Chapter 10
Case Study – Germany

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Abstract Public health structures in Germany reflect the federal system: health care in general lies within the responsibility of the 16 constituent states and the federal government only acts if a state asks for assistance. There were no bioterror-related intentional releases of biological agents in Germany in recent years. The potentially devastating effects of such an incident require sound public health preparedness planning. The Basic Constitutional Law (*Grundgesetz*) does not allow the deployment of armed forces within Germany with some rare exceptions. However, there is a well-established civil-military cooperation. The Federal Armed Forces (*Bundeswehr*) are deployed in humanitarian and multinational UN or NATO crisis containment missions abroad, requiring adequate protection from pathogens and diseases endemic or enzootic to those regions. Both, the military and the civil public health system are complex structures that contain administrative, care giving, medical investigation, and research capabilities in order to cope with natural, accidental or intentional biological incidents.

10.1 Current Public Health Situation

Today, pathogens with significant public health impact in Germany are mostly bacteria and viruses. Compared to other geographic regions (with different climates and environmental conditions), parasites and fungi are only of minor importance.

The views expressed in this chapter reflect the views of E-J Finke and do not represent the official opinion of the Federal Ministry of Defence.

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Biological agents such as prions and toxins are uncommon. Some of the most frequent infectious diseases are:

- Hepatitis B (former or current infection): about 7% of the general population [21].
- Hepatitis C: about 0.4% of the general population is seropositive [21].
- Influenza: on average, between 7,000 and 13,000 deaths per year due to seasonal influenza [30].
- HIV/AIDS: an estimated 73,000 persons currently infected, about 2,800 new infections per year [35].
- Tuberculosis: more than 7,000 cases per year [29].
- Food poisoning: about 200,000 cases are reported annually [29].
- Nosocomial infections: 400,000–600,000 cases annually, about 58,000 of whom require intensive care, resulting in an estimated 10,000–15,000 deaths [15, 16].

Although these and other infectious diseases are burdening the health care system significantly, the main causes of morbidity and mortality in Germany are consequences of chronic diseases. Amongst the ten most common causes of death, only pneumonia is directly linked to infection [45].

The relevant infectious diseases prevalent in Germany differ widely from agents that are perceived to be bioterrorism-relevant. A German assessment of biological agents that are considered to be of potential interest to bioterrorists mostly conforms to current international assessments, e.g. the CDC list [10], although there is no official German list of threat agents.[1] A comparison of the CDC list and the current German assessment shows some variations. Alphaviruses mentioned on the CDC list (such as eastern equine encephalitis virus and western equine encephalitis virus) are currently not considered to be agents of major concern in Germany. Another difference is the listing of food and water safety threats on the CDC list, such as *Salmonella*, *E. coli* and *Shigella* species. Furthermore, the CDC list includes emerging pathogens which are often omitted from bio-threat lists. In terms of public health response, those pathogens are covered by other mechanisms such as the International Health Regulations (IHR) and nationally by the German Protection against Infection Act (*Infektionsschutzgesetz*, IfSG).[2]

10.2 Risk Assessment for Potential Bioterrorism Agents

Compared to the impact of naturally occurring infectious diseases, currently most of the classical potential bioterrorism agents such as *B. anthracis*, botulinum neurotoxins, *Y. pestis*, Variola virus, *F. tularensis*, or viral hemorrhagic fever viruses are

[1] For selected highly pathogenic agents and toxins, the methods available in the Robert Koch-Institute for their detection, as well as the reference laboratories, see http://www.rki.de/DE/Content/Infekt/Biosicherheit/Diagnostik/Diagnostik-Detektion_node.html (accessed 21 May 2012).

[2] The law was adopted in 2000 and most recently updated on 28 July 2011; http://www.gesetze-im-internet.de/bundesrecht/ifsg/gesamt.pdf (accessed 29 August 2011).

not considered to pose an imminent risk in Germany. Rare cases of autochthonous as well as imported botulism and tularemia have been described [36]. In 2010, several cases of anthrax occurred among intravenous drug users [32–34]. Very few cases of viral hemorrhagic fevers – all of which had been imported – were treated in Germany [36]. No cases of plague were detected in recent years. Test systems are available for all currently relevant biological agents of either public health importance or those that are considered biothreat agents.

