

Biological agents and pandemics: review of the literature and national policies

BIOLOGICAL AGENTS AND PANDEMICS: REVIEW OF THE LITERATURE AND NATIONAL POLICIES

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Executive summary

One of the most important health issues the world faces is the threat of a global disease outbreak called a pandemic. Biological risks related to pandemics and epidemics can affect the health of workers, particularly in specific occupations, such as workers in health care, transport services or animal breeding or workers who contribute to contingency measures. These risks are assessed as important in the Agency's expert surveys on biological emerging risks.

The task covering literature survey and policy/practice overview was carried out in the frame of a Topic Centre Risk Observatory project, coordinated by the European Agency for Safety and Health at Work (EU-OSHA), on the request of the European Commission to include the collection of information about OSH and major disease outbreaks into the European Risk Observatory activities.

The report provides information on:

- biological risks related to pandemics and major disease outbreaks, which can affect workers at work,
- policies and practices in EU Member States in relation to how occupational safety and health is included in the assessment, recognition, recording and prevention of major disease outbreaks and pandemics, with regard to how prevention related to pandemics fits into general policies related to biological agents,
- case studies to highlight specific occupations and specific biological agents and explain how OSH policies and practices are integrated.

The methodology of the work was based on team work, usually applied in the Agency's Topic Centre projects. A group of partners representing EU Member States participated in collecting data and exchanging views and opinions, under a supervision of the Task Leader (CIOP-PIB). A main tool for collecting data was a template, making possible obtaining comparable information in similar structure of the content. A set of recommended sources and relevant policies/practices and case studies were selected. The scope of work covered the following countries: Finland, Denmark, Sweden, Estonia, Belgium, The Netherlands, Hungary, Czech Republic, Spain, Cyprus, Portugal, Slovakia, France, Greece, Lithuania, Latvia, Germany, Malta, Austria, Luxemburg, Poland, United Kingdom, Ireland, Slovenia.

The report addresses such problems as: bloodborne pathogens such as HIV/AIDS, which can be considered a global pandemic but it is currently most extensive in some regions, bioterrorism issues as far as relevant for workers, (Anthrax, tularemia), Legionnaires' Disease, influenza and zoonotic influenza, other epidemic diseases such as viral haemorrhagic fevers (e.g. Hanta, Ebola and Marburg viruses), plague, smallpox, tuberculosis, antibiotic-resistant microorganisms which may also revive diseases previously regarded as 'conquered'.

The collected and presented information takes into account specific occupations particularly at risk, such as transport workers, health care, animal breeding and care, workers involved in prevention and emergency measures, workers in the food industry and waste treatment.

- The selected content of literature sources was presented. Results of gathering and analyzing data cover the information on selected biological agents and infectious diseases, related to general context and occupational exposure. The survey revealed that there are only limited data on occupational exposure to infectious biological agents in the EU. Statistical data concerning occupational diseases exist, but not all work-related infectious diseases are registered as occupational diseases. Moreover, recognition and notification of occupational diseases vary between the EU countries making presenting a realistic evaluation of level of existing risk and the assessment of the incidence rate of occupational diseases caused by biological agents very difficult. Therefore, in order to better present occupational exposure, in the report were also used other sources of information, from non-European sources (e.g. CDC in the US), information on the outbreaks of diseases causing by emerging infectious biological agents from non-European regions and selected research reports. Importance of drug-resistant microorganisms, which can cause very severe infections, is pointed out by research. Some of the infectious biological agents, such as those causing anthrax, smallpox, tularaemia and

plague should be treated as emerging risks because of the possibility that they can be used for bioterrorism purposes.

The report presents examples of EU policies, practices and case studies concerning the prevention of emerging infectious diseases, with focus on national level. All EU workers are protected by the framework Directive 89/391/EEC. The framework directive is supplemented by individual directives to cover safety and health requirements. At the European level the Directive 2000/54/EC on the protection of workers from risks related to exposure to biological agents at work has been established. Provisions of the Directive were implemented in all EU countries regulations. Some guidance and specific regulations related to specific infectious biological agents and the specific workplaces have been also developed. There are some EU good practices for assessment and prevention of risks related to infectious biological agents/diseases, such as influenza, avian influenza, SARS, tuberculosis, anthrax, etc., but the need of further developing good practices, supporting employers and employees in identification and prevention of infectious biological agents should be emphasised. Good practices, developed in the countries such as US and Australia, could be used as examples for preparing European good practices, addressed to all workplaces as well as to specific agents and specific groups of workers.

The need of systematic approach to monitoring of occupational, biological risks has been confirmed. Further development of the European surveillance of work-related infectious diseases system is necessary. More detailed information concerning work-related infectious diseases, methods and tools for assessment of exposure on biological agents and health outcomes would be necessary in order to improve preventive measures at workplaces and increase awareness among employers, employees and policy makers. The difficulty of assessment biological risk at the workplace points out the necessity of development of reliable risk assessment/evaluation tools. There is a need for standards and occupational exposure limits related with biological agents. There are many links between the occupational safety and other areas such as public health, environmental safety, veterinary, and others. The results of the project prove the importance of links to public health area, the global context of the issues and a need for close international cooperation.

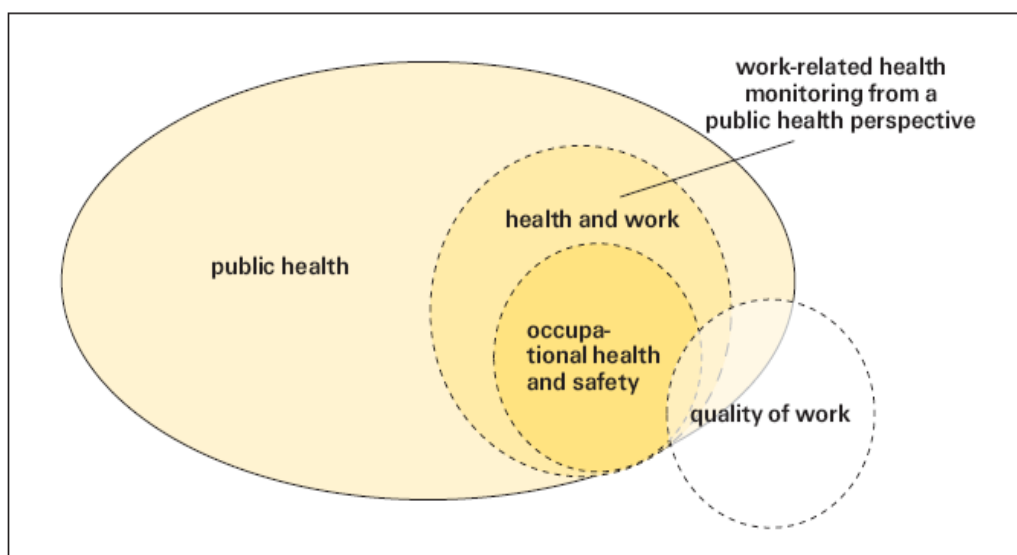
1. General Introduction

In the last decades new infectious diseases have been recognized and some well-known diseases have appeared again. According to the World Health Organization, since the 1970s one or more new diseases appears every year and nearly 40 diseases exist today which were unknown just over a generation ago [1]. These diseases are caused by newly detected or re-emerging biological agents. The Nobel Laureate and Columbia biologist Joshua Lederberg stated: "Emergence is in fact regression, a return to the standard that prevailed universally in the previous century" [2]. Analysing the history of outbreaks and trends in epidemiological data can help in better identification of the emerging and re-emerging risks for the whole population, including workers.

In order to strengthen the international alert and response activities, World Health Organisation and other relevant UN organizations encourage development of disease specific control initiatives [3], with emphasis on diseases with the most serious health impact and epidemic potential. The list of these diseases includes human influenza, poliomyelitis due to wild-type poliovirus, severe acute respiratory syndrome (SARS), smallpox, cholera and other epidemic diarrhoeal diseases, pneumonic plague, viral haemorrhagic fevers, yellow fever, anthrax, dengue, malaria, HIV/AIDS, tuberculosis, arboviruses and severe emerging zoonoses affecting humans, and also rapidly emerging problem of antibiotic resistance, which is driven by a combination of antibiotic misuse in human and veterinary medicine, migration, overcrowding, poor adherence to hygiene procedures in the health care system and, finally, genetic transfer between and within bacterial species. The list indicates major issues for public health, however can be also used as a framework for identifying possible risks related to infectious biological agents with the epidemic potential at workplaces.

Monitoring and prevention of work-related health risks is an important part of activities of public health, because of the impact of work on the general health of the society. Results of the project WORKHEALTH, supported by the European Commission, point out that work can be recognized as one of the most important determinants of people' health status [4]. The relation between areas of occupational health and safety, quality of work and public health is presented on the Fig.1.

Figure 1: Scope of work-related health monitoring from a public health perspective



In the report of the European Agency on the key research priorities in the field of occupational safety and health the need of clarifying the interactions between the areas is reported as important for the aim of systematic prevention, new ways of cooperation, effective use and sharing of research workplace exposure to biological agents has been identified as one of the key priorities for the EU-25 in the field of occupational health and safety. The Agency's report emphasizes that risk assessment and measurement methods for workplace exposure to biological agents are still very much at an

experimental stage and a lot of work should be done in order to improve them. An urgent need to protect workers, in all types of workplaces, from the risk to their health is reported. An increasing attention is paid to the biological hazards in the working environment due to a number of emerging issues such as, inter alia, bioterrorism, threat caused by HIV, risk related to global epidemics, the emergence of drug resistant organisms. Some of the hazards were previously unknown and can be treated as new and emerging. The increase of public perception of biological risks could also be emphasised.

The priorities in the Agency's report have been established taking into account experts forecast on emerging biological risks [5]. The forecast was prepared on the basis of Delphi method, which represents commonly used methodology to build up information on topics where no certain or complete data is available. The report brought an important input to the picture of the potential emerging risks in the working and living environment. The publication proves that knowledge of biohazards is still relatively scarce and that the problems should be dealt with as a global issue. It also confirmed the necessity to close multi-disciplinary cooperation between occupational safety and health professionals and representatives of other fields, such as public health, environmental protection, and others. The expert forecast represents a good background document for development further steps related to gathering and analysing data. The publication of the report was followed by the workshop, with participation of specialists from a variety of fields - occupational safety and health, environmental health, public health and policy makers¹. The main conclusions of the workshop pointed out that some years after the implementation of the EU-Directive 2000/54/EC on the protection of workers from risks related to exposure to biological agents at work, there is still a lack of understanding and awareness of the health risks caused by those agents at work.

The increased communication and cooperation between the researches and government representatives is needed in particular with a view to develop simple and practical tools for employers to help them to do a proper risk assessment. In order to provide an overview of research activities in the EU and encourage cooperation, it would be useful to develop a common database of EU-wide information on e.g. research activities on occupational risks of biological agents, on their concentrations in different work environments, on the allergic and toxic properties of the biological agents themselves and of their products. A further conclusion of the workshop was that the setting of occupational exposure limits (OELs) for biological agents is seen as not yet feasible. A multidisciplinary cooperation and coordination between OSH and other disciplines concerned by the biological risks such as public health, environmental protection, food safety or animal health is essential to manage these risks globally. The workshop was the first of the series and will be followed by two similar workshops to consolidate with EU policy makers, EU social partners, stakeholders and experts the results of the expert forecasts on emerging psychosocial risks and emerging chemical risks in 2008.

¹ Occupational, risks from biological agents: Facing up to the challenges (Brussels, June 2007)

2. Aims of the work and methodology

The work was carried out in the frame of a Topic Centre Risk Observatory project, coordinated by the European Agency for Safety and Health at Work (EU-OSHA), on the request of the European Commission to include the collection of information about OSH and major disease outbreaks into the Risk Observatory activities. The main aims of the project were as follows:

- Literature survey to explore more in depth the risks related to pandemics and major disease outbreaks and relevant prevention and control policies;
- Provision of an overview of policies and practices in 25 EU Member States in relation to how occupational safety and health is included in assessment, recognition, recording and prevention of major disease outbreaks and pandemics;
- Description how prevention related to pandemics fits into general policies related to biological agents;
- Inclusion of information related to specific occupations particularly at risk;
- Case studies that highlight specific occupations and specific biological agents and provide examples of OSH policies and practices related with the topic.

The report addresses selected issues such as exposure to blood borne pathogens (HIV/AIDS), bioterrorism issues as far as relevant for workers, Legionnaires' disease, influenza and avian influenza, other epidemic diseases such as viral haemorrhagic fevers (e.g. Hanta, Ebola and Marburg viruses), plague, smallpox, tuberculosis and the emergence of antibiotic-resistant microorganisms.

The methodology of the work was based on team work, usually applied in the Agency's Topic Centre projects. A group of partners representing EU Member States participated in collecting data and exchanging views and opinions, under a supervision of the Task Leader (CIOP-PIB). A main tool for collecting data was a template, making possible obtaining comparable information in similar structure of the content. Questions that have been formulated for gathering data, covered the issues of national policy approach in the context of biological hazards, especially the risk of pandemics and major disease outbreaks, prevention and treatment aspects, links to public health and EU policies, collaboration of authorities. Among data, searched for by partners, there were also subjects of the estimated numbers of workers at risk, costs, health outcomes, control measures. The question of various approaches in the area of policy and the transferability between EU Member States was raised. The interest concerned also assessment of risk for specific occupations, any guidance for them, new and emerging issues, follow-up measures in the case of outbreak.

General approach for gathering data, search strategy and selection criteria were discussed. A set of recommended sources covered: relevant research literature related to biological agents and disease outbreaks including prevention and control, monitoring systems with registers and compulsory reporting of infectious diseases, national legislation applicable to the risk of exposure to biological agents in the workplace, infection control and pandemics plan and related guidance, and the Agency information. Relevant case studies were selected. According to the scope of the project, the results of literature survey covering description of selected biological agents/diseases were presented, and an overview of policies and practices concerning biological risks on the international, European and national level. Relevant case studies were added to the content.

The policy and practice and case studies overview was created on the base of detailed, country-oriented template, covering data on notification/registration of exposure, national data related to exposure and diseases caused by the agents, policies and practices related to the threat of epidemic/pandemic and relevant case studies. The set of information has been gathered by the partners of the project. The scope of work covered the following countries: Finland, Denmark, Sweden, Estonia, Belgium, The Netherlands, Hungary, Czech Republic, Spain, Cyprus, Portugal, Slovakia, France, Greece, Lithuania, Latvia, Germany, Malta, Austria, Luxemburg, Poland, United Kingdom, Ireland, and Slovenia.

The deliverables were gathered and discussed by the team; the Agency Extranet facilities supported the processes of disseminations of files and introduction of comments.

3. Prevalence of diseases caused by infectious biological agents and their occurrence in occupational setting

3.1. Introduction

According to the data of International Labour Organization (ILO, 2002), among the world's 2.7 billion workers, at least 2 million deaths per year are attributable to occupational diseases and injuries. The numbers represent probably the tip of iceberg because data for estimating nonfatal illness and injury are not available for most of the globe. About 4 percent of the GDP is lost because of work-related diseases and injuries [6]. Work-related infectious diseases are infectious diseases caused by occupational factors. However, deciding whether a particular type of infection, or circumstance of infection, should be considered to be work-related is not always clear. In particular, this is because of issues of latency and lack of specific work-related features.

An occupational disease is defined by Eurostat as a case that was recognised (accepted) as an occupational disease by the national compensation or other competent authorities. This definition takes into account occurrence of such diseases, but inevitably also the way in which the concept of an occupational disease has been integrated into the social security systems. This integration determines the (legal and financial) motivation of the patient, the physician, and the employer to notify cases and the motivation of social security authorities and respective bodies to allocate them under the coverage of the normal social security or to define them as occupational diseases. Recognition of occupational disease and national social security practices differ between the Member States, so there are limitations in comparability of data. Data on occupational diseases are gathered according to the European Schedule of Occupational Diseases². A description of methodology contained, among others, data on geographical coverage, periods of gathering data and limitations of the methodology³. Selected infectious diseases are presented on the obligatory list (such as tuberculosis, hepatitis, and others). The set of data supports the assessment of exposure to biological agents for the sectors of activity, e.g. health and social work. There are also infectious diseases on the voluntary list (such as anthrax, tularaemia, Q-fever, haemorrhagic fever, and others).

In the last decades new infectious diseases have been recognized and some well-known diseases have appeared again. These diseases are caused by newly detected or re-emerging biological agents, mainly zoonotic. Analysing of the history of outbreaks caused by these agents and trends in epidemiological data can help in better identification of the risks related to them for the whole population, including workers. A combination of antibiotic misuse in human and veterinary medicine, migration, overcrowding, poor adherence to hygiene procedures in the health care system and, finally, genetic transfer between and within bacterial species - cause a further rapidly emerging problem concerning worldwide spread of antibiotic resistant organisms.

There are many infectious diseases that have been documented as being related to work and micro-organisms that could reasonably be expected to cause work-related infections. However, occupational diseases reporting procedures vary from country to country, and diseases considered job-related in one country may be classified as non-occupational in another one. Accurate data concerning prevalence of work-related occupational infectious diseases are not available at the time.

This part of the report includes basic information on some infectious biological agents which have been recognized as emerging biological risks in Europe, including pandemics. For the aims of the project, the threat of epidemic/pandemic in regard to occupational safety is one of the most important issues. There have been a number of such cases in human history. Some of epidemics occur when an entirely new disease emerges, such as AIDS, or a new version of an old disease emerges, such as influenza. There were concerns that SARS, a new contagious form of pneumonia, might become pandemic. Other diseases that may possibly attain pandemic proportions include also haemorrhagic fevers. The avian influenza virus is regarded as threat of global pandemic that could strike the world's population.

The report covers the agents/diseases that represent a health risk for workers including pandemics. The selected agents/diseases were chosen as most important for contemporary occupational safety - on the base of previous findings of the European Risk Observatory. For each agent/disease, selected

² http://ec.europa.eu/employment_social/news/2003/sep/occdis_recc_en.pdf

³ http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/EN/hsw_occ_dis_sm1.htm

data on their characteristics, prevalence in the world and in the EU countries are presented as well as information on occupational exposure.

3.2. *Blood borne pathogens*

3.2.1. Basic characteristics

Blood borne pathogens (BBVs) are viruses that some people carry in their blood and which may cause severe diseases in certain people and few or no symptoms in others. The virus can be transferred from carrier of the virus to another facing contact with human blood and/or other potentially infectious materials.

The BBVs can also be found in body fluids other than blood, for example, semen, vaginal secretions and breast milk. Other body fluids or materials such as urine, faeces, saliva, sputum, sweat, tears and vomit carry a minimal risk of BBV infection, unless they are contaminated with blood. Care should still be taken as the presence of blood is not always obvious.

The main blood borne pathogens (BBVs) are:

- Hepatitis B virus (HBV) and hepatitis C virus (HCV), which cause hepatitis, an inflammatory disease of the liver;
- Human immunodeficiency virus (HIV) which causes acquired immune deficiency syndrome (AIDS), affecting the immune system of the body.

