SURVEILLANCE REPORT

Annual Epidemiological Report for 2019

Anthrax

Key facts

- Anthrax continues to be uncommon in humans in Europe, with only a few cases reported every year.
- For 2019, one confirmed anthrax case was reported by Hungary.
- Twenty-nine EU/EEA countries notified zero confirmed cases.

Methods

This report is based on data for 2019 retrieved from The European Surveillance System (TESSy) on 5 October 2020. TESSy is a system for the collection, analysis and dissemination of data on communicable diseases.

For a detailed description of methods used to produce this report, please refer to the *Methods* chapter [1]. An overview of the national surveillance systems is available online [2].

A subset of the data used for this report is available through ECDC's online *Surveillance atlas of infectious diseases* [3].

Anthrax is under compulsory notification in all EU/EEA countries. In 2019, 30 EU/EEA Member States collected anthrax data through surveillance systems with national coverage. Twenty-six Member States used various versions of the EU case definition (2002, 2008, 2012 and 2018 version). Three Member States used other case definitions and one did not specify which case definition they used. In 22 countries, cases were reported by both laboratories and physicians. All Member States collected case-based data.

Epidemiology

For 2019, five cases of anthrax were reported, only one of which was a confirmed case. All cases presented as the cutaneous form of anthrax, and four of them required hospitalisation. All five cases have survived. Four of these cases were reported by Hungary, including the confirmed case. The other case was reported by Romania. The four Hungarian cases were all linked to farm animals, related to two separate events in two different counties [personal communication E. Mezei, Department of Communicable Disease Epidemiology and Infection Control, National Public Health Center, Budapest, Hungary, 31 July 2020].

Three cases were male, and two cases female. Four cases were in the 45–64 year age group and one case was in the 25–44 year age group.

In the period 2015–2019, only a few sporadic cases were reported each year, with a total of 20 confirmed cases (Table 1).

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Table 1. Distribution of confirmed anthrax cases by country and year, EU/EEA, 2015–2019

Country	2015	2016	2017	2018	2019
	Number	Number	Number	Number	Number
Austria	0	0	0	0	0
Belgium	0	0	0	0	0
Bulgaria	2	0	1	0	0
Croatia	0	0	0	0	0
Cyprus	0	0	0	0	0
Czechia	0	0	0	0	0
Denmark	0	0	0	0	0
Estonia	0	0	0	0	0
Finland	0	0	0	0	0
France	0	0	0	0	0
Germany	0	0	0	0	0
Greece	0	0	0	0	0
Hungary	0	0	0	0	1
Iceland	0	0	0	0	0
Ireland	0	0	0	0	0
Italy	0	0	0	0	0
Latvia	0	0	0	0	0
Liechtenstein	.	.	.	.	.
Lithuania	0	0	0	0	0
Luxembourg	0	0	0	0	0
Malta	0	0	0	0	0
Netherlands	0	0	0	1	0
Norway	0	0	0	0	0
Poland	0	0	0	0	0
Portugal	0	0	0	0	0
Romania	2	5	5	1	0
Slovakia	0	0	0	0	0
Slovenia	0	0	0	0	0
Spain	0	1	0	1	0
Sweden	0	0	0	0	0
United Kingdom	0	0	0	0	0
EU-EEA	**4**	**6**	**6**	**3**	**1**

Source: Country reports.
.: no data reported.

Outbreaks and other threats

No relevant outbreaks or threats due to anthrax were identified for 2019.

Discussion

Anthrax is a rare disease in the EU/EEA. Between 2015 and 2019, EU/EEA countries reported 20 confirmed cases to the European Surveillance System (TESSy), ranging from one to six cases per year. For 2019, only one confirmed case was reported by Hungary.

The disease is caused by the bacterium *Bacillus anthracis* which can form highly resistant spores and mainly affects herbivores and domestic animals. Humans can become infected after contact with spores through infected animals or contaminated animal products (e.g. wool or hide). As a result, people in close contact with infected animals or contaminated animal products such as farmers, veterinarians or people working in the animal hide industry, are at highest risk of becoming infected [4].