In principle, the same public health measures are required to control naturally occurring infectious diseases as well as diseases caused by the intentional release of pathogens or toxins (i.e. potential acts of bioterrorism or criminal acts). Consequently, most of the responding structures in Germany are identical. The legal basis for infection control in Germany is provided by the IfSG. It allows abrogating basic rights such as freedom of assembly or freedom of movement in order to control the spread of infections. This law also defines which diseases are notifiable (grouped into suspected cases, confirmed cases, and deaths) and sets the time frame for notification. There is a catch-all element implemented to also cover emerging pathogens or outbreaks of pathogens not explicitly mentioned in the law.

10.3 Public Health Structures and Regulations in the Civilian Sector

Germany is a federal state, and health care in general – including public health measures – is the responsibility of the 16 constituent states (*Bundesländer*). Each of these states has its own constitution and is largely autonomous. In case of notifiable diseases or pathogens, physicians on the local level initially notify the public health officer (*Amtsarzt*) and health agencies (*Gesundheitsämter*) of the municipality. However, the principle of subsidiarity applies and local authorities can ask for assistance. In case the local authorities are overwhelmed, they can request assistance from the county (*Landkreis*), the state, and the federal level. In cases or suspected cases of bioterrorism, the criminal investigations are performed by the Federal Criminal Police Office (*Bundeskriminalamt*, BKA).

On the federal level, the Federal Ministry of Health (*Bundesgesundheitsministerium*, BMG) is responsible for health policy, drafting bills, ordinances and administrative regulations. The BMG has five Higher Federal Authorities in its remit, the Robert Koch-Institute (RKI), the Paul-Ehrlich-Institute (PEI, Federal Institute for Vaccines and Biomedicines), the German Federal Institute of Medical Documentation and Information (DIMDI), the Federal Centre for Health Education (BZgA), and the Federal Institute for Drugs and Medical Devices (BfArM). Of these, the RKI is the central federal institution responsible for disease control and prevention. In a public health or bioterrorism emergency, the main responsibilities of the RKI are epidemiological and microbiological analysis as well as scientific support and counseling. An additional task is on-the-spot support on request of the federal state affected. The RKI is also the German authority providing information regarding the International Health Regulations (IHR) on infectious diseases via the German Joint

Information and Situation Centre (*Gemeinsames Melde- und Lagezentrum*, GMLZ) to the World Health Organization (WHO).

Within the RKI, the Centre for Biological Security (*Zentrum für Biologische Sicherheit*, ZBS) develops concepts for identifying bioterrorist attacks and diagnostic tools and capabilities for relevant pathogens. The centre is divided into the Federal Information Centre for Biological Security (*Informationsstelle des Bundes für Biologische Sicherheit*, IBBS) and six departments (ZBS1 to 6). ZBS1 works on highly pathogenic viruses, including developing diagnostic methods and strategies on how to combat and prevent infections with highly pathogenic viruses. Also affiliated to ZBS1 are two consultant laboratories: for tick-borne encephalitis and for orthopoxviruses. ZBS2 works on highly pathogenic bacteria, develops diagnostics for bacterial pathogens of high-risk groups, and also focuses on assuring the quality of diagnostics, e.g. through interlaboratory experiments (EQADeBa[3]). ZBS3 works on microbial toxins, including research on their pathogenesis. ZBS4 provides rapid diagnostics of relevant pathogens; mainly, this department focuses on different forms of electron microscopy. ZBS5 plans the building and setting up of a BSL-4 facility that is currently under construction. The newest addition, ZBS6, works on proteomics and spectroscopy of highly pathogenic organisms.

Other structures on the federal level are in the remit of the Federal Ministry of Food, Agriculture and Consumer Protection (BMELV). Here the Federal Institute for Risk Assessment (BfR) and the Federal Office of Consumer Protection and Food Safety (BVL) are responsible for a wide array of issues relating to food safety.