BBVs are mainly transmitted by exposure to infected blood or other body fluids containing virus, e.g. by contact between broken or damaged skin (or mucous membranes) and infected body fluids, sexual contact, sharing of hypodermic needles, accidental puncture from contaminated needles, broken glass, or other sharps, at/before birth.

Since early 1950s, blood borne transmission of viral infections has been recognized as an occupational risk for health care workers. In the workplace [7], direct exposure can occur through accidental contamination with blood/bodily fluids while using a sharp instrument, such as a needle or broken glass. Infectious blood or other bodily fluids may also contaminate open wounds, skin abrasions, skin damaged due to a condition such as eczema, or mucous membranes, through splashes into the eyes, nose or mouth.

3.2.2. Prevalence of diseases caused by blood borne pathogens

• *HBV*

The majority of the worldwide hepatitis burden, with subsequent chronic hepatitis, cirrhosis and liver cancer is due to hepatitis virus B (HBV). **Approximately 350 million people have chronic hepatitis B infection**, with endemic areas primarily in Africa and Asia (WHO)⁴.

High rates of chronic infections are found in the Amazon and the southern parts of eastern and central Europe. In the Middle East and Indian sub-continent, an estimated 2% to 5% of the general population is chronically infected. Less than 1% of the population in Western Europe and North American is chronically infected [<http://www.who.int/mediacentre/factsheets/fs204/en/>].

• *HCV*

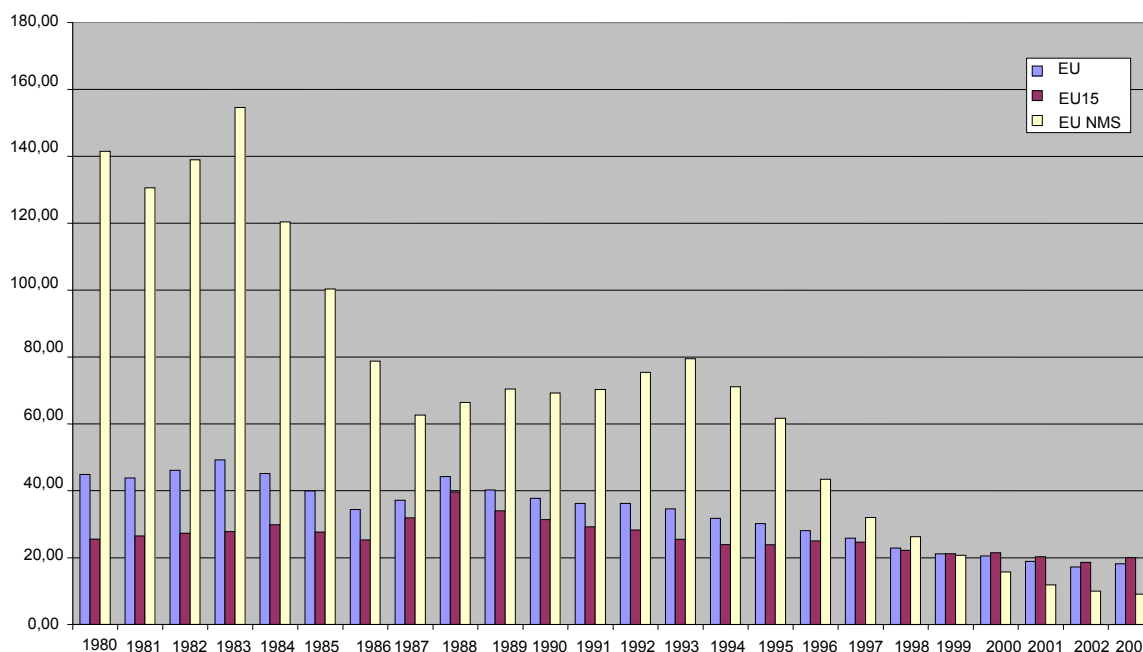
WHO estimates that **about 180 million people (app. 3% of the world's population) are infected with hepatitis C virus (HCV)**, 130 million of whom are chronic HCV carriers at risk of developing liver cirrhosis or liver cancer. It is estimated that **three to four million persons are newly infected each year**, 70% of whom will develop chronic hepatitis. HCV infection is responsible for 50–76% of all liver cancer cases, and two thirds of all liver transplants in the developed world. Disease prevalence is low

⁴ http://www.who.int/vaccine_research/diseases/viral_cancers/en/index2.html

(< 1%) in Australia, Canada and **northern Europe**, about 1% in countries of medium endemicity such as the USA and **most of Europe**, and high (>2%) in many countries in Africa, Latin America and Central and South-Eastern.

According to the data registered in the WHO data basis⁵, the **viral hepatitis** incidents rate in EU-25 is currently lower than 20 years ago (see Figure 2). Especially in the 10 NMS dramatic decrease in incidence rate has been noticed and in 1993 -2003 the decreasing trend was kept in those countries. In this period Portugal, Poland and Spain were the countries with the highest decrease in incidence rates (20-, 16- and 13- folds). However in some EU countries – like Finland and Belgium – the increase in incidence rates has been noticed.

Figure 2: Viral hepatitis incidence rates (per 100 000) in the EU by year



Source: European health for all database, WHO, <http://data.euro.who.int/hfadbf/>

In 2003 the EU countries with the highest number of registered viral hepatitis cases were: Germany (more than 15 000), United Kingdom (more than 9 000), Sweden (more than 3 000) and Poland (more than 2 500). The highest incidence rates have been noticed in Latvia (41,54 per 100 000 people), Sweden (37,33) and Finland (28,93).

• HIV

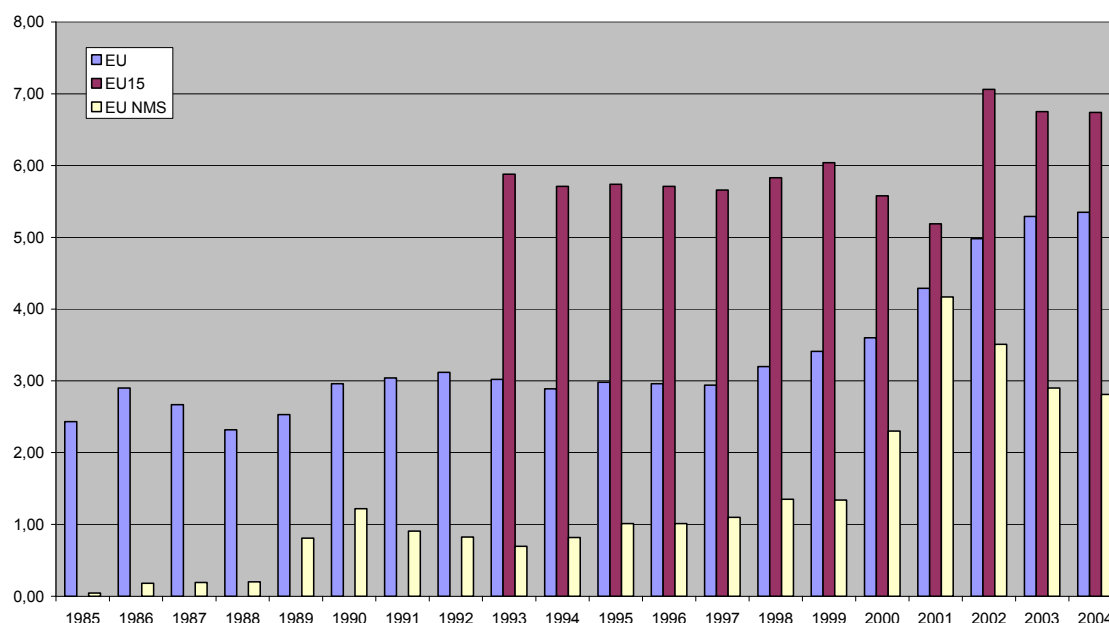
The number of people infected with HIV is still growing. There was app. 38.6 million (33.4 million–46.0 million) people worldwide living with HIV in 2005. An estimated 4.1 million (3.4 million–6.2 million) became newly infected with HIV and an estimated 2.8 million (2.4 million–3.3 million) lost their lives to AIDS [8]. According to new data, the AIDS epidemic appears to be slowing down globally, but new infections are continuing to increase in certain regions and countries. Important progress has been made in national AIDS responses, including increases in funding and access to treatment, and decreases in HIV prevalence among young people in some countries over the past five years.

In 1994 – 2004 the Europe shows an increase in the number of newly diagnosed **HIV infections**: their incidence rate per 100 000 population has increased by 80% (see Figure 3). The highest increase has been noticed in the 10 NMS (by more than 240%). The countries with the dramatic increase in the newly diagnosed HIV infections in this period were: Latvia (by app. + 450%), Ireland (by app. + 370%) and United Kingdom (by app. + 160%). The number of new diagnosis has also

⁵ <http://data.euro.who.int/hfadbf/>

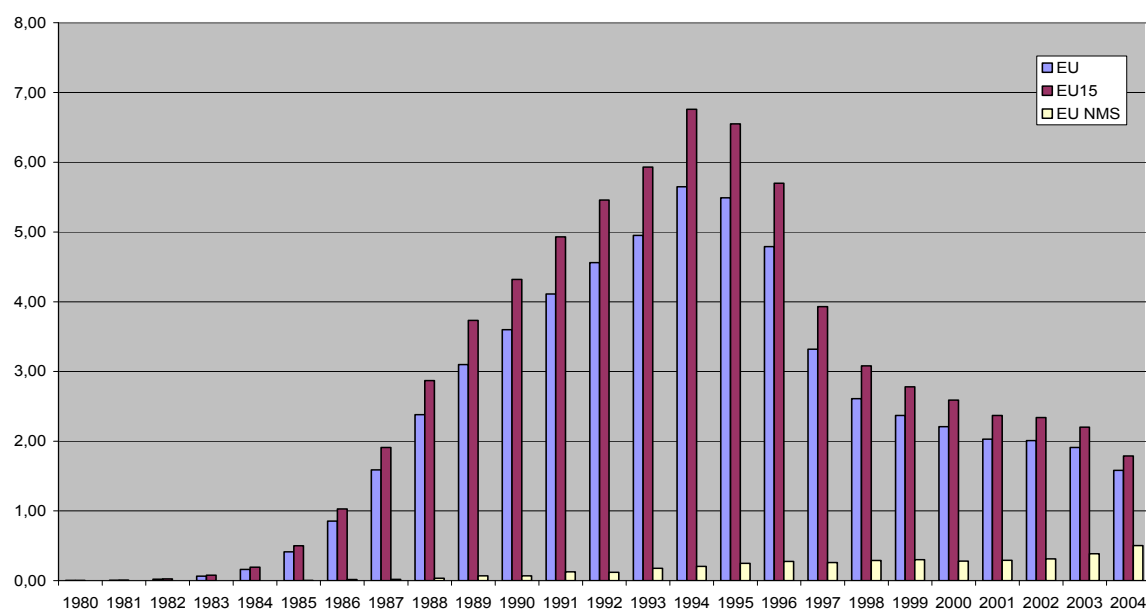
significantly grown in Finland (by app. 85%), Greece (by app. 80%), Sweden (by more than 60%) and Poland (by 55%). Data on HIV infections in Spain and Portugal are not available. The most affected groups remain injecting drug users and the homo/bisexual men. However, numbers of new HIV diagnoses are increasing among persons infected through heterosexual contact.

Figure 3: New HIV infections incidence rate in the EU by year



Source : European health for all database, WHO, <http://data.euro.who.int/hfadby/>

Figure 4: Clinically diagnosed AIDS incidence rate in the EU by year



Source : European health for all database, WHO, <http://data.euro.who.int/hfadby/>

Even though the incidence rate of new HIV infection has increased, in 1994 – 2004 incidence rate of clinically diagnosed AIDS cases has dropped in EU-region by app. 70% (see Figure 4). The incidence rate is higher in the “old” EU-15 than in the NMS (in 1994 it was more than 30-folds higher and in 2004 more than 3,5 times). In 1994 - 2004 the newly diagnosed AIDS incidence rate has increased in

NMS by app. 2.5-folds and decreased in the “old” EU-15 by app. 3.7-folds. Despite significant decrease in the number of newly diagnosed cases of AIDS in the EU-15 and also marked increase in the number of new AIDS diagnosis in the NMS, the difference between the two groups remains considerable.

The proportion of undiagnosed HIV is approximately 30% in the EU and is likely to be higher in neighbouring countries. The people are unaware of the infection and may unknowingly transmit HIV to others⁶.

3.2.3. Works/occupations at risk

According to the epidemiological studies diseases caused by blood borne pathogens often occur as work-related diseases among health care workers [9]. WHO made a risk analysis of hepatitis B, hepatitis C, and HIV infections among health care workers caused by contaminated sharps, such as syringe needles, scalpels, and broken glass. The results can be found in the World Health Report, 2002.

Among the 35 million health workers worldwide, there were 3 million percutaneous exposures to blood borne pathogens in 2000. It means that each health worker have been exposed to 0.1 - 4.7 injures per year. This is probably a low estimate because of the lack of surveillance systems and underreporting of injuries. Research has shown 40-75% underreporting of needle stick injuries⁷.

Numerous studies confirm occupational transmission of blood borne pathogens after percutaneous exposures [10], [11]. These studies confirm the need for widespread adoption of needlestick-prevention devices in health care settings, together with other preventive measures.

The risk of seroconversion following percutaneuos exposure to infected blood is estimated at approximately 0,3% for HIV, 1,8% for hepatitis C virus and 6 – 30% for hepatitis B virus [12].

According to the WHO:

- About 40 percent of all the hepatitis B and hepatitis C cases in health care workers were caused by sharps injuries, with wide regional variation. Between 1 and 12 percent of HIV infections in health care workers was caused by sharps injuries.

In the countries that have introduce appropriate preventive measures (like proper needle handling and waste management, substitutions for sharps, hepatitis B virus immunization, post-exposure prophylaxis, training, and legislative measures) the risk of infection is visibly lower.

Types of work where there may be contact with blood/body fluids cover [13]:

- custodial services (prisons/detention centres/homes),
- education,
- embalming and crematorium work,
- emergency services (ambulance/fire/police/rescue),
- first aid,
- hairdressing and beauticians' work,
- health care (hospitals, clinics, dental surgeries, pathology departments, community nursing, acupuncture, chiropody, associated cleaning services), laboratory work (forensic, research etc),
- local authority services (street cleaning/park maintenance/refuse disposal/public),
- medical/dental equipment repair,
- military,
- mortuary work,

⁶ <http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=3083>

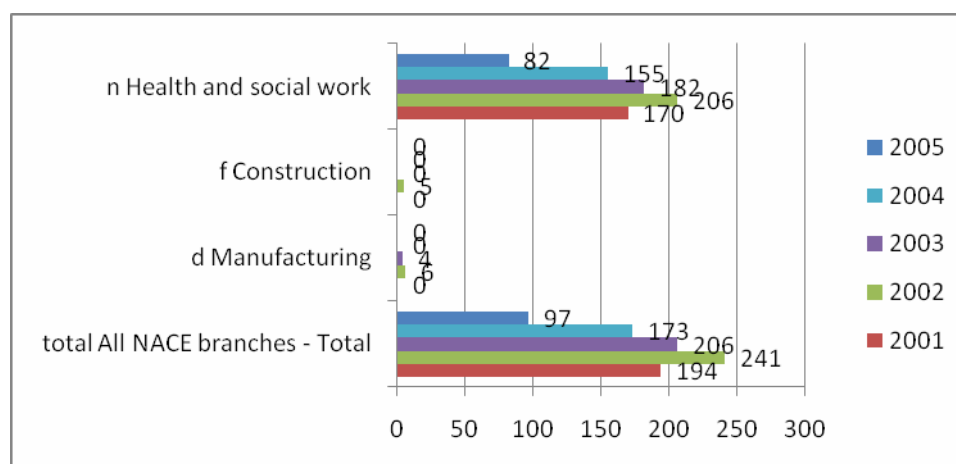
⁷ http://www.who.int/whr/2002/en/whr02_en.pdf

- needle exchange services,
- plumbing,
- sewage processing,
- social services,
- tattooing, ear and body piercing,
- vehicle recovery and repair.

According to the Commission Recommendation 3297/2003/EEC of 19.09.2003⁸, work-related viral hepatitis is an occupational disease in the group of infectious and parasitic diseases which **should be registered in the all EU countries**. HIV cases related to work have been not listed separately and can be included in the group: “Other infectious diseases caused by work in disease prevention, health care, domiciliary assistance and other comparable activities for which a risk of infection has been proven”. However, data on occupational diseases are not registered in a harmonised way in the EU countries.

The data on the work – related hepatitis B and C cases in 2001 – 2005 provided by the Eurostat for the “old” EU-15 are presented on the Figure 5. There were 97 cases in 2005 (less than in previous years of the period). Approximately 85 – 90% of all cases of hepatitis B and C were in the health and social work sector. There were 11 deaths due to occupational viral hepatitis in “old” EU-15 in this period.

Figure 5: Number of work-related cases of viral hepatitis B and C in the “old” EU–15 by year



Source: Eurostat: <http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/>

European schedule of occupational diseases covers viral hepatitis in the group *Infectious and parasitic diseases*. The Commission Recommendation 3297/2003/EEC emphasises the role of national healthcare systems that can play an important part in improving prevention of occupational illnesses. A ‘Notifiable Infectious Disease’ is a disease that is notifiable under the public health law. The appropriate actions can be carried out, such as identification of outbreaks or clusters at a local and national level and further cases prevented. The notification gives data for statistics and epidemiological studies and support vaccination programmes⁹.

The number of the recognized cases of occupation-linked or cases of hep B/C recognised as occupational diseases has decreased significantly from 1995 in which 501 cases of viral hepatitis have been registered, including 285 in health care sector.

Approximately 8 – 10% of all cases of viral hepatitis B and C in the EU are work – related.

⁸ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:238:0028:0034:EN:PDF>

⁹ <http://www.nelmht.nhs.uk/downloads/Notificationofinfectiousdisease.pdf>

According to the Eurostat, the statistical information on number of work-related HIV/AIDS cases is, in the lot of cases, confidential. The general number of deaths from HIV/AIDS is given for the EU: in the territory of the European Union, a total of 5,595 persons died from HIV/AIDS in 2005. The number of deaths differed considerably between the sexes: while the cases of death among men amounted to 4,355, their number totalled 1,240 among women¹⁰.

The surveillance of occupationally acquired blood borne viral infections in France can be **an example of national exposure data**. In France the surveillance of occupationally acquired blood borne viral infections was set up for HIV in 1991, in 1997 for HCV and in 2005 for HBV, in order to monitor and prevent exposures to blood linked with high risk for disease transmission.

The surveillance system is based on information provided by occupational health physicians, but also by any physician in charge of care of infected healthcare workers. Data are collected on anonymous forms available on the InVS web site¹¹.