Depending on the mode of contact with spores, the disease presents as cutaneous, gastrointestinal, inhalational or injectional anthrax. All five (confirmed and probable) cases of anthrax reported in 2019 presented as cutaneous anthrax. Cutaneous anthrax is the most common form of anthrax and occurs after a spore has passed the skin barrier through damaged skin. If treated, this usually results in a localised infection with low mortality. Other forms of anthrax are more severe and are associated with substantial mortality, even with appropriate treatment [5].

The first case of injectional anthrax was described in 2000 and was attributed to the injection of contaminated heroin [6]. In 2009–2010, Scotland experienced the largest ever outbreak of injectional anthrax, with 119 cases identified [7]. In 2012 and 2013, new cases of injectional anthrax were diagnosed in Denmark, France, Germany and the United Kingdom [8].

Bacillus anthracis can be divided into separate genotypes. Whole genome sequencing (WGS) can be used to identify different genotypes and has become an integral part of surveillance and outbreak investigations. Two recent publications have provided updated frameworks for *Bacillus anthracis* genotyping, based on two different, but congruent, high-resolution methods: core genome multilocus sequence typing (cgMLST) and single nucleotide polymorphisms (SNP) analysis [9,10]. The authors' work can guide epidemiologists in future anthrax outbreaks and facilitate international collaboration in the event of multi-country events.

Antibiotics are the cornerstone in the treatment of all anthrax types [5,11]. However, antibiotics will only address the bacterium and not the toxins released by the pathogen [5]. As a result, the administration of antitoxins could be considered as a complement to antibiotic therapy in inhalational anthrax [11,12]. However, the additional benefits of antitoxins have been contested [13]. In case of severe systemic disease, more supportive care might be needed [5].

Public health implications

People most at risk of developing anthrax are those who are in close contact with animals and potentially contaminated animal products. Control measures focus mainly on the appropriate handling of dead animals and animal products. This includes proper disposal of carcasses, decontamination of the environment, but also disinfection and decontamination of animal products [4]. Workers carrying out these measures must use protective equipment [4]. Even though gastrointestinal anthrax due to the ingestion of contaminated meat is possible, meat-borne transmission of anthrax in the EU is considered a very rare event [14].

There is, presumably, still a risk of exposure for heroin users in EU countries and it cannot be excluded that additional cases among injecting drug users will be identified in the future. Information on anthrax should be disseminated to healthcare workers, drug treatment and harm reduction centres, supporting an early diagnosis and treatment. The provision of appropriately dosed opiate substitution treatment could also prevent further anthrax cases [15]. In addition, the development of a syringe filter for spore-forming bacteria could be a tool for the prevention of infections in injecting drug users [16].

Vaccines against anthrax are available and are approved in some EU/EEA countries [11]. Guidelines recommend vaccination for those at risk such as veterinarians, abattoir workers, those working with animal hides or furs, laboratory workers and the armed forces in areas with a high risk of exposure [11,17]. Animals can be vaccinated to prevent them from being infected and passing the spores on to humans [4]. In areas prone to the disease, particularly those that experience outbreaks or sporadic cases in livestock, susceptible animals are usually vaccinated on an annual basis [4]. In addition to the pre-exposure prophylaxis with vaccines, the anthrax vaccine is also recommended for post-exposure prophylaxis along with antibiotics [11,17].

