Representative, Association of Directors
of Public Health London

Signature: _____ Date: _____
Representative, Food Standards Agency

Signature: _____ Date: _____
Representative, UK Health Security Agency

V FOOD STANDARDS AGENCY E. COLI OUTBREAK RESPONSE OVERVIEW

Mission of the Food Standards Agency

The mission of the Food Standards Agency is to promote safe food practices by addressing the risks associated with food handling, including production and delivery methods, while also protecting the health of the public.

Purpose of this plan

The purpose of this Emergency Response Plan is to establish an organized system for managing food safety emergencies such as *E. coli* outbreaks. The goal of this health plan is to significantly lower the number of cases of food safety illnesses. This plan is designed for the county of Greater London.

Authorities and their public health functions

The Association of Directors of Public Health (ADPH) for London represents the Directors of Public Health in London's 32 local authorities and the City of London. Each Director of Public Health works to improve public health in their local authority. Directors of Public Health work across three domains: health protection, health improvement, and healthcare. The core purpose of the ADPH is to:

- *"Provide support in addressing pan-London public health issues*
- *Problem solve and tackle emerging challenges*
- *Strengthen the profile of public health in London*
- *Provide an expert voice on public health issues*
- *Contribute to improved decision making through shared information*
- *Share best practice and benchmarking*
- *Provide mutual professional support to DsPH"*[6]

The Food Standards Agency (FSA) is a UK government agency operating in England, Northern Ireland, and Wales. FSA's main objective is to:

> *"protect public health from risks which may arise in connection with the consumption of food (including risks caused by the way in which it is produced or supplied) and otherwise to protect the interests of consumers in relation to food."*[7]

Additionally, as laid out in the *Food Standards Act 1999*, the FSA holds power to issue guidance on control of foodborne diseases:

> *(1) "The Agency may issue general guidance to local authorities or other public authorities on matters connected with the management of outbreaks or suspected outbreaks of food-borne disease.*

(2) Guidance issued under this section must identify the authority or authorities to which it is addressed.
(3) The Agency shall publish any guidance issued under this section in such manner as it thinks fit.
(4) Any authority to whom guidance under this section is issued shall have regard to the guidance in carrying out any functions to which the guidance relates.
(5) In this section "food-borne disease" means a disease of humans which is capable of being caused by the consumption of infected or otherwise contaminated food."[8]

The UK Health Security Agency (UKHSA) is a government agency responsible for:

> *"protecting every member of every community from the impact of infectious diseases, chemical, biological, radiological and nuclear incidents and other health threats"*[9]

UKHSA is sponsored by the Department of Health and Social Care. Within the UKHSA, health protection teams (HPT) provide specialist public health advice to prevent and reduce the impact of infectious disease, chemical and radiation hazards, and major emergencies. HPTs also work with:

- *"local disease surveillance*
- *maintaining alert systems*
- *investigating and managing health protection incidents and outbreaks*
- *implementing and monitoring national action plans for infectious diseases at local level"*[10]

Three HPTs work in London: North East and North Central London HPT, North West London HPT, and South London HPT.

Definitions

Association of Directors of Public Health (ADPH): represents the Directors of Public Health in London's 32 local authorities and the City of London

E. coli: *Escherichia coli* is a bacterium that is found in the intestines of warm-blooded organisms and in the environment. It is passed to humans through meat products that are raw or undercooked, unpasteurized dairy products, and contaminated produce or water.

Cross Contamination: Occurs when bacteria is transferred from one area to another

Food Standards Agency (FSA): UK government agency operating in England, Northern Ireland, and Wales to ensure food safety

Health Protection Team (HPT): specialist public health teams working within the UK Health Security Agency that cover local areas

RDM: Raw Drinking Milk is a dairy product that has not been pasteurized

RCDM: Registered Raw Cow Drinking Milk is an unpasteurized dairy product that has been legally recognized by the Food Standards Agency

United Kingdom Health Security Agency (UKHSA): UK government agency responsible for protecting every member of the community from the impact of infectious diseases, chemical, biological, radiological and nuclear accidents and other health threats

Communications plan

In a foodborne outbreak, communication between the Food Standards Agency, members of the industry, and the general public is crucial to contain the illness. The goal of this communication plan is to identify the stakeholders who should be contacted to contain the outbreak in an efficient manner.