Fourteen cases of HIV seroconversion were reported in France up to December 2005. The last HIV seroconversion case occurred in 2004 in a first-aid worker after a heavy splash to face and eyes with HIV containing blood. For HCV, 55 cases of seroconversion were notified up to December 2005, following 54 needlesticks or cuts and 1 cutaneous exposure on non-intact skin. No HBV seroconversion has been reported yet (vaccination against HBV is compulsory for healthcare workers). The surveillance shows that a majority of seroconversions have occurred after needlestick injuries with intravenous needles. Eight cases followed injuries with suture needles or subcutaneous needles. Universal precautions should be adhered to, whatever the task, and an appropriate management of occupational exposures is required [14].

Additional data are available in the WHO website¹².

3.3. *Viral Haemorrhagic Fevers*

3.3.1. **Basic characteristics**

Viral haemorrhagic fevers (VHF) viruses include four families of viruses: filoviruses, arenaviruses, bunyaviruses and flaviviruses. They all can cause viral haemorrhagic fevers - highly infectious and often fatal diseases. Some of the VHF viruses could be used as potential bioterrorism weapons. Viral haemorrhagic fevers viruses are in general zoonotic. The main reservoirs of these viruses are mostly rodents and arthropods. The multimammate rat, cotton rat, deer mouse, house mouse, and other field rodents are examples of reservoir hosts. Arthropod ticks and mosquitoes serve as vectors for some of the illnesses. However, the hosts of some viruses (e.g. Ebola, Hanta) remain unknown.

The VHF viruses are usually transmitted to humans by the bite of infected ticks and animals (including monkeys). Infection is transmitted between humans through contact with body fluids (e.g., blood, semen) and possibly through droplets dispersed in the air by coughing or sneezing.

VHFs are characterised mainly by the sudden onset of fever, malaise, headache, sore throat, abdominal pain, vomiting and diarrhoea, skin rash, and haemorrhage. The fatality rate varies depending on the particular virus involved but can reach 90%.

The Marburg virus has been successfully used for a weapon in the former USSR. Less effective were efforts to use the Ebola virus¹³.

Currently viral haemorrhagic fevers (VHF) viruses have been recognised as occupational risks mainly for health-care workers, workers in agriculture, forestry laboratory workers and aircraft personnel.

¹⁰ http://www.destatis.de/jetspeed/portal/cms/Sites/destatis/Internet/EN/Navigation/Publications/STATmagazin/Archive/Health.templateId=renderPrint.psml__nnn=true

¹¹ www.invs.sante.fr/surveillance/questionnaires.htm

¹² http://www.who.int/occupational_health/publications/newsletter/gohnet8eng.pdf

¹³ <http://www.medscape.com/>

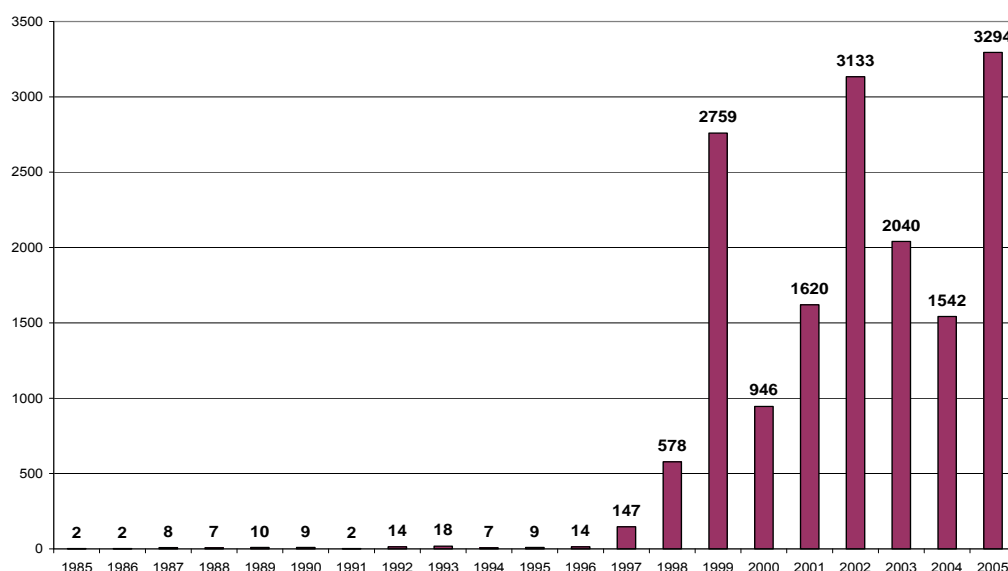
3.3.2. Prevalence of viral haemorrhagic fevers

Bunyaviruses: Hanta

Approximately 150 000 to 200 000 cases of Hanta involving hospitalization are reported each year throughout the world, with more than half in China. Russia and Korea also report hundreds to thousands of cases each year. Most remaining cases (hundreds per year) are found in Japan, Finland, Sweden, Bulgaria, Greece, Hungary, France, and the Balkan countries formerly constituting Yugoslavia. Depending in part on which type of Hantavirus is responsible for the illness, Hanta can appear as a mild, moderate, or severe disease. Death rates range from less than 0.1% for Hanta caused by Puumala (PUU) virus to approximately 5% to 10% for Hanta caused by HTN virus [15].

There were almost 16 000 Hanta cases registered in 1998 – 2005 in the EU countries. From 1999 every 3 years significant increase in the number of cases has been noticed (see Figure 6). In 2005 app. 77% of all cases have been registered in Finland, 13% in Germany and 8% in France. In 1999 - 2003 Sweden was also the country with the significant number of cases (several hundred each year) of relatively mild infection caused by a Puumala virus.

Figure 6: Number of Hanta cases in the EU registered in the WHO the centralised information system for infectious diseases CISID database, by year



Source: <http://data.euro.who.int/cisid/Default.aspx?TabID=105894>

Hantaviruses are widely endemic in Europe.

An exceptionally large increase in Hantavirus infections has been detected simultaneously in Belgium, Germany and France since spring 2005. From 1 January to 15 June 2005, 120 cases were reported in Belgium and 115 cases in France. In Germany, 258 laboratory-confirmed Hantavirus cases were reported between 1 January and 30 June. In contrast to previous annual trends, the increase in cases has occurred earlier in the year¹⁴.

Filoviruses: Marburg and Ebola

- The first known cases of **Ebola haemorrhagic fever** outbreaks were noticed in 1976 in northern Zaire and southern Sudan. There were 299 cases in Sudan, 150 of them fatal, and 318 cases in Zaire, 280 of them fatal. 76 of the 230 persons working in Maridi hospital in Sudan were infected, and 41 died. Approximately 1 850 cases with over 1 200 deaths have been documented since the Ebola virus was discovered.

¹⁴ <http://www.eurosurveillance.org/ew/2005/050825.asp>

- **Marburg haemorrhagic fever was initially detected** in 1967 following simultaneous outbreaks in Marburg and Frankfurt (Germany) and Belgrade (former Yugoslavia). The initial cases occurred in laboratory workers handling African green monkeys imported from Uganda. The outbreaks involved 25 primary infections, with 7 deaths, and 6 secondary cases, with no deaths. The primary infections were in laboratory staff exposed to Marburg virus while working with monkeys or their tissues. The secondary cases involved two doctors, a nurse, a post-mortem attendant, and the wife of a veterinarian. All secondary cases had direct contact, usually involving blood, with a primary case. Both doctors became infected through accidental skin pricks when drawing blood from patients. The outbreak of Marburg haemorrhagic fever was registered in Angola in 2004. During October 2004–March 2005, a total of 124 cases were identified; of these, 117 were fatal. Approximately 75% of the reported cases occurred in children aged years; cases also have occurred in adults, including health-care workers.
<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm54d330a1.htm>

There are no cases of Ebola in EU, registered in Centralized Information System for Infectious Diseases (CISID) – WHO database.

Arenaviruses: Lassa

- **The first Lassa cases** have been noticed in 1969 in three missionary nurses working in a small hospital in Lassa, in north eastern Nigeria. The nurses died. The virus has been isolated in the laboratories in New York in which precautions against laboratory infection had been minimal. One of the virologists working with infected cell cultures contracted the disease but recovered. A worker from a different laboratory, in the same building, also became infected and died.
- **The number of cases of Lassa fever annually is estimated at 200000 - 400000 cases with several thousand fatal.** In endemic areas such as Sierra Leone, antibodies to the virus in the population may reach 40%, and overall mortality is <2%, and hospitalized cases at 12%.

Since 1970, at least 16 cases of Lassa fever have been imported into Europe or North America; in none of these has onward transmission to another person been reported. The last reported imported case into Europe was in 2003 in a soldier from the United Kingdom who had been serving in Sierra Leone. In 2000, a European meeting to discuss the management of Lassa fever cases was held, after several importations in 1999/2000. The conclusions concerned, among others, the workplaces. A common feature of all cases discussed was late diagnosis. The consequences were that proper treatment of the patients started later, more staff were in contact with the patient and contacts were at a greater level of exposure to the patient than necessary¹⁵. **In 2000, there were 2 cases of Lassa in Germany, 1 in The Netherlands and 1 in United Kingdom, registered in CISID database.**

Case of Lassa fever imported in Germany has been detected on 21 July 2006

On 21 July 2006, German health authorities have reported to WHO an imported case of Lassa fever, confirmed by laboratory tests at the Bernhard-Nocht-Institute of Tropical Medicine, Hamburg, Germany.

The patient, resident in Sierra Leone, became ill with fever on 5 July 2006 and flew to Germany on 10 July 2006, where he arrived the following day.

He has been treated in isolation in Frankfurt and German health authorities have taken the appropriate measures to prevent further transmission of the virus.

While the risk to co-passengers was judged to be low, the case posed the risk for the flight crew members as well as aeroplane cleaning personnel¹⁶.

¹⁵ <http://www.eurosurveillance.org/ViewArticle.aspx?PublicationType=W&Volume=11&Issue=30&OrderNumber=1>

¹⁶ <http://www.eurosurveillance.org/ew/2006/060727.asp>

3.3.3. Works/occupations at risk

Bunyaviruses: Hanta I

In endemic areas workers whose working activities can lead to contact with rodents, their nests, droppings or urine or enter rodent-inhabited areas such as abandoned buildings or crawl spaces are at higher risk for hantavirus infection than the general public because of the frequency of their exposures. The most exposed are particularly:

- *foresters,*
- *agricultural workers,*
- *plumbers, electricians, telephone installers, maintenance and certain construction workers,*
- *cleaners dealing with dead rodents, their faeces, nesting materials.*

Prevention of the workplace from rodent infestations can minimize or eliminate worker risk for exposure. Permanent workplaces must be constructed, equipped and maintained to restrict rodent entry and harborage¹⁷.

Cases of Hantavirus in North America have been associated with:

- sweeping out barns and other farm buildings;
- trapping and studying mice;
- using compressed air and dry sweeping to clean up wood waste in a sawmill;
- handling grain contaminated with mouse droppings and urine;
- entering a barn infested with mice;
- planting or harvesting field crops;
- occupying previously vacant dwellings;
- disturbing rodent-infested areas while hiking or camping;
- living in or cleaning dwellings with a sizable indoor rodent population.

Filoviruses (Marburg and Ebola) and Arenaviruses (Lassa):

For the VHF infections the potential for epidemic spread in the EU is mostly considered to be low. Despite known breaches of guidance on infection control, none of the contacts of viral haemorrhagic fever imported into Europe since 1999 developed clinical illness. This recent experience in Europe confirms earlier findings about transmissibility which concerned a case of Nigerian girl, diagnosed as having Lassa fever and no secondary cases occurred among either first- or second-line contacts, and there was no serological evidence of subclinical infection among any of the contacts tested.

There is a risk of secondary VHF infections, particularly amongst hospital and laboratory staff, where there is the possibility of accidental inoculation or contamination of broken skin or mucous membranes by infected blood or body fluids.

One infection with Ebola virus and two with Lassa virus have been recorded as a result of laboratory accidents. Importantly, no further spread of infection occurred following any of these incidents.

Laboratory accidents have additionally occurred with other agents causing VHF, including Omsk haemorrhagic fever, haemorrhagic fever with renal syndrome (Hantaan), Kyasanur Forest disease and Brazilian haemorrhagic fever (Sabia)^[16].

¹⁷ <http://www.lni.wa.gov/Safety/Topics/AtoZ/Hantavirus/default.asp>

Occupational exposure to VHF infections with very low potential for epidemic spread in the EU can happen very rarely. In particular cases **the most exposed group can be health care workers**, especially if the preventive measures are inappropriate. The risk is also identified for **laboratory workers** exposed to biological agents. According to their level of risk of infection, biological agents were classified into four risk groups, and minimum provisions to guarantee a better standard of workers' safety and health have been prepared¹⁸. The use of ventilation and appropriate organisational measures, individual protection measures including personal protective equipment, provision of appropriate training is of great importance. There is also a risk of infections amongst **aircraft personnel**.

Eurostat database covers data on number of cases of occupational Haemorrhagic fever for the period: 2002 – 2005 (Number of occupational diseases of the EODS voluntary list by disease (ICD-10). The numbers of cases (EU, per year) for the years are below 100, e.g. in 2005 the number of cases registered was 84¹⁹.

3.4. Q – fever

3.4.1. Basic characteristics

Q-Fever is a disease of animals and man arising from infection by the organism *Coxiella burnetii* which belongs to a group of organisms known as rickettsia. Many persons who become infected suffer no symptoms. Some individuals become ill and their symptoms will usually be similar to a flu-like illness or pneumonia. In a small number of cases there may be serious complications. All those that have been infected, irrespectively whether they have developed symptoms or not, acquire a long-term immunity to the rickettsia.

A rickettsial organism is maintained in nature by tick transmission (it has been recovered from at least 40 species of ticks) among small mammal, rodent and possibly bird reservoir hosts. Animals like goats, sheep and cattle can carry the Q fever microbe in their flesh and body fluids. The highest levels of these microbes are found in tissues involved in birth - the uterus, placenta, and birth fluids. The agent may initially be introduced into domestic animal populations (or theoretically, but rarely, directly to people) by ticks. However, it is most commonly transmitted between domestic animals and from domestic animals to people through aerosolization of the organism from placental tissues. The organism is also shed in the milk of infected animals, so consumption of unpasteurized milk poses a risk, but infectivity is far less by this route. This microbe can live for months and even years in dust or soil. Reports of human-to-human transmission are extremely rare, but the organism has been isolated from human milk and human placental tissues, and there are reports of transmission to physicians during abortion procedures and autopsies.

3.4.2. Prevalence of Q-fever

Q-fever is rarely a notifiable disease and the incidence of human Q-fever cannot be assessed in most countries. Current epidemiological studies indicate, however, that Q-fever should be considered a public health problem in many countries, including France, the United Kingdom, Italy, Spain, Germany, Israel, Greece, and Canada (Nova Scotia), as well as in many countries where Q-fever is prevalent but unrecognized because of poor surveillance of the disease.

Serologic tests are most commonly used to diagnose human *C. burnetii* infections in the United States [17]. The Centers for Disease Control and Prevention (CDC) conducted a retrospective survey of state health departments in 2002 to collect information on human Q-fever cases reported in the period: 1978 - 1999. Q-fever case information for cases with illness onset during 2000 - 2004 was obtained through the National Electronic Telecommunications System for Surveillance (NETSS). These data include the first five complete years of cases after the addition of human Q-fever to the national list of notifiable diseases in 1999. Number of cases of human Q-fever recognized and reported by state health departments in the United States was 436 in the period: 1978–1999 and 255 in 2000–2004.

¹⁸ <http://osha.europa.eu/legislation/directives/A/1/2/07>

¹⁹ <http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/>

The average annual incidence in England and Wales is similar to that observed in the United States. In contrast, the annual incidence of Q-fever in some regions of France has been estimated to be higher. The low reported incidence of Q-fever in the United States compared with France (and Australia) is striking. Most human Q-fever cases in France and Australia are epidemiologically linked to exposure to small ruminants (sheep, goats, or their unpasteurized milk products), which make up an important part of the agricultural industry in those countries. In contrast, agriculture in the United States is heavily weighted toward the beef and dairy cattle industries rather than small ruminant farming. Thus, the circumstances of human exposure to *C. burnetii* are likely different in the United States than occurs in France and Australia.

In comparison with the previous period data, before 1978, in the United States, there were no reports of specific trends or epidemiologic features of disease. The renewed interest in *C. burnetii* as a **possible agent of bioterrorism** has highlighted the need to more accurately understand the disease burden of Q-fever.

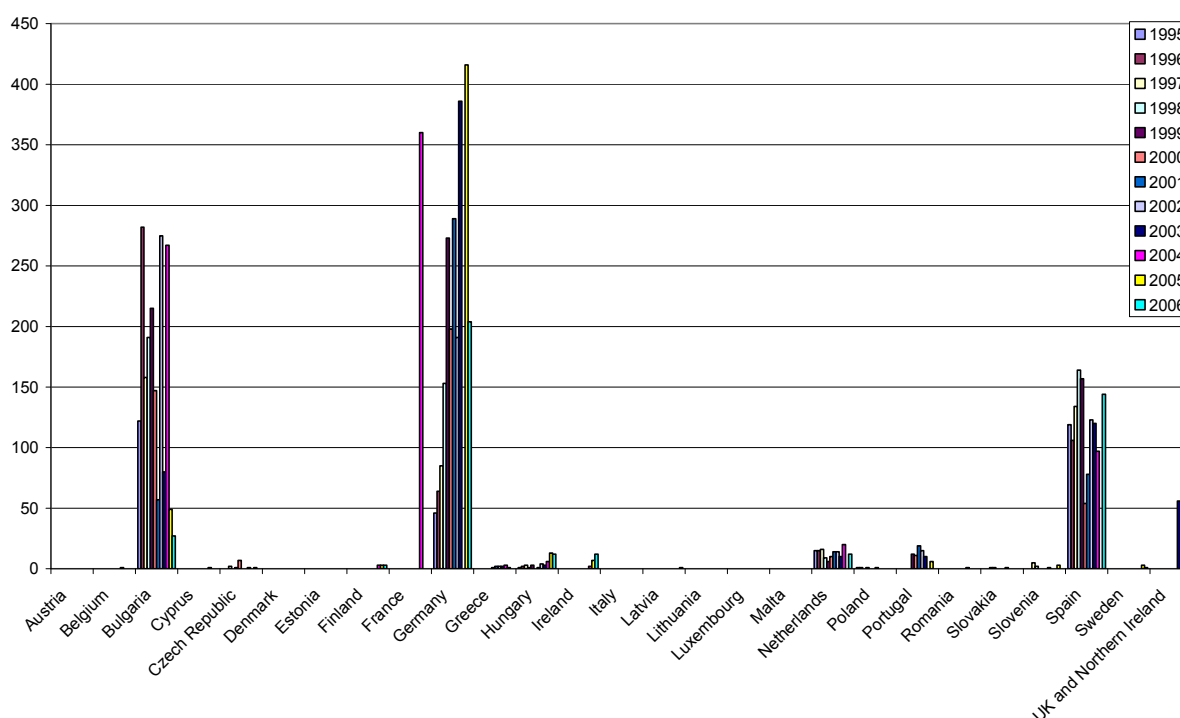
3.4.3. Works/occupations at risk

Q fever is usually an occupational disease of slaughterhouse workers and farmers. Transmission occurs via inhalation of a contaminated aerosol. *C. burnetii* concentrates in the placenta of infected animals, and exposing oneself to the products of conception in animals with *C. burnetii* infection is regarded as a high-risk activity. The risk concerns also veterinarians, and others who work with animals, animal products (e.g., contaminated hides) and particularly reproductive tract tissues.