Several additional structures have been implemented as public health tools in a broader sense. Germany has 18 national reference centres that monitor important infectious diseases. In addition, there are currently 49 consultant laboratories to comprehensively cover a broad spectrum of pathogens. All of these centers and laboratories perform research but they also – to different degrees – develop detection assays, reference materials and guidelines for prevention, therapy and diagnostics [23]. In 2003, the German Working Group for the Management of Highly Contagious Diseases (*Ständige Arbeitsgemeinschaft der Kompetenz- und Behandlungszentren*, StAKoB) was founded. This unique network combines BLS-4 laboratory, clinical, and public health expertise. Its mission comprises the development of guidelines for treatment of highly contagious and life-threatening infections, development of training and education concepts, and definition of quality standards. Furthermore, StAKoB organizes personnel and material support as well as common exercises [17]. The current members of the StAKoB are:

- Berlin (center of competence and clinical treatment center).
- Frankfurt/Main (center of competence and clinical treatment center).
- Hamburg (center of competence and clinical treatment center).
- Leipzig (center of competence and clinical treatment center).

[3] Establishment of quality assurances for detection of highly pathogenic bacteria of potential bioterrorism risk, http://www.rki.de/EN/Content/Prevention/EQADeBa/EQADeBa_node.html (accessed 21 May 2012).

- Munich (center of competence and clinical treatment center).
- Saarbrücken (clinical treatment center).
- Stuttgart (center of competence and clinical treatment center).
- Würzburg (clinical treatment center).

In addition to legal structures such as the IfSG as well as administrative and research resources, Germany (federal and state level) has developed and agreed on two comprehensive strategic concepts that facilitate collaboration on the different federal levels in case of a large-scale biological emergency. One of these concepts details the necessary steps in response to a smallpox outbreak (*Bund-Länder-Rahmenkonzept zur Vorbereitung auf biologische Gefahrenlagen*) [37]. The second concept is the national influenza preparedness plan [31] which consists of three parts:

- Measures.
- Phase-oriented tasks and recommendations.
- Scientific context.

These two concepts are being permanently updated. Although they have been developed for specific pathogens, they can be considered excellent bases for controlling other public health emergencies.

In order to allocate the limited funding and research resources appropriately, prioritization tools are being developed for naturally occurring pathogens as well as for potential biothreat agents. In both cases prioritization has to be done comparatively and reproducibly although different factors need to be taken into account beyond the question of whether an outbreak is possibly related to an intentional release. For instance, socio-economic, political or cultural factors could play a very important role as to how an epidemic spreads or what the potential impact could be – these considerations can become very complex, especially in case of incidents with multinational or global dimensions. All of the ranking and prioritizing efforts have to be dynamic processes as the variables are constantly changing.

Two departments of the RKI develop tools for the assessment of human-pathogenic agents. IBBS is currently developing a matrix that combines scientific data, e.g. regarding pathogenicity or routes of transmission, with information obtained from alternative sources (e.g. intelligence services). The purpose of this matrix is to assess the threat potential of biological agents in respect to their malevolent use by terrorists or criminals. Ideally, this tool will enable an independent and reproducible threat and risk assessment for all biological agents for which relevant information is available.

The Department for Infectious Disease Epidemiology (*Abteilung für Infektionsepidemiologie*) developed a matrix for naturally occurring infectious diseases [3, 22]. The main purpose of this matrix is to identify pathogens with potentially severe public health consequences. Currently, 127 biological agents are scored and divided into four priority groups. The list contains not only bacteria and viruses but also prions, fungi, parasites and even an unidentified agent (unidentified agent causing Kawasaki syndrome). Only one of the "classical" biothreat agents scores in

the highest priority group of this list pertaining to naturally occurring diseases (*Staphylococcus aureus* toxins). Several others are grouped in the second (e.g. *Brucella* spp., several hemorrhagic fever viruses, SARS corona virus and Variola virus) or the third priority group (e.g. *Bacillus anthracis*, different *Burkholderia* species, *Francisella tularensis*, *Vibrio cholerae* or *Yersinia pestis*), while several others are not listed at all (e.g. equine encephalitis viruses, Nipah virus, Japanese encephalitis virus). The fact that toxins such as abrin, ricin or saxitoxin are not mentioned reflects the fact that these are not transmissible pathogens.

Germany focuses not only on national preparedness but is greatly interested in maintaining and strengthening international plans and structures such as those provided by the European Centre for Disease Prevention and Control (ECDC), the WHO and other collaborative efforts such as the Global Health Security Initiative (GHSI). An important issue for controlling multinational disease outbreaks is the establishment of structures and tools for communication. In order to ensure ease of communication during a crisis, Germany conducts regional as well as national exercises and also participates in international exercises.