1. **Prepare a list of contacts within the agency, the Department of Health and Social Care, healthcare facilities, environmental agencies, in addition to farming agencies**

    - Members of the outbreak investigation teams within the Food Standards Agency and the Department of Health and Social Care
    - Epidemiologists at the Food Standards Agency and the Department of Health and Social Care
    - Environmental Health Specialists at the Department for Environment, Food, and Rural Affairs
    - Laboratory contacts
    - Key healthcare management teams and providers for hospitals and other medical care facilities in London, England
    - Personnel at The Farming Community Network

2. **Create a procedure to communicate data, regulations, and guidelines to be distributed to the public during the outbreak.**
    - The Food Standards Agency will be the main stakeholder responsible for investigation and all communication to the public regarding information about the outbreak must be approved by them.
    - Determine the head of communications for each department and agency involved in the outbreak investigation and coordination with The Food Standards Agency. (I.e. Epidemiology, the Department of Health and Social Care, the Department for Environment, Food, and Rural Affairs).
    - Determine key contacts in the healthcare field within the city of London.
    - Create a protocol to communicate all information between the following entities:
        - The Department of Health and Social Care
        - Hospitals and other healthcare facilities
        - The Department for Environment, Food, and Rural Affairs

        - The Farming Community Network
        - All establishments that sell food products
        - The media
        - The general public
    - Determine which data and information will be shared with the general public, and the manner in which to organize nonpublic information
    - Inform the public on the outbreak through the use of local news outlets, social media, and other online resources

Mutual aid agreement

The Parties identified above include FSA, UKSHA, and ADPH. Each organization has a responsibility to protect public health and act in the best interest of the public. The Parties acknowledge that in order to maintain public health protections, collaboration and mutual aid is required. It is the responsibility of each agency to notify others of suspected foodborne outbreaks. The Parties will work together to ensure surveillance and detection of foodborne outbreaks allows for rapid response. The Parties will engage in collaborative exchange of resources and services, remembering that we work to protect the public health of London and the entire United Kingdom.

Additionally, FSA has a Memorandum of Understanding (MoU) with Food Standards Scotland (FSS).[11] This MoU sets out terms and principles for working together, including on incident management. The MoU states that any outbreak originating in England, Wales, and Northern Ireland will be managed by FSA while any outbreak originating in Scotland will be managed by FSS.[11] The two organizations will share information and resources, and both organizations have the same Incident Management Plan.[11] Additionally, the MoU describes the organizations' roles in engaging with international organizations:

> *"The FSA and FSS will collectively cooperate on international stakeholder engagement planning in relation to incidents prevention, detection, response and recovery. This engagement includes the negotiation of international MoUs, when applicable, and engagement with the International Food Safety Authorities Network (INFOSAN). FSA and FSS will jointly consider potential international data sharing issues.*"[11]

INFOSAN is the WHO's tool for information exchange regarding foodborne illness and other food safety events. "INFOSAN members are encouraged to:

- *Report urgent food safety events of potential international significance to the INFOSAN Secretariat;*
- *Respond to information requests from the INFOSAN Secretariat during the verification and assessment of events by providing all necessary information;*
- *Request international assistance through the INFOSAN Secretariat to respond to food safety events as necessary;*
- *Take action on INFOSAN Alerts and disseminate information accordingly;*

- *Collaborate with their respective National IHR Focal Point on food safety events; and*
- *Share experiences and best practices related to food safety emergency management, so that all members can learn from one another."*[12]

VI CONCEPT OF OPERATIONS

Population Needs Assessment

According to the National Health Service (NHS), treatment for *E. coli* can be accomplished at home as there are currently no specific treatments for *E. coli 0157*. It is recommended for those who are infected to drink fluids to prevent dehydration. Antibiotics are not recommended especially for children and older adults as they may worsen conditions. Most healthy adults should fully recover after approximately 7 days and can return to school or work after being symptom-free for 48 hours.[13] Children may carry the *E.coli* infection months after recovery and should refrain from swimming in public pools until the *E.coli* infection is no longer detected in their system. Those with a higher chance of serious impacts from *E. coli* infection are children younger than 5 and adults ages 65 and older as well as those who were immunocompromised before contracting *E. coli*. In rare cases, an *E. coli* infection can lead to a hemolytic uremic syndrome (HUS) potentially causing kidney failure and death.[14] Those experiencing bloody diarrhea should contact their general practitioner. To prevent *E. coli* infections it is recommended to practice proper food safety and hand hygiene, especially for children ages 5 to 9 who have the highest incidence rate of *E. coli* infection.[15]

Matching available resources to the needs

Although many treatments of *E. coli* can be provided at home, there are clinical resources that are needed for all population groups. For example, lab equipment for stool and urine cultures are needed for children and adults in all age groups.[16] Additionally, lab equipment for blood tests and spinal taps are needed.[16] Both of these testing methods can determine whether or not an individual has an *E. coli* infection. Additionally, some patients may require supportive hospital care (IV fluids, dialysis, intensive care) as indicated.