In addition to the above information regarding presence of the rickettsia in the body of the animal: it is also present in urine – and in whole urinary tract, so contact with other parts of the carcass also may be a high-risk, and male animals may also be infectious.

As the micro-organisms is excreted with urine – there may be a risk also for those working in/around holding pans (presence of microbe in the dust) and for transport workers involved in movement of live animals.

Figure 7: Number of Q-fever cases in the EU registered in the WHO the centralized information system for infectious diseases CISID database, by year



Source: <http://data.euro.who.int/cisid/Default.aspx?TabID=105894>

In the United Kingdom most Q fever cases are sporadic or associated with occupational exposure to farm animals, or occur in areas where farm animals are handled. Retrospective serological studies have shown evidence of extensive infection in high risk populations, which suggests that many cases are often not identified at the time of the illness. Exposure to cattle, especially dairy cattle, poses the risk of Q fever. Being present at calving and handling cattle products of parturition may pose significant risks as high concentrations of the organism are found in the placenta and birth fluids.

In 2005, 17 serologically confirmed sporadic human cases were reported in England and Wales compared with 32 in 2004. Fifty nine percent of England and Wales cases were from the south west region of England, in part a reflection of the significance of agriculture to the region. There were no reports of overseas travel. Traditionally the incidence of Q fever in Northern Ireland was high when compared to other parts of the United Kingdom. However there has been an annual decrease in confirmed cases with only 6 reported in 2005 compared with 7 the previous year and 53 in 1999. The reasons for this decline are not known. There were two laboratory confirmed cases in Scotland in 2005 [18].

Q-fever remains primarily an occupational hazard in persons in contact with domestic animals such as cattle, sheep and, less frequently, goats. Persons at risk from Q -fever include also those in contact with dairy products, and laboratory personnel performing *Coxiella burnetii* culture and more importantly working with *C. burnetii*-infected animals. However, there has been an increase in reports of sporadic cases in people living in urban areas after occasional contact with farm animals or after contact with infected pets such as dogs and cats.

The Q-fever is a preventable disease and the vaccine is currently used in Australia for high risk exposure groups. The matter of efficacy and safety of Q-fever vaccine was raised by Health and Safety Executive at the Joint Committee on Vaccination and Immunisation meeting²⁰. <http://www.hse.gov.uk/aboutus/meetings/committees/acdp/100608/acdp89p4.pdf>

Eurostat database covers data on number of cases of occupational Q-fever for the period: 2002 – 2005 (Number of occupational diseases of the EODS voluntary list by disease (ICD-10). There were no cases registered in the period²¹.

3.5. Influenza ²²

3.5.1. Basic characteristics

Influenza is an illness associated with infection by influenza virus. The influenza virus was first identified in 1933. There are two main types that cause infections: influenza A and influenza B. Influenza A usually causes a more severe illness than influenza B. The symptoms of influenza include fever, headache, extreme tiredness, dry cough, sore throat, runny or stuffy nose and muscle aches [19]. Influenza has a rapid onset, and the acute illness lasts about three days. It is typical for influenza that it spreads rapidly around the world in seasonal epidemics. It occurs most often in winter and usually peaks between December and March in the northern hemisphere. In the United Kingdom, the Health Protection Agency monitors and records the incidence of seasonal flu. This information is used to guide the protection the population from influenza. In the US influenza activity has been registered at low levels from October to mid-December, increased during January and peaked in the mid-February. During the influenza season (October – March), people who accept the influenza vaccine are protected against serious consequences of the full scale influenza infection. High risk group covers: children and older adults, pregnant women, people with chronic health conditions, people in nursing homes and other institutionalized care and health care providers.

3.5.2. Prevalence of influenza

According to WHO, in annual influenza epidemics, 5-15% of the population are affected with upper respiratory tract infections. Sometimes the influenza virus undergo major changes resulting in global

²⁰ <http://www.hse.gov.uk/aboutus/meetings/committees/acdp/100608/acdp89p4.pdf>

²¹ <http://epp.eurostat.ec.europa.eu/>

²² As this paper was prepared before the recent H1N1 outbreak, the information on this issue is available on the Agency's website at: http://osha.europa.eu/en/riskobservatory/teaser/novel_flu_alerts_by_who_dg_sanco_01.27042009

pandemics (pandemic influenza), as has happened in years 1918-1919 ("Spanish flu"), in 1957 ("Asian influenza"), and in 1968 ("Hong Kong influenza"). Based on this epidemic pattern, principally everyone everywhere can be exposed to influenza virus.

The spread of influenza virus strains and their epidemiological impact in Europe are being monitored by European Influenza Surveillance Scheme (EISS). All 25 European Union Member States, Norway, Romania and Switzerland participate in EISS. The United Kingdom is represented by four surveillance networks: England, Northern Ireland, Scotland and Wales.

The EISS Weekly Electronic Bulletin presents and comments influenza activity in 29 European countries²³. EISS collects data from week 40 to week 20 of the following year. The intensity is given in 5 categories: no report, low, medium, high and very high. The data confirmed the seasonal character of the disease. For the seasons: 2002/3 – 2005/6, reports of high intensity were notified between 46 week to the 12 week of the next year, in dependence on season and country.

The EISS data are collected in collaboration with the WHO Collaborating Centre in London (United Kingdom) and the European Centre for Disease Prevention and Control in Stockholm (Sweden). During the 2005-2006 winter season, influenza activity has been moderate in the majority of countries in Europe and it further decreased or returned to baseline levels in week 16/2006. During this season, influenza B virus has been the dominant virus in Europe, accounting for 60% of total detections and it has represented the majority of positive specimens in two-thirds of the countries. A number of countries – Austria, Germany, Hungary, Portugal, Scotland, Romania and Wales – have seen very low overall levels of clinical influenza activity this season. No human cases of influenza A(H5N1) virus infection have been reported in the countries participating in EISS.

3.5.3. Works/occupations at risk

The Prevention and Control section of the EISS website contains data concerning influenza vaccination recommendations in Europe, covering, among others, health care personnel (<http://www.eiss.org/html/vaccination.html>). In 2004 the European Commission published a Working Paper on Community Influenza Pandemic Preparedness and Response Planning²⁴.

The Working Paper defines the phases and levels for a European Union (EU) response to an unfolding epidemiological situation of a pandemic with the classification system below based on the WHO classification. A set of links to the national pandemic plans is given.

According to Guidance on Preparing Workplaces for an Influenza Pandemic (<http://www.osha.gov/Publications/OSHA3327pandemic.pdf>), developed in the US by Occupational Safety and Health Administration (OSHA), the most exposed occupational groups (very high risk of exposure) include healthcare employees (for example, doctors, nurses, dentists) performing aerosol-generating procedures on known or suspected pandemic patients (for example, cough induction procedures, bronchoscopies, some dental procedures, or invasive specimen collection) and healthcare or laboratory personnel collecting or handling specimens from known or suspected pandemic patients.

High risk of exposure is identified for healthcare delivery and support staff exposed to known or suspected pandemic patients (for example, doctors, nurses, and other hospital staff that must enter patients' rooms), medical transport of known or suspected pandemic patients in enclosed vehicles (for example, emergency medical technicians) and people performing autopsies on known or suspected pandemic patients (for example, morgue and mortuary employees).

There is a medium level of risk of exposure for employees with high-frequency contact with the general population (such as schools, high population density work environments, and some high volume retail).

Low level of risk related to occupational exposure is characteristic for employees who have minimal occupational contact with the general public and other co-workers (for example, office employees).

²³ http://www.eiss.org/cgi-files/bulletin_v2.cgi?season=2005

²⁴ http://ec.europa.eu/index_en.htm

3.6. Avian Influenza

3.6.1. Basic characteristics

According to WHO [http://www.who.int/mediacentre/factsheets/avian_influenza/en/], Avian influenza ("bird flu") is an infectious disease of birds caused by type A strains of the influenza virus. The infection can cause a wide spectrum of symptoms in birds, ranging from mild illness, which may pass unnoticed, to a rapidly fatal disease that can cause severe epidemics.

Avian influenza viruses do not normally infect humans. However, there have been instances of certain highly pathogenic strains causing severe respiratory disease in humans. In most cases, the people infected had been in close contact with infected poultry or with objects contaminated by their faeces. Nevertheless, there is concern is that the virus could mutate to become more easily transmissible between humans, raising the possibility of an influenza pandemic. Selected results of research suggest that some avian influenza A H7 virus strains have properties that might enhance their potential to infect humans and their potential to spread from human to human (www.ens-newswire.com/ens/oct2008/2008-10-27-091.asp). The highly pathogenic H5N1 virus is of the greatest concern for human health (of the hundreds of strains of avian influenza A viruses, only four are known to have caused human infections: H5N1, H7N3, H7N7, and H9N2). In general, human infections with viruses H7N3, H7N7, and H9N2 have resulted in mild symptoms and little severe illness. The notable exception is H5N1 virus, which is highly pathogenic.

In many cases, the disease caused by the H5N1 virus has an unusually aggressive clinical course, with rapid deterioration and high fatality. Like most emerging diseases, H5N1 influenza in humans is reported as 'poorly understood'. Clinical data are beginning to provide a picture of the clinical features of disease, but much remains to be learned.

The incubation period for H5N1 avian influenza may be longer than that for normal seasonal influenza. WHO currently recommends that an incubation period of seven days be used for field investigations and the monitoring of patient contacts. Initial symptoms include a high fever, usually with a temperature higher than 38°C, and influenza-like symptoms. Diarrhoea, vomiting, abdominal pain, chest pain, and bleeding from the nose and gums have also been reported as early symptoms in some patients. Watery diarrhoea without blood appears to be more common in H5N1 avian influenza than in normal seasonal influenza. The spectrum of clinical symptoms may, however, be broader [20].

3.6.2. Prevalence of avian influenza

WHO is coordinating the **global** response to human cases of H5N1 avian influenza and monitoring the corresponding threat of an influenza pandemic. According to the WHO, in 2003 – 2006 human cases have been reported in 10 countries (see table 1). All in all, there have been 231 laboratory-confirmed cases of which 133 (57%) were fatal (situation on July 20, 2006).

Table 1: Cumulative Number of Confirmed Human Cases of Avian Influenza A/(H5N1) Reported to WHO till 20 July 2006

Country	2003		2004		2005		2006		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Azerbaijan							8	5	8	5
Cambodia					4	4	2	2	6	6
China					8	5	11	7	19	12
Djibouti							1		1	
Egypt							14	6	14	6
Indonesia					17	11	37	31	54	42

Country	2003		2004		2005		2006		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Iraq							2	2	2	2
Thailand			17	12	5	2			22	14
Turkey							12	4	12	4
Viet Nam	3	3	29	20	61	19			93	42
Total	3	3	46	32	95	41	87	57	231	133

(Source:WHO: http://www.who.int/csr/disease/avian_influenza/country/cases_table_2006_07_26/en/index.html)

More information is available on the WHO website (<http://www.who.int/wer/wer8126.pdf>).

The direct risk to the health of people **in Europe** from A/H5N1 is very low, but not zero. Human outbreaks in Turkey, Iraq, Azerbaijan, Egypt and elsewhere have indicated the potential for transmission of infection to humans from sick domestic poultry and probably also wild birds.

While cases of H5N1 has not been reported in EU, there were, however, cases caused by other strains.

Human Cases of H7N7 Infection in The Netherlands

In April 2003 the National Influenza Centre in The Netherlands reported 83 confirmed cases of human H7N7 influenza virus infections which occurred among poultry workers and their families since the H7N7 outbreak began in chickens at the end of February 2003. A 57-year-old veterinarian who visited one of the affected farms died of acute respiratory distress syndrome and related complications from H7N7 infection. In the same period Dutch authorities have reported evidence of possible transmission of H7N7 influenza from 2 poultry workers to 3 family members. All 3 family members had conjunctivitis and one also had influenza like illness²⁵.

The presence of other strains among birds was also reported in the United Kingdom, e.g. in 2007 a low-pathogenic H7N2 virus on a chicken farm in Wales. A few people who had contact with infected birds had mild symptoms of the disease.

www.cidrap.umn.edu/cidrap/content/influenza/avianflu/news/jun0508brits-jw.html

Information on avian influenza in Europe is provided by the European Commission DG Health and Consumer Protection including information from the Animal Disease Notification System, as well as by the European Commission Joint Research Centre. Information is updated on a regular basis²⁶.

3.6.3. Works/occupations at risk

Most human cases (H5N1) have occurred in rural households with small flocks of poultry. Very few cases have been detected in occupations assumed to be at an elevated risk, such as commercial poultry workers, workers at live poultry markets, cullers, veterinarians, and health care workers.

Workers groups which may be exposed to the virus and should take appropriate precautions include the following where H5N1 may be present:

- Health care workers caring for those with H5N1 infection: though there have been no cases in this group for nearly a decade the risk is present and preventive measures should be taken. A related group are those working in laboratories with H5N1 viruses,
- Veterinarians and people involved in controlling outbreaks in birds (culling),

²⁵ <http://www.cdc.gov/flu/avian/h7n7-netherlands.htm>

²⁶ <http://disasters.jrc.it/AvianFlu/Europe/>

- People who work on poultry farms,
- People who may have close contact with infected wild birds e.g. some ornithologists and hunters,
- People who deal with sewage which is contaminated with H5N1.

For the majority of people who have no contacts with domestic or wild birds or their droppings, the risk of acquiring H5N1 is almost non-existent.

The report of the ECDC (European Centre for Disease Prevention and Control) [21] points out the risk of contact with domestic poultry. A risk of person to person transmission is also mentioned²⁷.

3.7. SARS

3.7.1. Basic characteristics

Severe acute respiratory syndrome (SARS) is a viral respiratory illness caused by a coronavirus, called SARS-associated coronavirus (SARS-CoV). SARS was first reported in Asia in February 2003 (*earlier the first probable case in November 2002*). The natural reservoir of SARS-CoV has not been identified but there is some evidence that the reservoir for this pathogen may involve a range of animal species among which the masked palm civet is the most often associated with animal-to-human transmission.

The main way that SARS seems to spread person-to-person is by respiratory aerosol. Potential ways in which SARS can be spread include also touching the skin of other people or objects that are contaminated with infectious droplets and then touching own eye(s), nose, or mouth. The World Health Organisation declared that transmission of SARS CoV had ceased among humans on July 2003.

3.7.2. Prevalence of SARS

During the outbreak in 2002-2003, a total of 8 096 people worldwide became sick with SARS; of these, 774 died. SARS was first reported in Asia. Over the next few months, the illness spread to a total of 26 countries including European countries (France, Germany, Italy, Republic of Ireland, Romania, Spain, Switzerland, and United Kingdom) before the global outbreak was contained. The most recent human cases of SARS-CoV infection were reported in China in April 2004 in an outbreak resulting from laboratory-acquired infections – after the official end of threat. Currently, there is no known SARS transmission anywhere in the world. More detailed information is provided on the WHO website: http://www.who.int/csr/sars/country/table2004_04_21/en/.

In March 2003 in France one SARS case has been imported from Viet Nam. 50 persons have been investigated as “contact persons”. One aircraft staff member, 2 passengers and a friend of the ill person were infected²⁸.

3.7.3. Works/occupations at risk

According to the WHO, SARS is a growing concern for health care workers. The effects of SARS on hospitals and health care professionals are discussed in recent studies. The need to widen the research to include social workers, practicing in a hospital environment affected by SARS is pointed out.

The rapid infectivity of SARS, its face-to-face transmission and the speed with which it traversed the world resulted in development and implementation unparalleled modern public health and infection control measures. Those at greatest risk were health care providers in hospital settings.

²⁷ http://ecdc.europa.eu/Health_topics/Pandemic_Influenza/Guidance.html

²⁸ http://www.invs.sante.fr/beh/2003/24_25/index.htm
<http://www.medscape.com>

However, as epidemiologists examine it, health care professionals must continue to treat patients affected by SARS, practice in environments that demand strict infection control procedures, or both. Because of SARS, there have been substantial changes to the occupational conditions in hospitals for health care workers.

Little is known about the experiences, impacts and demands on health care professionals practicing in a hospital environment carrying out the SARS treatment and protection against its transmission. This gap in the literature is especially concerning because SARS and hospitals' vigilant infectious control procedures greatly influenced health care practice and the care that patients and families received. Although the literature has begun to recognize that SARS has caused changes in health care practice and placed extreme demands on health care workers, the experience and its impact on social workers has remained understudied [22].

Occupations in which there is the highest risk of exposure to SARS include also laboratory workers handling samples or items contaminated with the virus, anathomopathology, mortuary or crematorium workers, public transportation workers including airline crew, food handlers and people who prepare or serve food, mainly in underdeveloped regions in Asia (more than one third of the cases in China with onset of SARS before February 1, 2003, were in food handlers.

[<http://www.cdc.gov/ncidod/EID/vol11no01/04-0637.htm>).

3.8. *Legionella*

3.8.1. Basic characteristics

Legionella is a Gram-negative, motile, rod-shaped, aerobic bacterium. Legionnaires' disease is a lung infection, type of pneumonia, caused by breathing the bacterium *Legionella pneumophila* or other *Legionella* species. Pontiac Fever is a milder form of this disease.

The *Legionella* bacteria are natural inhabitants of water and can be detected e.g. in rivers, lakes and streams. They become attached to surfaces (such as e.g. plastics, rubber, and wood) in an aquatic environment forming a biofilm. The major sources of *Legionella* are water distribution systems of large buildings (hotels, hospitals) and air-conditioning systems. It can be found e.g. in hot and cold water system, cooling towers, hot tubs, evaporative condensers, hot whirlpool and spa baths, natural pools, showers, thermal springs, hot water tanks, biological treatment plants, large plumbing systems and respiratory therapy equipment.

The cases of Legionnaires' diseases could be nosocomial (hospital acquired), community or travel related²⁹.

Most of the outbreaks reported from in 1976 have been associated with airborne transmission (e.g. by inhaling aerosol, airborne water droplets or mist that has been contaminated) of *Legionella* bacteria through cooling towers, showers, and other aerosolizing devices. However, most cases of Legionnaires' Diseases are sporadic, and the source and mode of infection in many cases are unknown. In Australia and Japan infections with one species, *Legionella longbeachae*, have been associated with gardening and use of potting soil. Legionnaires' Disease is not transmitted from person to person³⁰.