10.4 Health Care in the Armed Forces

The Basic Constitutional Law (*Grundgesetz*) prohibits deployment of armed forces within Germany, with some rare exceptions such as emergency relief in the case of a natural disaster. The civil-military cooperation (CIMIC) within Germany is based on the Law on Civil Protection and Disaster Relief (*Gesetz über den Zivilschutz und die Katastrophenhilfe des Bundes*). In addition, the Federal Armed Forces (*Bundeswehr*) are deployed in humanitarian aid and multinational UN or NATO crisis containment missions abroad. Currently, about 7,700 military personnel are deployed on various missions such as ISAF or KFOR [7]. Some of these missions take place in tropical or subtropical areas and thus soldiers might contract not only diseases endemic in Germany but also pathogens and parasites endemic in these regions. Many of these pathogens are considered to be biological agents that may potentially be misused by terrorist or militant groups.

The health care for soldiers is the responsibility of the Chief of Staff of the Medical Service (*Inspekteur des Sanitätsdienstes der Bundeswehr*, InspSan) at the Federal Ministry of Defence (*Bundesministerium für Verteidigung*, BMVg). The implementation of public-legal tasks in the fields of hygiene and infection protection is the mission of the *Bundeswehr* Medical Office (*Sanitätsamt der Bundeswehr*, SanABw) and the medical commands (*Sanitätskommandos*, SanKdo). However, these structures are currently undergoing organizational changes due to the structural reform of the *Bundeswehr*.

Disease surveillance, prevention and control, and hygiene supervision are the responsibility of special departments of health and veterinary services at the SanABw and at the medical commands. Laboratory and investigational support is provided by the *Bundeswehr* Central Institutes of Medical Service (Zentrale Institute des Sanitätsdienstes der Bundeswehr, ZInstSanBw) in Coblenz, Kiel and Munich

(comparable to the civilian country health investigation offices), the special branch of tropical medicine of the *Bundeswehr* at the Bernhard Nocht Institute in Hamburg, and the *Bundeswehr* Institute of Microbiology (*Institut für Mikrobiologie der Bundeswehr*, InstMikroBioBw), which was established in 2002 in Munich [8].

In case of outbreaks of communicable diseases in military communities, inspection, sampling, epidemiological and laboratory investigations, as well as anti-epidemic countermeasures will be performed by fact-finding or epidemiological investigation teams and specialists of the *Bundeswehr* health and veterinary services using medical intelligence. In parallel, military practitioners, clinicians and microbiological laboratories report diseases or notifiable pathogens:

- to the local public health officers and health agencies as required by the IfSG.
- to the senior hygienists of the departments of health service at regional medical commands, who notifies the SanABw according to the military chain of command [8].

The SanABw sends summary notifications to the staff department of the BMVg and to the RKI. Notifications from deployed *Bundeswehr* contingents are passed through a special military chain to the Operations Command (*Einsatzführungskommando*) in Germany, the responsible medical commands, and the SanABw for final epidemiological risk assessment.

Medical biological defence lies with the responsibility of the Bundeswehr Medical Service with the aim to protect, contain and restore the health of soldiers under threat or exposure with biological warfare or related agents, to control biological environments and to investigate and verify a deliberate use of biological agents in cooperation with the Bundeswehr NBC troops and the Military Research Institute for Protective Technologies and NBC Protection (*Wehrwissenschaftliches Institut für Schutztechnologien und ABC-Schutz*, WIS) in Munster.

Taking into account factors such as growing international terrorism and weaknesses of international disarmament control mechanisms in preventing the development and production of biological weapons, the NATO alliance leaders at their Summit in Prague 2002 under the Prague Capabilities Commitments agreed to develop and improve the capabilities to cope with biological threats [25]. These requirements have been implemented in May 2003 by the new Defence Policy Guidelines (*Verteidigungspolitische Richtlinien*) widening the range of the *Bundeswehr* to multinational operations in order to cope with crises and conflicts, to support NATO partners also under CBRN conditions and to assist in disasters [9]. In order to improve the preparedness of allied armed forces against emergencies due to natural epidemics or acts of bioterrorism, the Committee of the Chiefs of Military Medical Services in NATO (COMEDS) decided in Vilnius 2008 to build a multinational Deployment Health Surveillance Capability (DHSC) which was established in January 2010 at the *Bundeswehr* Medical Office in Munich [1]. Its main task will be the near-real-time epidemiological monitoring and symptoms-based detection of outbreaks during missions. Currently, international terrorism and proliferation of dual-use know how and weapons of mass destruction are regarded as the most significant threats (White Book on security policy of Germany and future of *Bundeswehr*) [6].