While the use of antibiotics is not recommended to treat *E. coli* infections, severe illnesses can occur as a result of the *E. coli* infection, such as such as sepsis, kidney failure, or meningitis.[16] To treat these conditions, antibiotics can be used, such as Trimethoprim/sulfamethoxazole (TMP/SMX), Ciprofloxacin, Rifaximin, Trimethoprim/sulfamethoxazole (TMP/SMX), and Nitrofurantoin.[16] The age group that is most likely to need these resources are adults of all age groups. In addition to these resources, medical facilities should have adequate materials to treat individuals if they are admitted. These resources include, but are not limited to, the available antibiotics if they are needed, rehydration materials and supplies, and the BRAT diet components, which include Bananas, Rice, Applesauce, Toast.[17] In addition to hospitals having these supplies available to them, grocery stores and distribution centers should have these materials available as well, in addition to beverages with electrolytes.[17]

An additional resource is the creation of food safety education materials to prevent future outbreaks. The creation of informative pamphlets, posters, or posts on social media can educate individuals on proper food safety practices and techniques to prevent *E. coli* infections.

Evaluating the effectiveness of the response

Once an outbreak has been detected, it is crucial that investigation and control activities begin right away. Evaluation activities will be conducted throughout the outbreak response as well as once the outbreak has been declared over.

Overview

The purpose of evaluation activities is to:

- Assess the timeliness and appropriateness of the response actions taken, including case identification and implementation of control measures
- Evaluate the effectiveness of communication strategies in informing the public and healthcare providers about the outbreak and preventive measures
- Review the coordination and collaboration between the agencies and organizations involved in the response
- Examine the resource allocation and utilization, including the availability of personnel, laboratory services, and medical supplies
- Analyze the overall impact of the response on containing the outbreak and mitigating its effects

During the outbreak

Evaluation activities will begin immediately, acknowledging that the standards to measure response effectiveness will differ from everyday programs.[18] Immediately following outbreak detection, the following steps should occur:[19]

1. Using available information, consider common symptoms and exposure factors of probable cases
2. Develop a case definition and disseminate
3. Collect relevant specimens
4. Initiate immediate control measures
5. Agree on communication activities and responsibilities
6. Identify cases

During the outbreak, evaluation activities will be completed by responders. These include utilizing a checklist to determine if proper steps are being taken, as well as appropriate data collection. These data will help to understand the timeliness of response actions, who was involved with the response, the epidemiology of the outbreak, and the utilization of laboratory services and medical supplies.

After-Action Report

Once the outbreak has ended, focus will shift to an After-Action Report (AAR). The objectives of the AAR are “to identify capacities in place before the response, any challenges that came to light during it, the lessons identified, and any best practices observed during the response, including the development of new capacities.”[20] The AAR will be conducted through three phases:

1. Observation: during this phase, evaluators will objectively describe how investigation and control activities were completed.
2. Analysis: during this phase, evaluators will compare completed activities to the standards, in order to determine gaps between what was planned and what actually occurred, what went well and what did not go well, and why activities occurred the way they did.
3. Recommendations: during this phase, evaluators will identify areas for improvement and provide recommendations to improve future outbreak activities.

The evaluation findings will be used to identify lessons learned and recommendations for improving future outbreak response efforts. The comprehensive AAR detailing the evaluation findings and recommendations will be prepared and disseminated to relevant stakeholders, including public health authorities, government agencies, and the public. The recommendations will be used to update the outbreak response plan and improve preparedness for future outbreaks.

Annex 1: Threat and Hazards Assessment Table

Natural	Technological	Human-caused
Resulting from acts of nature	Involves accidents or the failures of systems and structures	Caused by the intentional actions of an adversary
• **Climate change (temperature changes, flooding, and droughts):** Changes in precipitation can introduce pathogens and other toxins to crops. Seasonal changes in temperature can impact the occurrence of bacteria, viruses, parasites, and other pathogens.[21] The UK currently produces about half of its food domestically; the other half is imported from all over the world, including Europe, North and South America, Africa, and Asia.[22] This means that changes in weather patterns in other parts of the world could still impact foodborne outbreaks in the UK. Flooding can also increase animals' contact with fecal contamination which can further expose them to dangerous bacteria.[23] • **Severe storms:** Severe storms can damage roads, facilities, and other infrastructure used to store and transport food. The 2023-24 storm season has had a very active start, with seven major storms named from September-December.[24] Storms can also lead to power outages.	• **Improper hot/cold holding temperatures:** Foods that need to be kept cold must be stored at 41°F or below. Failure in these temperature storage methods at any stage can lead to bacteria growth. Cold storage methods include walk-in coolers, prep coolers, cold top tables, holding foods on ice, refrigerated displays, and refrigerated trucks.[25] Foods that need to be kept hot must be stored at 135°F or above. Hot storage methods include steam tables, crock pots, heat lamps, double boilers, and hot holding cases.[25] • **Power outages:** Power outages can impact facilities' ability to properly store food at the correct temperature. Two-thirds of the UK experienced power outages in 2023, lasting on average two and a half hours.[26] These can impact individual homes and food storage facilities. • **Pasteurization process failure:** Pasteurization of milk products kills bacteria, including E. coli. Failures in this process may lead to contamination of milk, cheese, and other dairy products. For example, a 2019 outbreak in England occurred when a pasteurizer had a damaged rubber seal, causing unpasteurized milk to leak into the pasteurized milk.[27] • **Improper cooking techniques:** Food must be properly cooked to an internal temperature of 140°F. Slow heating techniques, such as slow cookers, may not reach temperatures high enough to kill bacteria. One study examined gravy samples which were heated to 115°F which was hot enough to stimulate E. coli bacteria to survive longer, but not hot enough to kill it.[28] Food preparation workers must ensure food is cooked to proper temperatures.	• **Terrorism and bioterrorism:** Two bioterrorism attacks have occurred in the UK between 1970-2019.[29] Though both used Anthrax, it is possible that different bacteria could be used in a terrorist attack. • **Personal hygiene:** Personal hygiene is an important factor in preventing contamination.[30] Food service workers could intentionally not adhere to hygiene standards, which could lead to foodborne outbreaks, even if their intention was not to cause an outbreak.