3.8.2. Prevalence of Legionnaires' Disease

First described outbreak of Legionnaires' Disease occurred in 1976 in a hotel in which an American Legion meeting took place.

Since that time cases of the disease have been reported in North and South America, Asia, Australia, New Zealand, Europe and Africa.

²⁹ <http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=588>

³⁰ <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm4934a1.htm>

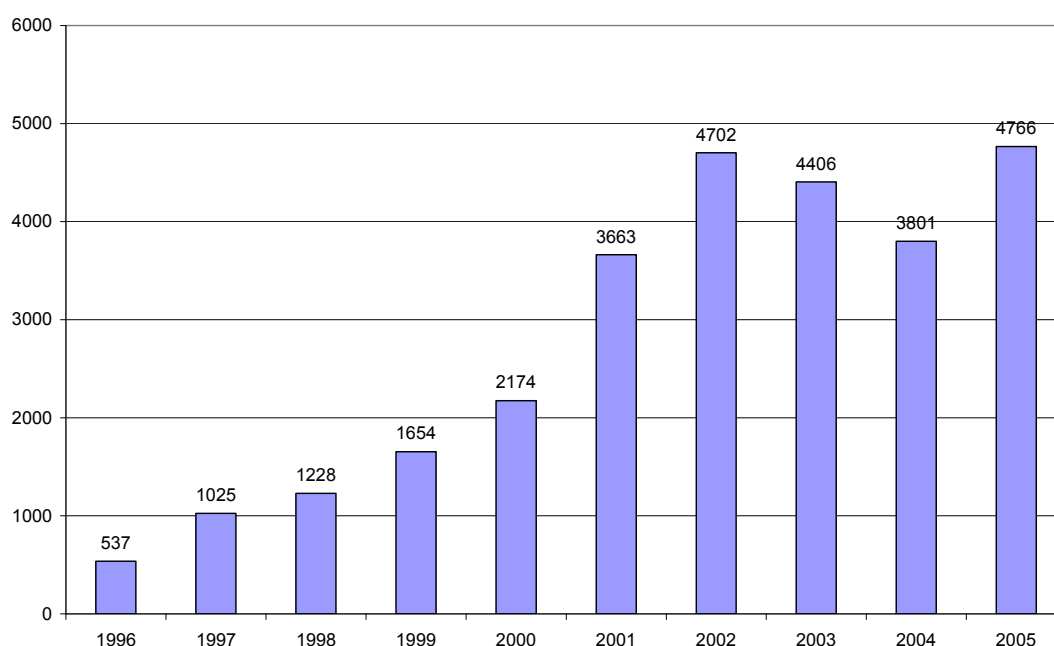
Most cases of Legionnaires' Disease **in the world** have been reported from the industrial countries. Some of the outbreaks which have occurred in the last years include:

- France, Sept. 2006: 12 cases,
- France, August 2006: 26 cases, 2 deaths,
- United Kingdom, whirlpool spa, August 2006
- The Netherlands, July 2006: 30 cases,
- Spain, June 2006: 139 cases,
- Spain, March-April 2006: 15 cases,
- Spain, Dec. 2005: 20 cases,
- Spain, Oct. 2005: 19 cases, 2 deaths,
- London, 12 cases, July-August 2005,
- Norway's Worst Outbreak, May-June 2005: 53 cases, 10 deaths,
- Spain Hospital, Feb. 2005: 6 cases, 1 death.

and others.

The number of the Legionnaires' Diseases cases **in Europe** (including EU countries) has grown significantly in the last years (see Figure 8).

Figure 8: Number of Legionnaires' Disease cases registered in CISID in the EU countries by year



Source: WHO Regional Office for Europe, centralized information system for infectious diseases – CISID, <http://data.euro.who.int/cisid/?TabID=67>

The countries with the highest number of Legionnaires' Disease's cases registered in 1989 – 2005 are: England & Wales (1695 cases) The Netherlands (987 cases), France (811 cases), Italy (515 cases), Sweden (321 cases) and Denmark (315 cases). In 2005 more than 32% of all cases have been registered in France, more than 25% in Spain, 8% in Italy, 7% in United Kingdom and 6% in The Netherlands.

The information on current outbreaks of Legionnaires' disease is published on the website: <http://www.hcinfo.com/outbreaks-news.htm>.

Spain, 139 cases, June 2006

On June 1, four confirmed cases of Legionnaires' disease were reported in Pamplona, northern Spain. By June 8, the number of reported cases had grown to 139, all of which were diagnosed by urinary antigen tests. The patients ranged from 21 to 97 years of age. Seventy-six (55%) of the patients were hospitalized, seven of whom required intensive care. No deaths were reported. The investigators inspected cooling towers located at buildings in the neighbourhood in which most of the initial cases occurred.

Australia, 2 Cases in mine workers, December 2006

Legionnaires' disease was confirmed in two men in their 30s and 40s who work at different areas of the same mine in Australia.

The mine was shut down around 10 December. Both workers were discharged from the hospital after responding to treatment. Water samples were collected from the mine by a Queensland health officer but test results are not yet available. A spokesman for the mine said it would remain closed until a risk assessment was completed and control measures were in place³¹.

3.8.3. Works/occupations at risk

There are not statistical data which can be a basis of identification of occupations/sectors at risk. In general, the distribution of cases Legionnaires' Disease between various sources of infection is as follows: 16% travel, 6% hospital, 40% community, 38% unknown.

Legionnaires' Disease is often associated with travel and with staying in hotels. 55% of 119 hotels in the Mediterranean region in various European countries had *Legionella* in their water distribution systems.

Most of outbreaks of epidemic caused by the *Legionella* bacteria involve hospitals workers and residents and workers exposed to a risk of breathing in the air contaminated by bacteria growing in poorly maintained cooling towers.

Works most at risk include also maintaining water cooling towers in air conditioning systems and some outdoor works, e.g. related to soil distribution by bulldozing and working in the areas where surface or aerosolized water discharge exist which can be contaminated by the microorganisms responsible for Legionnaires' disease.

The other occupational groups exposed can be also people working with soil (e.g. gardeners). However, the risk for this occupational group in the Europe is rather low – the surveys have not revealed *Legionella* in soil samples from Europe.

3.9. Tuberculosis

3.9.1. Basic characteristics

Tuberculosis (TB) is an infectious disease caused by the bacterium *Mycobacterium tuberculosis*. It is a small, slow-growing, aerobic, rod-like bacterium. **Multi-drug resistant tuberculosis** is tuberculosis resistant to at least main drugs used in the TB treatment: isoniazid and rifampicin. The European Centre for Disease Prevention and Control has made tackling TB a priority and is developing a plan of activities, taking into account the suggested actions above, to assist EU member states in preventing multidrug resistance and the emergence of extensively drug resistant TB³².

Tuberculosis is spread by aerosol droplets expelled by people with active disease of the lungs when they cough, sneeze, speak or spit. A person with untreated, active tuberculosis can infect 10 – 15 other people each a year. Less frequently it can be acquired through ingestion of contaminated milk

³¹ <http://www.hcinfo.com/outbreaks-news.htm>

³² <http://www.eurosurveillance.org/ViewArticle.aspx?PublicationType=W&Volume=11&Issue=39&OrderNumber=2>

or through laboratory contamination. Tuberculosis can become drug-resistant if a patient is not treated long enough or doesn't receive the correct drugs in effective doses.

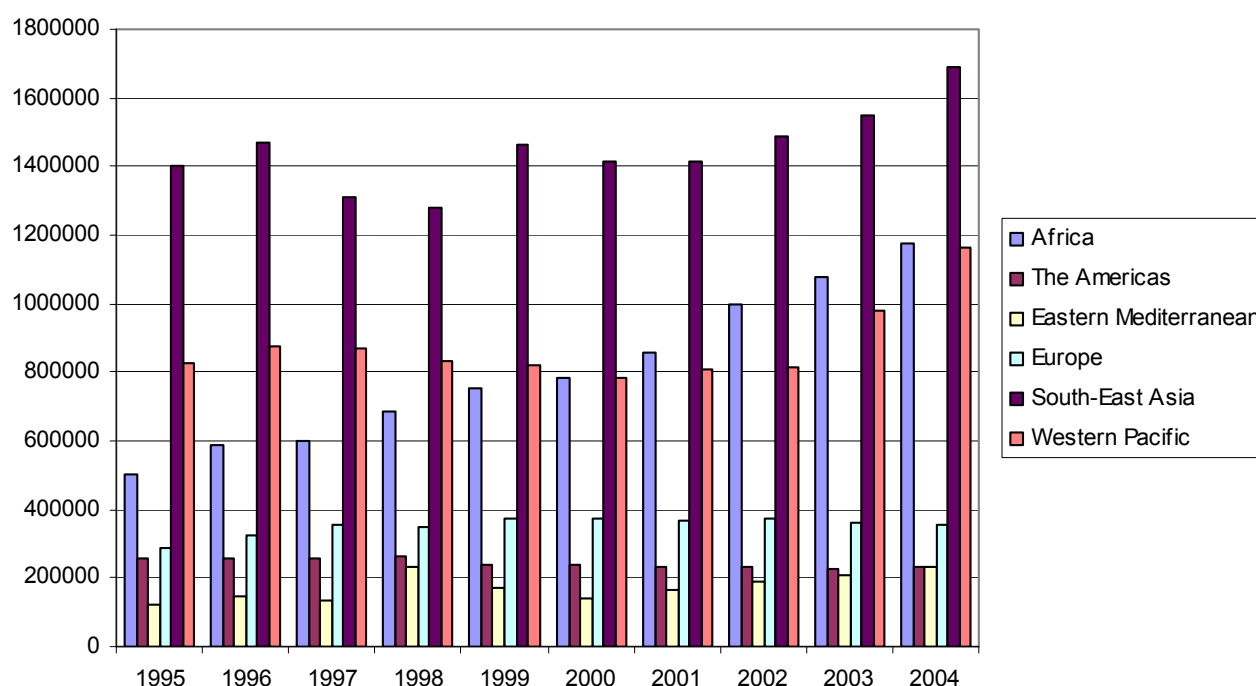
In the EU, TB is more prevalent in migrants, the homeless, prisoners and drug users than other sectors of the population. In the WHO European Region, majority of cases were reported from outside the EU, mostly by the eastern countries of the former Soviet Union. TB is also recognized as occupational disease, e.g. for health care workers.

3.9.2. Prevalence of Tuberculosis

Tuberculosis kills about 1,7 million people each year. WHO estimates that one-third of the world's population is infected with Tuberculosis. However, people infected with TB bacilli will not necessarily become sick with the disease: only 5 to 10 percent of the infected people become sick with Tuberculosis at some time during their life.

The WHO estimates that in 2004 the largest number of new TB cases occurred in WHO's South-East Asia Region (app. 33% of all cases – see Figure 9). However, the estimated incidence rate is the highest in sub-Saharan Africa, at nearly 400 cases per 100 000 population.

Figure 9: Cases of Tuberculosis in different WHO regions



Source: http://www.who.int/tb/publications/global_report/2006/annex_2_download/en/index.html

According to the WHO's Global TB Control Report there are app. 300 000 new cases of Multi-drug resistant tuberculosis per year worldwide. There is also new evidence that drug resistant strains are becoming more resistant, and unresponsive to current treatments. **79% of MDR-TB cases are now "super strains", resistant to at least three of the four main drugs used to cure TB.**

Prevalance of TB differs among the EU countries. According to the annual report prepared by the EuroTB³³, for the area of the European Union (EU) and Andorra, Iceland, Israel, Norway and Switzerland, 93,129 TB cases were reported in 2005. TB notification rates were highest in Romania,

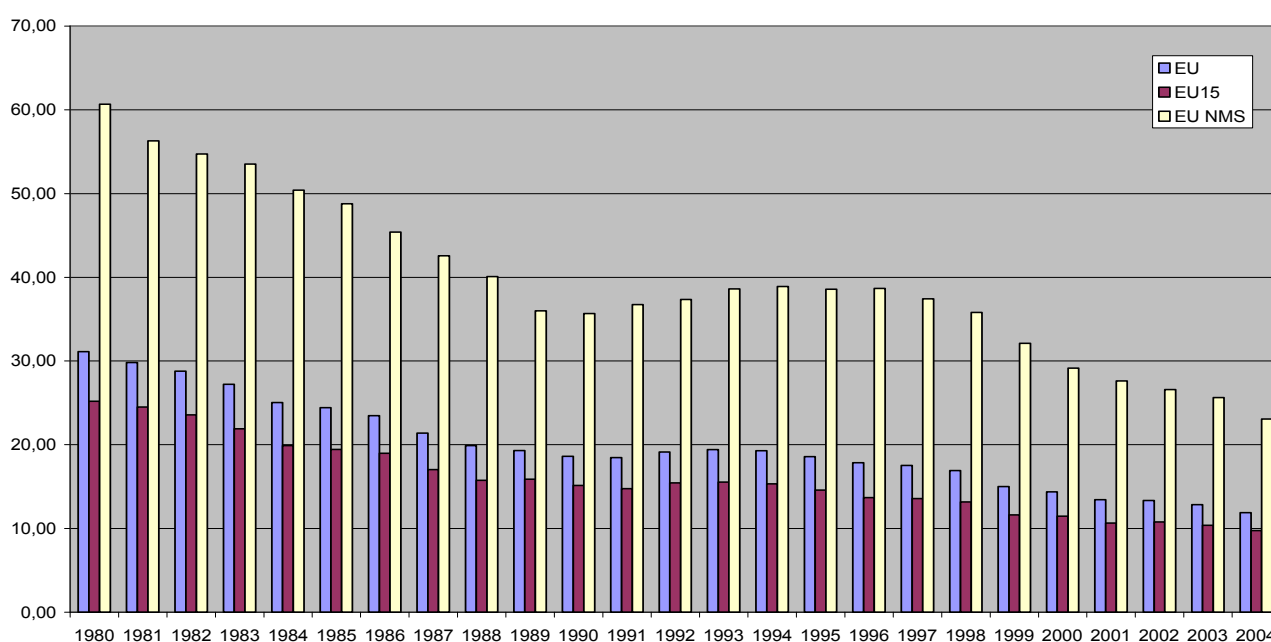
³³ http://ecdc.europa.eu/documents/pdf/EuroTB_report.pdf

Bulgaria the Baltic States. Between 2001 and 2005, overall notification rates decreased, but substantial increases were observed in Greece, in Sweden and United Kingdom.

Cases of Multi-drug-resistant TB are 10 times more frequently identified in parts of Eastern Europe (former Soviet Union) and Central Asia than in the rest of the world. The countries with the highest proportion of MDR TB (reaching 14%) include: Estonia, Kazakhstan, Latvia, Lithuania, parts of the Russian Federation and Uzbekistan, with drug resistance in new patients. Other regions of the highest prevalence are: China, Ecuador, Israel and South Africa. In the Central Europe and Africa the levels of drug resistance are the lowest.

In 1994 – 2004 the Tuberculosis incidence rates in the EU region have decreased by app. 40% (see Figure 10).

Figure 10: Tuberculosis incidence rates in the EU, by year



Source: European health for all database, WHO, <http://data.euro.who.int/hfad/>

The countries in which the decrease in the TB incidence rates is the highest include Slovakia (by app.64%), Slovenia (by app.54%), Germany (by app.54%), Poland (by app.47%), France and Czech Republic (by app.46%), Hungary (by app.45%) and Spain (by app. 40%). In the United Kingdom and Lithuania the increase in the TB incidence rates has been noticed.

The number of TB cases which has been registered in WHO database in 1980 – 2004 in EU countries.

In some EU countries: Estonia, Lithuania and Latvia the incidence of MDR TB is one of the highest. In the countries of Western and Central Europe MDR TB include up to 2,1% of all the new tuberculosis (TB) cases. In Western Europe, drug resistance is more frequent among cases of non-citizens (in 1999 cases of foreign origin accounted for over 90% of the MDR cases in the West).

In 2005, the 25 EU countries (plus Iceland and Norway) reported 59 497 TB cases corresponding to an overall rate of 13 per 100 000 per year, with a countrywide range from 4 to 75. Five countries (France, Germany, Poland, Spain and United Kingdom) had more than 5 000 cases each. The incidence rate from 7 to 31 (<http://data.euro.who.int/hfad/>). In the EU27, Romania will be the country with the highest notification rate (135 per 100 000 per year in 2005) [23].

The *Public Health* section of the Eurostat database presents data on numbers of deaths for tuberculosis. The disease was recognised as a cause of death for 7160 cases in 2006 in EU27. The

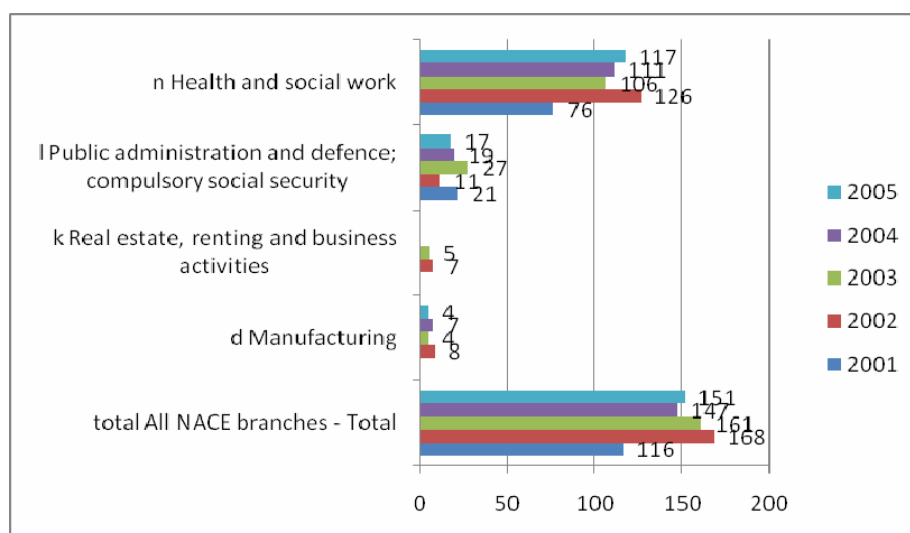
number is lower than in previous period (e.g. in the 1999 the registered number of tuberculosis as a cause of death was 9722).

3.9.3. Works/occupations at risk

Tuberculosis is an occupational disease which should be registered in the all EU countries [24]. The section *Occupational diseases* of the Eurostat database contains data on the number and incidence rate (per 100 000 workers) of tuberculosis (as occupational disease) by economic activity and sex, based on the Eurostat methodology. According to the data, the number of cases of occupational tuberculosis (per year) for the “old” EU-15 is greater in 2002 – 2005 than the number of cases in 2001 (see Figure 11). The value is decreasing in the period 2002 – 2004, but the trend is not continued in 2005.

Each year app. 65 - 77% of all registered cases of occupational tuberculosis has been recognized among health and social workers and 6 – 15% among public administration workers.