To ensure the availability of adequate resources, the Department for Medical NBC Defence Task Force at the SanABw with Medical Biological Reconnaissance Teams (MBRT) of the affiliated *Bundeswehr* Institute of Microbiology were established in 2003. In 2004, the Action Plan "Civilian crisis prevention, conflict resolution and consolidation of peace" and a new "Conception of the *Bundeswehr*" [9] were enacted. In 2005, the special concept for Medical NBC Defence (*Fachkonzept Medizinischer ABC-Schutz*), first introduced in 1997, was adapted. The spectrum as well as the ranking of potential biothreat agents applied here is variable and results from a dynamic risk assessment process by different expert panels, e.g. the Australia group [2], CDC (category A, B and C agents) or the NATO Biomedical Advisory Committee (BioMedAC Expert Panel) of the COMEDS [25].

The *Bundeswehr* Institute of Microbiology is one of the scientific reach-back capabilities of the BMVg in the case of natural and intentional biological emergencies and takes scientific leadership for special diagnostics as well as for applied research and development [8]. It conducts integrated research in cooperation with military (NATO, Partnership for Peace) and civilian scientific and commercial partners in Germany and internationally, using different scientific networks and cooperative biological research programmes, e.g. of the European Defence Agency (EDA). In 2011, the *Bundeswehr* Institute of Microbiology became a partner of the Centre for Infection Medicine Munich (*Zentrum für Infektionsmedizin München*) of the German Centre for Infection Research (*Deutsches Zentrum für Infektionsforschung*) [5].

The *Bundeswehr* Institute of Microbiology provides special advice, concepts, guidelines, instructions, procedures, and measures to the Chief of Medical Service and other military or civilian stakeholders. The institute has a Central Diagnostic Laboratory (CDL) at its disposal, comprising four research departments with specialized laboratories (among them a BSL-3 laboratory and national Consultant Laboratories for tularemia and brucellosis), and the Department of Medical Biological Reconnaissance and Verification with MBRTs.

The CDL implements a broad array of cultural, molecular-biological and immunological diagnostics. It uses in-house assays developed, validated and certified by the research departments of the institute according to the requirements of the European Directive on in vitro diagnostic medical devices, permitting the identification, differentiation and typing of most of the bacterial and viral agents listed by the CDC. At present, an analysis list and request forms are offered to all medical facilities of the *Bundeswehr*, but can also be obtained on request by civilian customers. These diagnostic capabilities were developed by the *Bundeswehr* Institute of Microbiology within the framework of a long-term applied research programme of the BMVg on diagnosis, pathogenesis, immunology, epidemiology and microbial forensics of potential biothreat agents and related health disorders. The institute's laboratories take part in internal and external quality assurance processes at national and international level by participation in military and civilian inter-laboratory proficiency and round-robin tests, e.g. INSTAND, EQADeBa, QCMD, and contribute to the standardization of diagnostics [26, 39].

In case of unusual outbreaks of diseases or suspected acts of bioterrorism, in addition to notification as required by IfSG and IHR, the Medical CBRN Defence

Department of SanABw can deploy its Medical NBC Task Force with MBRTs and specialists of the *Bundeswehr* Institute of Microbiology communicating by telemedicine. The MBRTs offer rapidly deployable modular field laboratories with equipment for personal protection, decontamination, sample collection and secure transportation of specimens as well as rapid detection and identification techniques, validated SOPs for different deployment scenarios and trained multi-disciplinary staff [38]. This ensures the interoperability within NATO as required by NATO standardization agreements (NATO STANAG) for Rapidly Deployable Outbreak Investigation Teams (RDOIT), prompt investigation of suspicious outbreaks, as well as special medical advice and information for commanders and medical authorities [25, 46]. The teams assist in the prophylaxis and clinical management as well as in infection prevention and control, including force protection, safety of health care workers and waste disposal. In case of suspected acts of bioterrorism or violations of the BTWC, MBRTs also sample specimens for laboratory verification at the *Bundeswehr* Institute of Microbiology according NATO standards. Consequently, the teams have been evaluated by multinational field exercises [38].