Annex 2: Drills and exercises

Training Seminar Title: Foodborne illness: how to properly prepare your food to avoid foodborne outbreaks	
Objectives of your Training Seminar (What mitigation strategy are you advocating?)	To teach participants how to properly handle, prepare, and store food to avoid foodborne illness
Estimated Length of Training	2 hours; scheduled annually and offered when *E. coli* outbreaks have been identified
Target Audience and max size of audience.	Community members, particularly those who: ● prepare food for themselves or others ● are at higher risk of serious impacts from *E. coli* infection, including those aged 65+ and those who are immunocompromised Maximum size is 20-30 people since this will require access to a kitchen or other food preparation space
Who would be a good candidate (e.g., structural engineer, health dept. official, first responder?) as Facilitator of this session? Why?	The Food Standards Agency offers free online food safety training courses.[31] For in-person training sessions, various London-based organizations have already developed food safety courses for individuals seeking to work in food handling or catering.[32] These courses could easily be adapted to offer a shorter course for individuals who are preparing food for themselves or others non-commercially.
What do you want community members to do as a result of their attending this session?	1. Understand the concept of safe food 2. Understand the risks of foodborne illness 3. Improve food preparation and handling knowledge and practice 4. Improve food storage knowledge and practice 5. Improve knowledge and practice of proper cleaning techniques
Strategies to increase community uptake of your mitigation	1. Teach through preparing food that participants will get to eat during the training 2. Partner with local restaurants and offer discounts for those who have participated in this training 3. Help participants set alerts for foodborne outbreaks so they can become aware of any risks and know which foods to avoid 4. Distribute magnets and reference guides with brief information about proper food handling and preparation that people can place on their refrigerator as a reminder 5. Distribute food storage containers with labeling instructions to make it easier for participants to date their food

Annex 3: Short-term recovery

Activity	Steps	Specific actions
Taking immediate disease control measures	1. Using available information, consider common symptoms and exposure factors of probable cases	1. Remain vigilant and keep an eye out for any signs of diseases and specific symptoms 2. Share information to communities about the common symptoms to look out for and what steps to follow if they start feeling sick.
	2. Develop a case definition and disseminate	1. Decide what symptoms or might be sick 2. Make sure the definition and symptoms to look out for are clear and share this with others so they know what to look for.
	3. Collect relevant specimens	1. Set up locations for proper specimen collection 2. Ensure that the collection points have the necessary supplies
	4. Initiate immediate control measures	1. Recall all contaminated products 2. Inform grocery carriers and distributors of contaminated products 3. Inform the public of product recall through SMS alerts, news outlets, social media, and signage at grocery carriers
	5. Agree on communication activities and responsibilities	1. Determine priority contacts: ● Members of FSA outbreak investigation teams ● Epidemiologists at the FSA ● Environmental Health Specialists at the Department for Environment, Food, and Rural Affairs ● Laboratory contacts ● Key healthcare management teams and providers in London, England ● Personnel at The Farming Community Network 2. Inform the public of contaminated products through SMS alerts, social media, signage at grocery carriers, and news outlets
	6. Identify cases	1. Request notification from hospitals and other medical establishments upon diagnosis 2. Ensure that medical establishments and hospitals are properly equipped with testing equipment
Strengthen programs for prevention and education	1. Identify locations for education activities 2. Allocate funds to increase education activities 3. Schedule and advertise	Refer to Annex 2 for specific information on education activities

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