Figure 11: Number of work-related case of tuberculosis in the “old” EU-15 by year



Source: Eurostat : <http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/>

Some data from national sources seem to confirm this growing trend (see table 2).

Table 2: Number of recognized cases of occupational tuberculosis by country and year

Countries	1991	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Denmark		3	2	6	6	3	7	6	4	5	5
Finland		7	7	10	10	6	9	16			
France	17				51	63	61	85	50	83	96 indicative
Poland				192	151	131	100	93	93	86	
Spain						2	2	3	0	5	

Works with the highest probability of occupational exposure include:

- Health care (hospitals, community nursing, associated cleaning services),
- Pathologists,
- Laboratory work,

- Emergency services (ambulance/police),
- Education,
- Work in camps for refugees and people seeking asylum.

The current vaccine for tuberculosis is BCG (Bacille Calmette Guérin). The vaccine was first used in 1921. BCG is the only vaccine available today for protection against tuberculosis. It is most effective in protecting children from the disease³⁴.

3.10. Anthrax

3.10.1. Basic characteristics

Anthrax is an acute infectious disease caused by the bacterium **Bacillus anthracis**. This gram-positive bacillus forms spores which can survive in the environment for decades, even centuries. There are three types of anthrax: cutaneous (most common), inhalation or pulmonary (rare) and gastrointestinal (rare).

Bacillus anthracis spores are present in soil in much of the world, causing infection in herbivorous mammals (e.g. cattle, sheep and goats). Because of its persistence in the soil, anthrax is still a rather important veterinary disease, especially of domestic herbivores in countries with extensive cattle breeding. Endemic in Asia, South America and Africa, anthrax can occur anywhere in the world.

The cutaneous route is the most common, naturally-occurring form of infection (caused by contacts with infected animals or handling infected products such as wool, hides, etc.). Digestive anthrax follows eating of undercooked meat from an infected animal. Respiratory form occurs as a result of breathing in anthrax spores that may be forced into the air e.g. from contaminated animal products. Anthrax has little potential for person to person transmission.

In the case of a deliberate use of anthrax spores, inhalation anthrax would be the most likely mode of infection with a great number of death: death is universal in untreated cases and may occur in as many as 95% of treated cases if adapted antibiotic therapy is begun more than 48 hours after the onset of the symptoms.

3.10.2. Prevalence of anthrax

Cutaneous anthrax is the most common naturally occurring form with an estimated 2000 cases reported annually world wide, most of them outside of Europe. However, there are few cases regularly occurring in different EU Member States [25].

The largest reported epidemic occurred in Zimbabwe between 1979 and 1985 with more than 10 000 human cases of anthrax, nearly all of them cutaneous. The last important outbreaks of anthrax was in Sverdlovsk (inhalational anthrax), in 1979, after an accident in a Soviet military plant with at least 66 deaths.

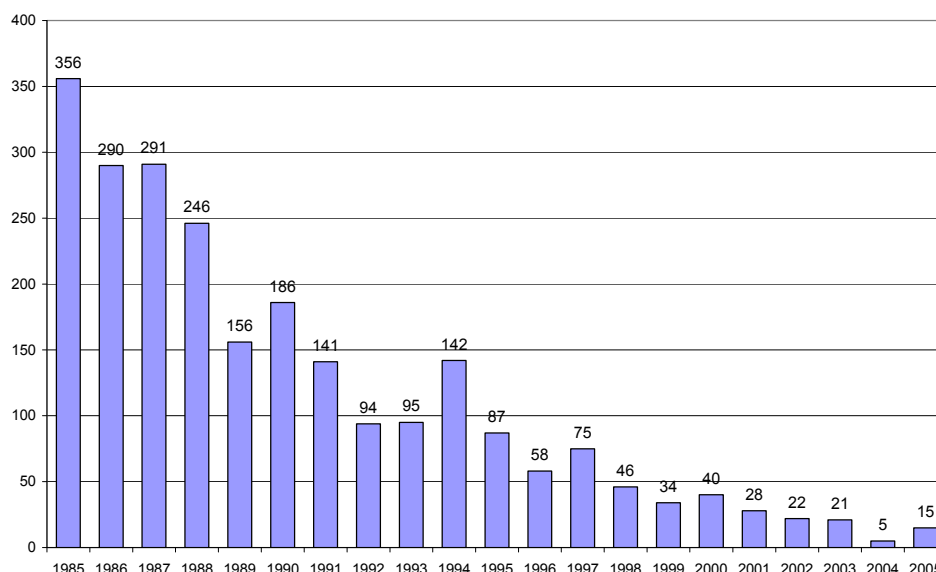
The number of anthrax cases registered in the Centralized Information System for Infectious Diseases (CISID) in the WHO European Region³⁵ in 1985 – 2005 is presented in the Figure 12.

In the last decades the number of registered anthrax cases has dropped significantly in the EU. In 2001 - 2005 years app. 100 cases altogether have been registered, app. 80% in Spain and 13% in Greece.

³⁴ http://www.who.int/vaccine_research/diseases/tb/vaccine_development/bcg/en

³⁵ <http://data.euro.who.int/cisid/?TabID=67>

Figure 12: The number of anthrax cases registered in the all EU countries in the centralized information system for infectious diseases (CISID)



Source: WHO Regional Office for Europe, centralized information system for infectious diseases CISID, <http://data.euro.who.int/cisid/?TabID=67>

Over the last 10 years, the overall incidence has been stable. Twenty-seven countries reported a total of 250 cases throughout the period (though only 24 countries reported for the whole 10-year period). The most cases were reported by Spain (65%), followed by Greece (14%). In 2005, 21 countries reported just 10 cases.

Given the absence of naturally occurring cases of inhalation anthrax in developing countries, the occurrence of a single case is now a cause for alarm. World wide anthrax data are available on the Promedmail website³⁶. US anthrax attacks: October-November 2001.

Anthrax poses a threat as a biological warfare agent. US anthrax attacks were conducted by contaminated mail (powder with anthrax spores) with 23 cases including 5 deaths, 18 of them being confirmed and 5 being suspected of anthrax. None cases were identified after until 2001.

3.10.3. Works/occupations at risk

Possibly at higher risk of exposure in endemic regions are:

- workers employed in abattoirs (e.g. slaughterers, butchers, meat packers) and tanneries performing tasks related to animals or animal products such as hides, wool, but also:
- animal breeders ,
- animal caretakers,
- animal scientists,
- farmers & ranchers,
- farm workers,
- hunters & trappers,
- lab animal workers,
- veterinarians,
- personnel of veterinarian laboratories and research laboratories working with *Bacillus anthracis*.

³⁶ <http://www.promedmail.org/pls/otn/f?p=2400:1000>

Examples of anthrax resulting from occupational exposure include:

- California, USA, 2004. Inadvertent laboratory exposure to *Bacillus anthracis*. 12 potentially exposed persons. 8 with chemoprophylaxis; No clinical case.
- Texas, USA, 2002. Cutaneous anthrax in a laboratory worker – Handling of vials of *B. anthracis* without gloves.
- New York City, USA, February 2006. Inhalation anthrax associated with dried animal hides –. Member of a dance troupe making traditional African drums by using hard-dried animal hides bought in Cote d'Ivoire. He survives. This report relates a previous cutaneous anthrax associated with a goat hide drum purchased in Haiti in 1974.
- Scotland, United Kingdom, July 2006. Inhalation anthrax associated with dried animal hides. Self employed artist making drums with imported untreated skins of animals. He died.
- Saskatchewan, Canada, July 2006. One skin anthrax of a man. 36 farms quarantined.
- Bolzano, Italia, January 2006. 2 cutaneous cases in a non endemic region (a farmer and his wife) linked to hay imported from another region.

Anthrax continues to be endemic in West Africa, Spain, Greece, Turkey, Albania, Romania and Central Asia, where veterinary control programs are inadequate.

Industrial processing of animal hair or hides accounted for 153 (65%) of 236 anthrax cases reported to CDC during 1955-1999. Commercial products made from animal hair or hides accounted for an additional five cases (2%). The majority of these 158 cases were cutaneous anthrax; only 10 (6%) were inhalation anthrax.

Eurostat database presents anthrax on the voluntary list of occupational diseases. There were no cases registered in the database (Number of occupational diseases of the EODS voluntary list by disease (ICD-10)³⁷.

3.11. Tularemia

3.11.1. Basic characteristics

Tularemia is a disease caused by the bacterium *Francisella tularensis holartica* (type B) group 2 in the Europe and *Francisella tularensis tularensis* (type A) group 3 in North America. Tularemia is also known as rabbit fever or deer fly fever. Tularemia most often affects rabbits and hares and rodents; however, it has been reported as affecting other species of wild and domestic mammals.

Tularemia is endemic in many parts of the world, including North America, Europe and Asia. Tularemia can be transmitted by inhalation of aerosol, direct contact, ingestion or by arthropod vectors. This zoonotic disease can be acquired by skin or mucous membrane contact with body fluids or tissues from infected animals, and the most common cases are characterized by fever, chills, headache, malaise, an ulcerated skin lesion, and painful glands. Nearly all cases of tularemia occur in rural areas and are associated with the bites of infected ticks, mosquitoes, and biting flies or with the handling of infected rodents, rabbits, or hares. Less commonly, tularemia can be contracted through ingestion of contaminated food or water or by inhalation. There is no documented person to person transmission.

All forms of tularemia can progress to pleuropneumonia, meningitis, sepsis, shock, and death. For typhoidal tularemia which results from ingestion of contaminated food or water mortality rates can range from 40 to 60% if prompt treatment is not sought. Mortality of other forms of tularemia is lower.

³⁷ <http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/>

Francisella tularensis is classified as a Category A agent of bioterrorism because of its high infectivity, ease of dissemination, and its potential to cause severe disease. Anticipated mechanisms for dissemination include contamination of food or water and aerosolization.

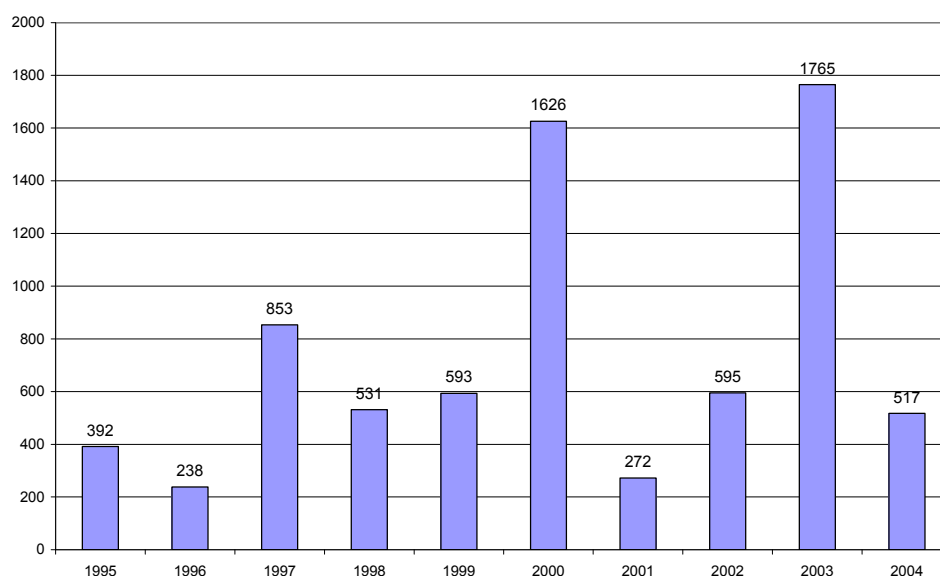
3.11.2. Prevalence of Tularemia

Outbreaks of tularemia are not well registered. According to WHO, the only tularemia outbreaks registered were in Kosovo during 2002 with 715 suspected cases (170 laboratory confirmed) and during 2000 with 699 suspected cases (56 laboratory confirmed).

On the website of Promedmail, the global electronic reporting system for outbreaks of emerging infectious diseases and toxins³⁸, a lot of small outbreaks are reported. Most of them have occurred in the USA. In the Russian Federation, 2019 cases of tularaemia were registered from 1987 till 1997. From 60 to 75% of the cases were reported in three regions: the Northern, the Central and the West-Siberian.

Every 3 years the number of tularemia cases registered in CISID database in the EU countries is growing significantly (almost 3 – folds in relation to earlier 2 years) and there is growing tendency in the number of cases registered during these outbreaks (see Figure 13). There is no visible trend in the number of cases in the periods between outbreaks.

Figure 13: The number of tularaemia cases registered in the all EU countries in the centralized information system for infectious diseases (CISID)



Source: WHO Regional Office for Europe, centralized information system for infectious diseases – CISID, <http://data.euro.who.int/cisid/?TabID=67>

In the last years the incidence rates were the highest in Sweden and Finland.

Tularemia in France

Notification of tularemia is mandatory in France since October 2002. The surveillance aims at following the trends in incidence, at describing the cases clinically and epidemiologically, and at making an early detection of any unusual event such as clusters of cases or the use of virulent strains as biological weapons. All suspected and confirmed cases of infection by *Francisella tularensis* have to be notified early.

³⁸ <http://www.promedmail.org/pls/otn/f?p=2400:1000>

20 sporadic cases were notified in 2003, 21 cases in 2004. Among those cases, forty patients (98%) reported at least 1 at-risk exposure:

- 20 (49%) cases had skinned game animals,
- 8 (20%) reported a tick bite
- 1 patient had been exposed to *F. tularensis* in a microbiological laboratory.

Most cases lived in the Poitou-Charentes and Alsace-Lorraine administrative regions. Apart from sporadic cases, a cluster of 14 air-borne cases occurred in Poitou-Charentes in 2004³⁹. In 2005, 23 cases have been registered in France.

3.11.3. Works/occupations at risk

Tularemia is an occupational risk for farmers, foresters, and veterinarians, and is listed by the US Centers for Disease Control and Prevention (CDC) as high-priority, biological warfare agent.

High risk job tasks associated with this disease include:

- handle infected animal carcasses or placental tissues,
- handle infected dog or cat (bite or scratch),
- raise farm dust contaminated with *Francisella tularensis*,
- work in a medical or research laboratory handling the pathogen,
- work in tick infested area⁴⁰.

Eurostat database covers data on number of cases of occupational tularaemia for the period: 2002 – 2005. The total numbers of cases, registered in the period, was 33⁴¹.

3.12. Plague

Plague is an infectious disease of animals and humans caused by a bacterium, *Yersinia pestis*. Historically, plague caused thousands of deaths throughout Europe during the 6th and 14th Centuries. Today, plague in humans is rare can be treated with antibiotics if diagnosed early. Common general symptoms are: fever, chills, body aches, sore throat, abdominal pain, nausea, vomiting, cough that may contain blood, constipation⁴², and black or tarry stools, stomach pains, shortness of breath, heart irregularities⁴³, and others.

The bacteria can be transmitted from a host such as a rat to a human through the bite of an animal or insect, such as a flea. The animal or insect that spreads the disease is referred to as a vector and many species can serve as hosts. The vector is usually the rat flea. Thirty different flea species have been identified as carriers of the plague. Other carriers of plague include ticks and human lice. Transmission can also occur when someone inhales plague-infected organisms that have been released into the air. The inhalation form of the plague can be aerosolized, as in acts of terrorism. People infected by pneumonic plague can transmit air-borne plague in the form of coughed droplets. Close contact with plague-infected tissue or fluid can also transmit plague⁴⁴.

Between 1987 and 2001, 36 876 cases of plague with 2847 deaths were reported to WHO. The USA, which has a very large enzootic reservoir, had only 125 human cases in that period, probably because the affected areas are rural and largely uninhabited. In 2000 and 2001 more than 95% of reported human cases were from African region, including a well documented focus in Madagascar accounting for more than 41% of the world reported cases.

³⁹ http://www.invs.sante.fr/publications/2005/tularemie_france_2003_2004/index.html

⁴⁰ http://hazmap.nlm.nih.gov/cgi-bin/hazmap_generic?tbl=TblDiseases&id=180

⁴¹ <http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home/>

⁴² <http://www.emedicinehealth.com/script/main/art.asp?articlekey=59276>

⁴³ <http://www.emedicinehealth.com/script/main/art.asp?articlekey=88489>

⁴⁴ http://www.emedicinehealth.com/plague/page2_em.htm

In that country, plague re-emerged as a problem in the 1980s, and the yearly incidence increased in the 1990s to nine cases per 100 000 inhabitants. Worldwide, bubonic plague is predominant form reported (80-95% of suspected cases), with mortality of 10-20%. Increased mortality (22%) is seen in a small proportion of patients who develop systemic *Y. pestis* sepsis with no bubo, known as primary septicaemic plague. Primary pulmonary plague is the rarest form of disease, but has the highest mortality rate, which approaches 100% if untreated and more than 50% with antimicrobial treatment [26].

In Europe no human plague cases have been reported for a long time. Though relatively rare, the disease has a worldwide distribution and in the most recent years, a growing number of cases are being reported to WHO. Low risk of occupational exposure can be related to aircraft personnel and health care workers.

Yersinia pestis is possible to be used to produce a **bioweapon** because the bacterium occurs in nature and could be isolated and grown in quantity in a laboratory. Used in an aerosol attack it could cause cases of the pneumonic form of plague. The bacteria can spread from ill people to others who have close contact with them. Because of the delay between being exposed to the bacteria and becoming sick, people could travel over a large area before becoming contagious and possibly infecting others. Controlling the disease would then be more difficult.

3.13. Smallpox

Smallpox is an acute contagious disease caused by a **Poxviridae virus**: Variola virus, group 4 in the EU classification.

Smallpox has two main forms: variola major and variola minor. The symptoms of smallpox begin with high fever, head and body aches, and sometimes vomiting. The characteristic smallpox rash appears.

Both forms cause similar symptoms. The disease follows a milder course in variola minor, which has a case-fatality rate of less than 1 per cent. The fatality rate of variola major is around 30%. There are also two other rare forms of smallpox: haemorrhagic (invariably fatal) and malignant (almost invariably fatal).

Smallpox is transmitted from person to person by infected aerosols and air droplets spread in face-to-face contact with an infected person after fever has begun, especially if symptoms include coughing. The disease can also be transmitted by contaminated clothes and bedding, though the risk of infection from this source is much lower.

Smallpox was one of the world's most feared diseases until it was eradicated by a collaborative global vaccination programme led by the World Health Organization. The last known natural case was in Somalia in 1977. Since then, the only known cases were caused by a laboratory accident in 1978 in Birmingham, England, which killed one person and caused a limited outbreak.

Smallpox was officially declared eradicated in 1979. Since then no case has been noticed in the EU.

Although the WHO declared smallpox eradicated, concern over its potential use by terrorists or in biowarfare has led to striking growth in research related to this disease. The risk for smallpox occurring as a result of a deliberate release by terrorists is not known, but is considered very low⁴⁵.