Within this context, deployable medical reconnaissance and special diagnostic capabilities of the *Bundeswehr* Institute of Microbiology have been offered already within CIMIC to support other federal departments in security measures and medical care during public events in Germany. They have also assisted civilian institutions (e.g. health agencies) to investigate unusual outbreaks caused by *Francisella tularensis holarctica* near Göttingen in 2004 [44] and Darmstadt in 2006 [20], or by Puumala virus in Lower Bavaria in 2004 [24]. The support provided included monitoring natural foci in order to assess infection risks and to distinguish epidemic/epizootic "background signals" from zoonoses (tick borne encephalitis, tularemia, rickettsial and hanta virus diseases) in training and mission areas of the *Bundeswehr*.

Since the 1990s, specialists of the *Bundeswehr* Institute of Microbiology and its predecessor, the former Institute of Microbiology of the *Bundeswehr* Medical Academy (*Sanitätsakademie der Bundeswehr*) Munich, have been participating in different expert or working groups and scientific networks of NATO (e.g. Biological Medical Advisory Council), WHO (e.g. Smallpox Advisory Committee on Variola Virus Research), EU (European Networks of Imported Viral Diseases and BSL-4 Laboratories, European Defence Agency). The institute has assisted in outbreak investigations or risk assessment on request by:

- the WHO/GOARN in Kosovo in 2000 on tularemia, and in 2008 on Crimean Congo hemorrhagic fever [19, 47].
- the Pasteur Institute Madagascar since 1999 on plague [27].
- the Democratic Republic of Congo since 2001 on monkey pox, and in 2003 on Ebola hemorrhagic fever [18, 28].
- the United Arab Emirates since 2004 on glanders [41].
- and the Netherlands in 2010 on Q fever.

Already prior to the events of 9/11 and Amerithrax in the USA and especially thereafter, the BMVg has been supporting the civilian health service in order to

improve the preparedness against natural or intentional biological threats. Between 2000 and 2006 the civilian-military specialist group "Epidemics Protection-CIMIC" and the interdisciplinary expert group "Biological Threats" at the RKI developed concepts for the management of life-threatening imported infectious diseases with a national network of competence and treatment centres (see section on StAKoB above), a draft concept for national influenza pandemic preparedness, and handbooks on the management of dangerous biological events as well as guidelines for disaster, emergency and public health services [4, 13, 14, 17, 30, 31, 35–37]. These concepts were adapted to the special requirements of the medical support of soldiers deployed in Germany or abroad, resulting e.g. in the influenza pandemic planning and *Bundeswehr* Hospital Alert and Emergency Plans.

The special advice of the *Bundeswehr* Institute of Microbiology on medical biological defence is available on demand via the BMVg also for other federal departments and authorities, public health agencies, civilian scientific institutions, and medical societies in the form of assessments, training courses, workshops, or conferences, e.g. at the *Bundeswehr* Medical Academy, or at the Academy of Crisis Management, Emergency Planning and Civil Protection (*Akademie für Krisenmanagement, Notfallplanung und Zivilschutz*). Relevant expertise on medical biological defence has been introduced in special publications, guidelines and handbooks covering e.g. aspects of disaster, emergency or infection medicine [12, 40, 42], and in NATO Advanced Research Workshops [11, 43].

Since 1994, on behalf of the BMVg, the *Bundeswehr* Institute of Microbiology holds the international Medical Biological Defence conferences at the *Bundeswehr* Medical Academy in Munich almost every year and since 2007 biannually. The conference has become a successful international event in this special field. It offers civilian and military researchers as well as medical and political stakeholders from all over the world a scientific forum to exchange actual assessments of biological risks and threats, perspectives and developments in diagnosis, prevention, treatment, and anti-epidemic management of diseases caused by pathogens of concern, and reconnaissance and verification of unusual events. Here, the results of the full range of applied research and development of the BMVg at the *Bundeswehr* Institute of Microbiology and the WIS are presented. This conference represents an example of an important confidence-building measure of Germany within the framework of the BTWC.

10.5 Conclusion

The current assessment of the potential public health impact of naturally occurring versus intentionally caused infectious diseases comes to the conclusion that intentional release is not likely at this time. However, due to the potential magnitude of either event it is crucial to keep up with scientific developments and findings of security agencies. It is equally important to strengthen public health structures, to implement communication structures and to identify vulnerabilities ahead of time.

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