References

1. European Centre for Disease Prevention and Control (ECDC). Introduction to the Annual Epidemiological Report. Stockholm: ECDC; 2020. Available at: https://www.ecdc.europa.eu/en/surveillance-and-disease-data/annual-epidemiological-reports/introduction-annual
2. European Centre for Disease Prevention and Control (ECDC). Surveillance systems overview for 2019. Stockholm: ECDC; 2021. Available at: https://www.ecdc.europa.eu/en/publications-data/surveillance-systems-overview-2019
3. European Centre for Disease Prevention and Control (ECDC). Surveillance Atlas of Infectious Diseases. Stockholm: ECDC; 2019. Available at: https://www.ecdc.europa.eu/en/surveillance-atlas-infectious-diseases
4. World Health Organization (WHO). Anthrax in humans and animals. 4th edition. Geneva: WHO; 2008.
5. Savransky V, Ionin B, Reece J. Current Status and Trends in Prophylaxis and Management of Anthrax Disease. Pathogens. 2020 May 12;9(5) Available at: https://www.ncbi.nlm.nih.gov/pubmed/32408493
6. Ringertz SH, Hoiby EA, Jensenius M, Maehlen J, Caugant DA, Myklebust A, et al. Injectional anthrax in a heroin skin-popper. Lancet. 2000 Nov 4;356(9241):1574-5. Available at: https://www.ncbi.nlm.nih.gov/pubmed/11075776
7. National Anthrax Outbreak Control Team. An Outbreak of Anthrax Among Drug Users in Scotland, December 2009 to December 2010. Glasgow: Health Protection Scotland; 2011.
8. Berger T, Kassirer M, Aran AA. Injectional anthrax - new presentation of an old disease. Euro Surveill. 2014 Aug 14;19(32)
9. Bruce SA, Schiraldi NJ, Kamath PL, Easterday WR, Turner WC. A classification framework for *Bacillus anthracis* defined by global genomic structure. Evol Appl. 2020 May;13(5):935-44. Available at: https://www.ncbi.nlm.nih.gov/pubmed/32431744
10. Abdel-Glil MY, Chiaverini A, Garofolo G, Fasanella A, Parisi A, Harmsen D, et al. A Whole-Genome-Based Gene-by-Gene Typing System for Standardized High-Resolution Strain Typing of *Bacillus anthracis*. J Clin Microbiol. 2021 Jun 18;59(7):e0288920. Available at: https://www.ncbi.nlm.nih.gov/pubmed/33827898
11. European Medicines Agency (EMA). Assessment report: Obiltoxaximab SFL. Amsterdam: EMA; 2020. Available at: https://www.ema.europa.eu/en/documents/assessment-report/obiltoxaximab-sfl-epar-public-assessment-report_en.pdf
12. Hendricks KA, Wright ME, Shadomy SV, Bradley JS, Morrow MG, Pavia AT, et al. US Centers for Disease Control and Prevention Expert Panel Meetings on Prevention and Treatment of Anthrax in Adults. Emerg Infect Dis. 2014 Feb;20(2) Available at: https://www.ncbi.nlm.nih.gov/pubmed/24447897
13. Vietri NJ. Does anthrax antitoxin therapy have a role in the treatment of inhalational anthrax? Curr Opin Infect Dis. 2018 Jun;31(3):257-62. Available at: https://www.ncbi.nlm.nih.gov/pubmed/29570493
14. EFSA Panel on Biological Hazards (BIOHAZ). Scientific Opinion on the public health hazards to be covered by inspection of meat (bovine animals). EFSA Journal. 2013;11(6):3266:261. Available at: http://dx.doi.org/10.2903/j.efsa.2013.3266
15. European Centre for Disease Prevention and Control (ECDC) and European Monitoring Centre for Drugs and Drug Addiction (EMCDDA). Joint ECDC and EMCDDA rapid risk assessment. Anthrax cases among injecting drug users Germany, June-July 2012: update, 13 July 2012. Stockholm and Lisbon: ECDC and EMCDDA; 2012.
16. Alhusein N, Scott J, Kasprzyk-Hordern B, Bolhuis A. Development of a filter to prevent infections with spore-forming bacteria in injecting drug users. Harm Reduction Journal. 2016 Dec 1;13(1):33.
17. Bower WA, Schiffer J, Atmar RL, Keitel WA, Friedlander AM, Liu L, et al. Use of Anthrax Vaccine in the United States: Recommendations of the Advisory Committee on Immunization Practices, 2019. MMWR Recomm Rep. 2019 Dec 13;68(4):1-14. Available at: https://www.ncbi.nlm.nih.gov/pubmed/31834290