Modern molecular techniques and new animal models are advancing our understanding of smallpox and its interaction with the host immune system. Rapid progress is likewise being made in smallpox laboratory diagnostics, smallpox vaccines, and antiviral medications. WHO and several nations are developing stockpiles of smallpox vaccine for use in the event the disease is reintroduced. National and international public-health agencies have also drawn up plans to help with early detection of and response to a smallpox outbreak. These plans hinge on physicians' ability to recognise the clinical features of smallpox and to distinguish it from other illnesses characterised by rashes [27].

⁴⁵ <http://www.bt.cdc.gov/agent/smallpox/prep/cdc-prep.asp>

3.14. Antibiotic-resistant microorganisms and health outcomes

3.14.1. Basic characteristics

Antibiotic-resistant bacteria have developed resistance to certain antimicrobial agents to which they were originally susceptible.

Several factors have resulted in the apparition of the drug-resistant bacteria: wide spread use of antibiotics for human health, for veterinary purposes and as animal growth promoters, as well as the natural evolution of bacteria. Bacteria constantly adapt to their environment and have the ability to take on the characteristics of other bacteria. When antibiotics are mis-or overused, the weak bacteria are killed, while the more resistant ones survive and multiply. Worse, organisms developing resistance to one antibiotic have the ability to develop resistance to another chemically related antibiotic. This phenomenon is called cross-resistance.

Common examples of these organisms include:

MRSA - Methicillin/oxacillin-resistant *Staphylococcus aureus*: *Staphylococcus aureus* can be found on many individuals skin and do not cause major problems; if it gets inside the body, for instance under the skin or into the lungs, it can cause important infections such as boils or pneumonia. MRSA is *Staphylococcus aureus* resistant to commonly used anti-staphylococcal antibiotics. It is currently the most commonly identified antibiotic-resistant pathogen in hospitals and the most important cause of antibiotic-resistant health care-associated infections in many parts of the world, including Europe, the Americas, North Africa and the Middle- and Far-East. Infections with MRSA may result in prolonged hospital stay and in higher mortality rates. An increasing problem with community acquired MRSA, which have slightly different clinical characteristics, has been reported recently.

Escherichia coli bacteria: although *E. coli* usually colonises intestines with no adverse health effects, the bacteria are the most frequent cause of community and hospital-acquired urinary tract infections. It is associated with spontaneous and surgical peritonitis and causes synergistic wound infections. *E. coli* may carry several resistance mechanisms. The problem with the Extended Spectrum Beta-Lactamases (ESBLs) is particularly worrisome as resistance may be transferred between different bacteria, for instance in the gut. This is probably the most rapidly growing threat at present.

VRE - Vancomycin-resistant enterococci: enterococci can live in the human intestines and female genital tract without causing disease. Sometimes this bacterium can be the cause of urinary tract infections, blood stream infections and wound infections. The vast majority of clinical enterococcal infections in humans are caused by *Enterococcus faecalis* (around 80% of clinical isolates) and *Enterococcus faecium*. Enterococci are intrinsically resistant to a broad range of antibiotics, difficult to treat and have a tendency to disseminate and spread between patients in the hospital setting.

PRSP - Penicillin-resistant *Streptococcus pneumoniae*: *Streptococcus pneumoniae* is the frequent cause of severe lower respiratory tract infections (e.g. pneumonia), especially among young children, elderly people and patients with immunodeficiencies. Morbidity and mortality are high and annually approximately 3 million people worldwide die of pneumococcal infections.

Until 2000, *Streptococcus pneumoniae* infections caused is US 100 000-135 000 hospitalizations for pneumonia, 6 million cases of otitis media, and 60 000 cases of invasive disease, including 3300 cases of meningitis. Incidence of sterile-site infections showed geographic variation from 21 to 33 cases per 100,000 population. Disease figures are now changing due to conjugate vaccine introduction; in 2002, the rate of invasive disease was 13 cases per 100,000 in the United States⁴⁶.

The frequency of antibiotic resistance in invasive *S. pneumoniae* in Spain was among the highest in the EU. To address the public health problem of antibiotic resistance, the European Union (EU) founded the European Antimicrobial Resistance Surveillance System.

⁴⁶ http://www.cdc.gov/ncidod/dbmd/diseaseinfo/streppneum_t.htm

A network of 40 hospitals that serve approximately 30% of the Spanish population (about 12 million) participated. Each laboratory reported data on antimicrobial susceptibility testing using standard laboratory procedures that were evaluated by an external quality control program. Invasive *S. pneumoniae* was isolated from 1,968 patients, 20% of whom were children at or below the age of 14 years⁴⁷.

Drug-resistant bacteria can spread from human to human or from animal to human, as any other microorganisms. In the health care sector, the most common routes of exposure are probably transmission between patients via contaminated hands of the health care staff. Other possibilities are skin contact with devices or surfaces contaminated with body fluids or skin scales from an infected person, or skin contact with an infected person. MRSA for instance is usually not airborne but spreads through direct or indirect physical contact.

The drug-resistant bacteria can also be transmitted from animals to human. Common causes for the promotion of drug-resistant pathogens in the food industry are: high density of animals, poor hygiene of the working environment and animal confinement areas, failure to control the risk of infection and to control the proper use of antibiotics, in particular the use of antibiotics as growth-promoters, as well as stress reactions amongst the animals. Resistant bacteria may colonise the human intestinal tract and transfer resistance genes to human endogenous flora.

Another pathway for the transfer of drug-resistant bacteria from animals to humans is airborne exposure. Little research is available regarding airborne antibiotic-resistant bacteria within animal's industrial facilities, but workers were found to be exposed to antibiotic-resistant pathogens via dust and bioaerosols in animals confinement facilities, for instance in concentrated swine feeding facilities. Infected or colonised workers may in turn become reservoirs of drug-resistant bacteria that can spread to the broader community.

3.14.2. Prevalence of antibiotic-resistant microorganisms

Antimicrobial resistance is a global problem that must be addressed in all countries. The prevalence of resistant pathogens varies widely between and within countries, and over time.

The report (2004) of the American Centers for Disease Control and Prevention (CDC) mentions the following reported cases of resistant microbes in 2004 in the USA:

- 2590 cases of drug-resistant *Streptococcus pneumoniae*;
- 1 case of vancomycin-resistant *Staphylococcus aureus*;

In Europe the European Antimicrobial Resistance Surveillance System (EARSS) collects routinely data on the major indicator pathogens: *Streptococcus pneumoniae*, *Staphylococcus aureus*, *Enterococcus faecalis*, *Enterococcus faecium* and *Escherichia coli*.

***Streptococcus pneumoniae* resistance reported by EARSS in 2004**

Of the total *S. pneumoniae* population reported:

- 9% were reported non-susceptible to penicillin.
- 15.5% was resistant to erythromycin.
- among the *S. pneumoniae* population both tested for erythromycin and penicillin 5% had reduced susceptibility to both penicillin and erythromycin (dual resistance), 5% were only non-susceptible to penicillin (single penicillin resistance). Most prevalent was single erythromycin resistance with a proportion of 11% (single erythromycin resistance).

⁴⁷ <http://jcm.asm.org/cgi/content/abstract/42/12/5571>

In four countries (BE, IE, ES, UK) a decrease of penicillin non-susceptibility was observed. In three of them (BE, IE, ES) the resistance proportions were over 10% when EARSS started in 1999.

All four saw a constant decrease over the entire surveillance period, which was mainly brought about by a significant reduction in strains displaying full clinical penicillin resistance. Noteworthy, however, is the increasing trend in the proportion of penicillin non-susceptibility in Iceland, Sweden and Finland.

In the past 6 years, erythromycin resistance proportions have remained relatively stable for most of the countries participating in EARSS, except for Germany, The Netherlands and Finland, where a significant increase was observed over the years, with a relatively low proportion of penicillin non-susceptibility. This emphasizes that caution should also be taken even though resistance proportions are still low [28].

3.14.3. Works/occupations at risk

Most at risk are workers in contact with infected people - such as health care workers, and more especially hospital workers - but also laboratories workers, and workers in contact with infected animals in the livestock and food industry: animal handlers, farmers, workers in broiler houses, workers in poultry production, slaughterers, butchers, veterinarian staff etc.

A critical component of the antimicrobial resistance problem are hospitals. The combination of highly susceptible patients, intensive and prolonged antimicrobial agent use, and cross-infection may lead to nosocomial (hospital acquired) infections with highly resistant bacterial pathogens in patients, who then become a reservoir of contamination for staff.

Failure to implement simple infection control practices before and after contact with patients, such as disinfecting hands and changing gloves, is a common cause for contamination (or sometimes colonisation) of staff and further secondary transmission. The importance of legislation and relevant procedures concerning infection control could be emphasised for protection of staff and patients in health care settings.

Epidemiological studies have traced resistant human infections directly to specific livestock and poultry operations. Especially workers handling animal faeces are at risk. A study by the University Hospital Maastricht demonstrates that the prevalence of the faecal *E. coli* resistant to some antimicrobial agents is rather high in turkey farmers, broiler farmers, laying-hen farmers, turkey slaughterers and broiler slaughterers⁴⁸:

Table 3: Prevalence (%) and high degree (%) of antibiotic-resistant faecal *E. coli* from poultry farmers and poultry slaughterers

	Turkey farmers (n=47)		Broiler Farmers (n=51)		Laying-hen farmers (n=25)		Turkey slaughterers (n=47)		Broiler slaughterers (n=46)	
Antimicrobial agent (concentration mg/L)	prev.	HD	prev.	HD	prev.	HD	prev.	HD	prev.	HD
Amoxycillin (25)	66	19	57	22	32	4	45	9	48	20
Ciprofloxacin (4)	23	4	8	2	0	0	0	0	7	0
Flumequine (16)	26	4	14	2	0	0	0	0	9	0
Neomycin (32)	57	6	20	2	8	0	32	0	54	15
Nitrofurantoin (50)	2	0	2	2	0	0	0	0	0	0

⁴⁸ <http://jac.oxfordjournals.org/cgi/content/full/47/6/763#T1>

	Turkey farmers (n=47)		Broiler Farmers (n=51)		Laying-hen farmers (n=25)		Turkey slaughterers (n=47)		Broiler slaughterers (n=46)	
Antimicrobial agent (concentration mg/L)	prev.	HD	prev.	HD	prev.	HD	prev.	HD	prev.	HD
Oxytetracycline (25)	79	28	61	16	36	4	55	19	43	13
Trimethoprim (8)	72	15	47	14	28	4	38	11	37	11

prev. = Prevalence

HD = high degree (i.e. a high proportion of resistant *E. coli*, $\geq 50\%$ of the total *E. coli* population of each sample).

Workers in the livestock are especially at risk when a high density of animals and poor hygiene is noticed in the working environment, so the animals' housing provisions are of great importance.

The apparition of antimicrobial-resistance results from widespread use of antibiotics in human and veterinary treatment, often incorrect, the non-therapeutic use e.g. in livestock production and the natural evolution processes. The EU ban on the use of antibiotics for non-medical purposes was published⁴⁹ not only as part of the EU's food safety strategy, but for public health purposes. The need of the reduction of non-essential use of antibiotics was emphasized.

The continuous evolving of antimicrobial-resistant organisms should be taken into account in the policies and procedures aimed to minimise their spread and possible health outcomes⁵⁰.

3.15. Summary

- Some factors, such as environmental changes, microbiological adaptation, globalization of trade and traffic⁵¹ as well as agriculture/food production have influenced the emergence of new risks related to infectious biological agents. The new and increasing OSH risk caused by infectious biological agents can affect all population, including workplaces and are recognized as an issue with potentially serious impact on human health. If they are present in working environment, the occupational risks for workers are high and can not be accepted without implementation of appropriate preventive measures. Some workers can be especially exposed, including those working in health care sector and agriculture.
- There are only limited data on occupational exposure to infectious biological agents in the EU. Statistical information concerning occupational diseases (it means cases that were accepted as an occupational disease by the national compensation or other competent authorities) do exist in the most countries, however not all work – related infectious diseases are registered as occupational diseases. The rules of recognition and notification of occupational diseases vary between the Member States. The probable under-reporting of occupational diseases might be related to many sources of limitations. An analysis of EU occupational data should be supported by public health statistics, registered in Eurostat database, concerning general prevalence of the disease among the population. The link between occupational health and public health area should be emphasised. Additionally, different sources of information should be used in order to characterise occupational exposure, including information provided by non-European sources (e.g. CDC in the US), information on the outbreaks of diseases causing by emerging infectious biological agents imported from non-European regions (such as SARS, avian influenza, etc.) which have affected workers (mainly from health care sector and air transport) and some research reports.

⁴⁹ <http://europa.eu/rapid/pressReleasesAction.do?reference=IP/05/1687&>

⁵⁰ http://www.ccohs.ca/oshanswers/biol_hazards/drugresist.html

⁵¹ Globalisation and occupational infectious risk – C. Le Bâcle – INRS – 2005

- Basic information on prevalence of diseases related to some emerging infectious biological agents and occupational groups exposed have been summarised in the table 4. Analysis of the information collected confirm the growing importance of the risks related to these agents and indicate that more and more effective prevention is necessary.
- Emerging infectious biological agents can have a major impact on human's health. They include some zoonotic diseases. On the basis of latest forecasts on emerging biological risks related to occupational health, the main representatives were pointed out: Blood borne pathogens such as hepatitis C and B viruses and HIV, Lassa and Hanta virus, Avian influenza, SARS, Legionella, Tuberculosis, Tularaemia (which potentially could be used as biological weapon). Summarized data on prevalence of the agents/diseases and examples of workplaces/occupations exposed are given in the Table below.
- Biological agents with the major impact on the human's health also include drug-resistant microorganisms which can cause very severe infections which are difficult to treat.
- Some of the infectious biological agents, such as e.g. that causing anthrax, tularaemia and plague are for years present in natural environment and currently can be treated as emerging risks because of the possibility to be used in the deliberate way for bioterrorism purposes. Because of that information on the unexpected cases of these diseases and the appropriate preventive measures is needed.
- In order to strengthen the capacity to identify and to prevent infectious biological agents at workplaces further development of the European monitoring and surveillance system is necessary. Currently the information on the number of cases in general population is available for each UE country. More detailed information concerning work – related (not only occupational) infectious diseases would be useful to improve preventive measures at workplaces.
- The Directive 2000/54/EC lays down particular minimum provisions designed to guarantee a better standard of workers' safety and health and applies to activities in which workers are actually or potentially exposed to biological agents as a result of their work. Preventive measures in the workplace are specific for the particular level of classification, covering four risk groups of biological agents. High quality risk assessment and provision of adequate OSH trainings are of great importance.

Table 4: Biological agents/diseases – prevalence and examples of workplaces/occupation exposed

Agent / disease	Prevalence in the world	Prevalence in the EU	Some examples of works/occupations exposed
Hepatitis B virus (HBV)	<ul style="list-style-type: none"> App. 350 million cases of chronic hepatitis b infection in the world. 	<ul style="list-style-type: none"> App. 8400 cases in the EU in 2005. In 1998 – 2004 number of cases registered in the EU has decreased almost 3-folds. The growing tendency in incidence rates has been noticed in Belgium, Austria, Cyprus. 	<ul style="list-style-type: none"> Health care workers, Emergency services (ambulance/fire/police/rescue), Education, Beauticians' work, Laboratory work (forensic, research etc), Medical/dental equipment repair, Mortuary work, Needle exchange services, Social services, Cleaners.
Hepatitis C virus (HCV)	<ul style="list-style-type: none"> App. 180 million cases of hepatitis c infection in the world. App. 3 – 4 million of new cases each year. 	<ul style="list-style-type: none"> App. 28 000 cases in the EU in 2005. In 1998 – 2004 number of cases registered in the EU has increased almost 3-folds. 	<ul style="list-style-type: none"> Education, Beauticians' work, Laboratory work (forensic, research etc), Medical/dental equipment repair, Mortuary work, Needle exchange services, Social services, Cleaners.
Human immunodeficiency virus (HIV)	<ul style="list-style-type: none"> App. 33.4 – 46.0 million cases of hiv worldwide in 2005. App. 3.4 – 6.2 million cases of new infections with hiv. App. 2.4 – 3.3 million of deaths due to aids. 	<p>In 1994 – 2003:</p> <ul style="list-style-type: none"> New hiv infections incidence rate per 100 000 population has increased by 85%. The number of new hiv incidence rate (per 1000 000 population) exceeded 5 cases in 2004. Incidence rate of clinically diagnosed aids cases has dropped in EU-region by app. 70%. 	<ul style="list-style-type: none"> Medical/dental equipment repair, Mortuary work, Needle exchange services, Social services, Cleaners.
Lassa	The number of cases annually is estimated at 200 000 – 400 000 cases with several thousand fatal.	<ul style="list-style-type: none"> In 2000, there are 2 cases of Lassa in Germany, 1 in The Netherlands and 1 in United Kingdom, registered in Cidid database. 1 case of Lassa fever imported in Germany on 21 July 2006. 	<ul style="list-style-type: none"> Health care workers, Aircraft personnel.
Hanta	App. 150 000 to 200 000 cases involving hospitalization are reported each year.	<ul style="list-style-type: none"> Almost 16 000 hanta cases registered in 1998 – 2005 in the EU. From 1999 every 3 years significant increase in the number of cases has been noticed. From 1 January to 15 June 2005, 120 cases were reported in Belgium and 115 cases in France. 	<ul style="list-style-type: none"> Foresters, Agricultural workers, Plumbers, electricians, telephone installers, maintenance and certain construction workers, Cleaners dealing with dead rodents, their faeces and/or nesting materials.

Agent / disease	Prevalence in the world	Prevalence in the EU	Some examples of works/occupations exposed
		<ul style="list-style-type: none"> In Germany, 258 laboratory confirmed hantavirus cases were reported between 1st January and 30 June, and in contrast to previous annual trends, the increase in cases has occurred earlier in the year. 	
Avian influenza	<ul style="list-style-type: none"> According to WHO, human cases in the current outbreak have been reported in 10 countries. All in all, there has been 231 laboratory-confirmed cases of which 133 (57%) have been fatal (situation on July 20, 2006). 	<ul style="list-style-type: none"> The direct risk to the health of people in Europe from A/H5N1 is very low, but not zero. Human outbreaks in Turkey, Iraq, Azerbaijan, Egypt and elsewhere have indicated the potential of infection of humans from sick domestic poultry and probably also wild birds. In 2003 in the The Netherlands, 83 confirmed cases of human H7N7 influenza virus infections were reported. In the same period Dutch authorities have reported evidence of possible transmission of H7N7 influenza from 2 poultry workers to 3 family members. 	<ul style="list-style-type: none"> Health care workers caring for those with H5N1 infection, Persons working in laboratories with H5N1 viruses, Veterinarian and people involved in controlling outbreaks in birds (culling), People who work on industrial poultry farms, People who may have close contact with infected wild birds e.g. Some ornithologists and hunters, People who deal with sewage which is contaminated with H5N1.
SARS	During the outbreak in 2002-2003, a total of 8 098 people worldwide became sick with SARS; of these, 774 died.	In 2003 in France one SARS case has been imported from Viet Nam. One aircraft staff member, 2 passengers and a friend of the ill person were infected. Two cases have been imported from China.	<ul style="list-style-type: none"> Health care workers, Laboratory workers handling samples or items contaminated with the virus, Funeral services workers, Public transportation workers including airline crew, Food handlers and people who prepare or serve food (mainly in underdeveloped regions in Asia).
Legionnaires' disease	First described outbreak of Legionnaires' Disease occurred in 1976 in a hotel, since that time the disease have been reported in North and South America, Asia, Australia, New Zealand, Europe and Africa.	<ul style="list-style-type: none"> The number of the Legionnaires' Diseases cases in the Europe (including EU countries) has grown significantly in the last years. 	<ul style="list-style-type: none"> Health care workers. Workers exposed to a contaminated cooling tower, including maintaining water cooling towers in air conditioning systems.

Agent / disease	Prevalence in the world	Prevalence in the EU	Some examples of works/occupations exposed
		<ul style="list-style-type: none"> The countries with the highest number of Legionnaires' Disease's cases registered in 1989 – 2005 are: England & Wales (1695 cases), The Netherlands (987 cases), France (811 cases), Italy (515 cases), Sweden (321 cases) and Denmark (315 cases). 	<ul style="list-style-type: none"> Some outdoor works, e.g. Related to soil distribution by bulldozing and working in the areas where surface or aerosolized water discharge exist which can be contaminated by the microorganisms responsible for legionnaires' disease.
Tuberculosis	<ul style="list-style-type: none"> 1/3 of the world's population is infected with Tuberculosis. App. 300 000 new cases of Multi-drug resistant tuberculosis per year worldwide. 79% of MDR-TB cases are now "super strains", resistant to at least three of the four main drugs used to cure TB. 	<ul style="list-style-type: none"> In 1994 – 2004 the Tuberculosis incidence rates in the EU region have decreased by app. 40%. In 2005, the 25 EU countries (plus Iceland and Norway) reported 59 497 TB cases corresponding to an overall rate of 13 per 100 000 per year, with a countrywide range from 4 to 75. In some EU countries: Estonia, Lithuania and Latvia the incidence of MDR TB is one of the highest. 	<ul style="list-style-type: none"> Health care (hospitals, community nursing, associated cleaning services). Emergency services (ambulance/police). Laboratory work. Education.
Tularaemia	<ul style="list-style-type: none"> Outbreaks were registered in Kosovo during 2002 with 715 suspected cases (170 laboratory confirmed) and during 2000 with 699 suspected cases (56 laboratory confirmed). 2019 cases of tularaemia were registered from 1987 till 1997 in three regions: the Northern, the Central and the West-Siberian and other regions of the Russian Federation. Small outbreaks were reported. In the USA. 	<ul style="list-style-type: none"> Every 3 years the number of tularemia cases registered in CISID database in the EU countries is growing significantly (853 cases in 1997, 1626 cases in 2000, 175 cases in 2003). There is no visible trend in the number of cases in the periods between outbreaks. In the last years the incidence rates were the highest in Sweden and Finland. In France, 20 sporadic cases were notified in 2003 and 21 cases in 2004. 	<ul style="list-style-type: none"> Farmers. Foresters. Veterinarians. Microbiological laboratory workers.

4. Policies and practices concerning the infectious biological agents/diseases and specific health problems, with regard to workers' protection at work

4.1. *Introduction*

Effective identification of occupational hazard related to infectious biological agents and relevant prevention at workplaces - is a challenging issue which requires co-operation between institutions responsible for occupational health and safety, public health, environmental health and also for animal health protection and food safety. Occupational safety at health is an interdisciplinary one, and the interactions between OSH and public health and other overlapping areas of human activity is of utmost importance.

In the last years a number of initiatives have been launched by different international and European bodies, aimed at strengthening global response to emerging and re-emerging infectious diseases and related issues, such as deliberate use of biological agents or drug-resistance. The new International Health Regulation encompasses public health emergencies of international concern, including emerging diseases, which must be reported as soon as possible to the WHO [29]. The initiative, as many others, is mainly related to public health area. However, some policies and practices, e.g. Finnish policies concerning Tuberculosis, SARS, Legionella (Tab. 5) have been developed with regard to health protection at work, particularly for the most exposed groups of workers, such as health care workers.

At international level policies concerning infectious diseases with focusing on workplaces have been developed mainly by World Health Organization (WHO) and International Labour Organization (ILO). Other international organizations, such as Food and Agriculture Organization (FAO), International Union of Food, Agricultural, Hotel, Restaurant, Catering, Tobacco and Allied Workers' Associations (IUF) have also published some workplace-related guidelines, directed at prevention of specific diseases such as, for example, avian influenza.

In the European Union provisions concerning identification and prevention of all risks at the workplaces (including biological) have been primarily established in the EU directives:

- 89/391/EEC on the introduction of measures to encourage improvements in the safety and health of workers at work,
- 89/686/EEC on the approximation of the laws of the Member States relating to personal protective equipment,
- 89/656/EEC on the minimum health and safety requirements for the use by workers of personal protective equipment at the workplace.

The specific requirement related to exposure to biological agents at workplaces have been presented in the Directive 2000/54/EC on the protection of workers from risks related to exposure to biological agents at work (the seventh individual directive within the meaning of Article 16(1) of Directive 1989/391). This Directive provides more specific provisions concerning rules of proceeding in the case of actual or potential exposure to biological agents at workplaces, including requirements for information and notification to the competent authority (art. 7 and 13), provision for maintaining hygiene and individual protection (art. 8), information and training of workers (articles 9 and 10), establishing and keeping a list of exposed workers (art. 11) and conducting health surveillance (art. 14), as well as need for special measures for industrial processes, laboratories and animal rooms (art. 16). According to the directives it is the employer's obligation to assess risks related to the exposure to biological agents (including infectious) at the workplace and to apply appropriate measures to eliminate or minimise the risk.

Commission Recommendation concerning the European schedule of occupational diseases (2003), contains a list of diseases, taking into account infectious and parasitic diseases (position 4): Infectious or parasitic diseases transmitted to man by animals or remains of animals, Tetanus, Brucellosis, Viral hepatitis, Tuberculosis, Amoebiasis and other infectious diseases caused by work in

disease prevention, health care, domiciliary assistance and other comparable activities for which a risk of infection has been proven⁵².

There are only limited number of policies and practices developed at European level with regard to prevention of infectious diseases with the workplace focus. The majority of the European policies and practices concerning surveillance, prevention and response to infectious diseases have been developed with regard to public health. Some elements related to workplace health and safety are included in guidance developed at European level for Legionella and Avian Flu prevention.

The framework Directive 98/391/EEC, supplemented by individual directives transposed to the EU national legislations, forms the basis for all the further, more specific laws aimed to cover health and safety needs. At national level all the EU countries have implemented the individual Directive 2000/54/EC and established national policies related to biological agents at workplaces in their regulations resulting from the directive. National regulations for monitoring and preventing infectious diseases are mainly related to public health and in some cases also to the most exposed workplaces, such as for example health care, veterinary care and air transport. Nevertheless, there is a significant overlap between these areas and occupational safety, and implementing good practices developed for public health reasons would also improve occupational health and safety. Additionally, in some countries such as e.g. Finland, France, Italy, Spain, good practices have been developed, supporting employers in assessment and prevention of risks arising from exposure to infectious biological agents.

The occupational risk related with biological agents is pointed out among research priorities for the EU [30]. The EU research activities in relation to biological safety cover, among others, European project on development of training for biosafety laboratories level 3 and 4 employees coordinated by Biosafety Europe [<http://www.biosafety-europe.eu/index.html>], the activities of the Stockholm Agency (ECDC) and other networks that deal with infectious diseases.

In the following part of the report, examples of policies and practices related to workplaces, developed at international, European and national levels have been shortly presented. Some policies and practices related mainly to public health, which include elements concerning workplaces, have been also included.

4.2. International policies and practices related to infectious biological agents/diseases, with regard to workers protection at work

4.2.1. Global WHO strategy on occupational health for all: The way to health at work, 1994⁵³

Objectives:

- Strengthening international and national policies for health at work and development of policy tools,
- Developing the healthy work environment,
- Developing healthy work practices and promotion of health at work,
- Strengthening occupational health services (OHS),
- Establishment of support services for occupational health,
- Development of occupational health standards based on scientific risk assessment,
- Development of human resources for occupational health,
- Establishment of registration and data systems development,
- Strengthening research,
- Developing collaboration in occupational health.

⁵² <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32003H0670:EN:HTML>

⁵³ http://www.who.int/occupational_health/publications/globstrategy/en/index.html

Scope and content:

The strategy presents the current situation and new needs of occupational health in different parts of the world, proposes policy principles, 10 objectives and international and national actions for further improvement of occupational health. It creates general framework for actions related to prevention of work-related diseases, including infectious, led by WHO.

This document is directly related to occupational safety and health.

4.2.2. Laboratory biosafety manual. Third edition: WHO, Geneva, 2004⁵⁴

Objectives:

- Creating a helpful reference and guide to develop and establish national codes of practice for securing microbiological assets,
- Providing practical guidance on biosafety techniques for use in laboratories at all levels.

Scope and content

The first *Laboratory Biosafety Manual* has been published in 1983. The third edition has been extensively revised and expanded. The manual now covers risk assessment and safe use of recombinant DNA technology, and provides guidelines for the commissioning and certification of laboratories. Laboratory biosecurity concepts are introduced, and the latest regulations for the transport of infectious substances are reflected. Material on safety in health-care laboratories, previously published elsewhere by WHO, has also been incorporated.

The Manual provides the codes of practices for laboratories with different safety levels (1-4) which include the basic laboratory practices and procedures to promote good (i.e. safe) microbiological techniques (GMT). It includes guidelines related particularly to laboratory design, equipment and facilities, health and medical surveillance, training, waste handling, chemical, fire, electrical, radiation and equipment safety, transport of infectious substances and safety organization and training. It contains also information on first aid, immunization of staff and safety checklists for laboratories.

In many laboratories and national laboratory programmes, the manual could be used to develop written practices and procedures for safe laboratory operations.

This document is related to safety of laboratories regarding biological hazards, with implications for occupational safety.

4.2.3. Avian influenza, including influenza A (H5N1), in humans: WHO interim infection control guideline for health care facilities, 2007 (revised)⁵⁵

Objectives:

To provide guideline for health care workers in health-care facilities evaluating or providing care for patients with suspected or confirmed avian influenza infection, in addition to guidelines in national pandemic influenza plans.

Scope and content:

The guideline is directed to government planners, health-care facility administrators, infection control practitioners, occupational health specialists, direct care providers and other professionals involved in

⁵⁴ http://www.who.int/csr/resources/publications/biosafety/WHO_CDS_CSR_LYO_2004_11/en

⁵⁵ <http://www.wpro.who.int/NR/rdonlyres/EA6D9DF3-688D-4316-91DF-5553E7B1DBCD/0/InfectionControlAInhumansWHOInterimGuidelinesfor.pdf>

patient care. The guideline includes recommendations concerning general control precautions for all health – care facilities and recommendations for safe provision of care for Avian influenza infected patients.

This document is related to occupational safety and health of health care workers.

4.2.4. WHO Laboratory biosafety guidelines for handling specimens suspected of containing avian influenza A virus, 2005⁵⁶

Objectives:

To minimize the possibility of an avian influenza infection in humans following a laboratory accident.

Scope and content:

The guidelines are intended for management of an institute or laboratory, supervisors and laboratory employees. They include general recommendations on standard precautions and guidelines for handling specimens that may contain avian influenza A virus. Guidelines can be used additional to WHO Laboratory Biosafety Manual.

This document is related to safety of laboratories regarding avian influenza hazards, with implications for occupational safety.

4.2.5. WHO Interim recommendations for the protection of the persons involved in the mass slaughter of animals potentially infected with highly pathogenic avian influenza viruses, 2004⁵⁷

Objectives:

To prevent human infections resulting from exposure to infected poultry and their faeces or dust/soil contaminated with faeces.

Scope and content:

The recommendation indicates preventive measures which should be used, such as personal protective equipment for cullers and transporters, disinfection, monitoring health of all persons exposed to infected chickens, serological surveillance of exposed animal workers and veterinarians.

This document is related to occupational safety and health.

4.2.6. Tuberculosis and Air Travel guidelines for prevention and control, WHO, 2006⁵⁸

Objectives:

- Defining the extent of the problem and the potential risks.
- Providing recommendations for travellers, physicians and health authorities and airline companies.

⁵⁶ http://www.who.int/csr/disease/avian_influenza/guidelines/handlingspecimens/en/index.html

⁵⁷ <http://www.wpro.who.int/NR/rdonlyres/7693BAF7-13E7-42DB-B92B-004CF5D517E7/0/WHOinterimrecommendation26012004.pdf>

⁵⁸ http://www.who.int/tb/features_archive/aviation_guidelines/en/index.html

- Providing effective procedures to reduce the risk of transmission of infection on board and to ensure appropriate follow-up when necessary.

Scope and content:

The guidelines include: information on transmission of TB on board of aircraft, a summary of the practices adopted for the management of patients with infectious TB associated with air travel, and of commonly encountered difficulties, suggestions of practical ways to reduce the risk of exposure to *M. tuberculosis* on board of commercial aircraft, and guidance on procedures to follow and responsibilities when infectious TB is diagnosed in a patient who has a history of recent air travel, including contact tracing, notifying and screening for possible interventions. The guidelines include specific recommendations for passengers, air crews, physicians, health authorities and airline companies. They are applicable to all domestic and international airlines worldwide.

This document is related to public health and occupational safety and health.

4.2.7. Joint ILO/WHO Guidelines on health services and HIV/AIDS, 2005⁵⁹

Objectives:

- To promote the sound management of HIV/AIDS in health services, including the prevention of occupational exposure.
- To ensure appropriate working conditions for health-care workers and effective care of patients, especially those living with HIV/AIDS.

Scope and content:

The guidelines reflect the ten key principles of the ILO code of practice on HIV/AIDS and the world of work which apply to all aspects of work and all workplaces, including the health sector. They are intended for governments, public and private employers, workers and their representatives, professional associations, scientific and academic institutions, and all other groups and bodies with responsibilities and activities relevant to the delivery of health care.

The guidelines include elements related to: legislation, policy development, labour relations, occupational safety and health (including prevention and protection against infectious pathogens in the OSH management system), safe work practices (particularly safe handling of disposable sharps and injection, equipment, cleaning, disinfection and sterilization of equipment, cleaning blood spills, body handling and disposal, laundry and waste management), exposure incident management, care, treatment and support to health-care workers infected or affected by HIV/AIDS, knowledge, education and training of workers.

In addition, practical information on the most relevant technical aspects of occupational safety and health is provided in the form of concise fact sheets adapted from a range of reliable international and national sources.

This document is related to occupational safety and health.

4.2.8. ILO Recommendation No. 192 on Safety and Health in Agriculture⁶⁰

Objectives:

Protecting safety and health of workers in agriculture, related to ILO Recommendation No. 184 on Safety and Health in Agriculture

⁵⁹ http://www.who.int/hiv/pub/prev_care/healthservices/en/index.html

⁶⁰ <http://www.ilo.org/public/english/standards/relm/ilc/ilc89/pdf/r192.pdf>

Elements related to biological agents (including infectious) that may affect workplaces:

a. The article 14 of the convention:

National laws should ensure that risks such as those of infection, allergy or poisoning are prevented or kept to a minimum when biological agents are handled, and activities involving animals, livestock and stabling areas, comply with national or other recognised health and safety standards.

b. The Paragraph 8 of the Recommendation:

Measures for handling biological agents and for handling animals should comprise:

- **Risk assessment measures** to eliminate, prevent or reduce biological risks;
- **Control and testing of animals**, in accordance with veterinary standards and national law and practice, for diseases transmissible to humans;
- **Protective measures for the handling of animals** and, where appropriate, provision of protective equipment and clothing;
- **Protective measures for the handling of biological agents** and, if necessary, provision of appropriate protective equipment and clothing;
- **Immunisation of workers handling animals**, as appropriate;
- **Provision of disinfectants and washing facilities**, and the maintenance and cleaning of personal protective equipment and clothing;
- **Provision of first aid**, antidotes or other emergency procedures in case of contact with poisonous animals, insects or plants;
- **Safety measures for the handling, collection, storage and disposal of manure and waste**;
- **Safety measures for the handling and disposal of carcasses of infected animals**, including the cleaning and disinfection of contaminated premises; and
- **Safety information** including warning signs and training for those workers handling animals.

These documents are related to occupational safety and health.

4.2.9. An ILO code of practice on HIV/AIDS and the world of work, 2001⁶¹

Objectives:

To provide a set of guidelines for addressing the risks resulting from the HIV/AIDS epidemic at the workplace level.

Scope and content:

The code applies to all employers and workers (including applicants for work) in the public and private sectors and all aspects of work, formal and informal.

The guidelines cover the following key areas of action:

- Prevention of HIV/AIDS;
- Management and mitigation of the impact of HIV/AIDS on the world of work;
- Care and support of workers infected and affected by HIV/AIDS;
- Elimination of stigma and discrimination on the basis of real or perceived HIV status.

⁶¹ <http://www.ilo.org/public/english/protection/trav/aids/publ/codelanguage.htm>

This document is related to occupational safety and health.

4.2.10. ILO-FHI HIV/AIDS Behaviour Change Communication Toolkit for the Workplace, 2005⁶²

Objectives:

- To support implementation key aspects of the ILO Code of Practice on HIV/AIDS and the world of work,
- To help users develop, implement and evaluate workplace programmes for behaviour change tailored to workplaces.

Scope and content:

The intended users of the toolkit are stakeholders responsible for HIV/AIDS programming at all levels in the world of work, with a particular focus on the workplace: staff and members of workers' and employers' organizations, representatives of management and workers, workplace HIV/AIDS focal points, members of workplace HIV/AIDS or health and safety committees, and peer educators to be recruited from the workforce. The toolkit is also relevant for ministry officials with workplace-related responsibilities, and in particular for the government as an employer, to help it develop programmes for its own staff and public servants such as teachers and health workers.

It is divided into 7 booklets that can be used either separately or jointly to design and implement a comprehensive BCC programme at the workplace:

1. Overview of Behaviour Change Communication Programming for the Workplace.
2. Gathering Data for the Development of a Behaviour Change Communication Programme for the Workplace.
3. Designing a Behaviour Change Communication Strategy.
4. Developing Materials for a Behaviour Change Communication Programme for the Workplace.
5. Guide to Conducting Peer Education at the Workplace.
6. Tools for Monitoring and Evaluation of the Behaviour Change Communication Programme for the Workplace.
7. Training in the Use of the Toolkit.

This document is related to occupational safety and health.

4.2.11. Action on HIV/AIDS at the workplace starts here: A step-by-step guide, updated 2008⁶³

Objectives:

- To support implementation workplace programmes for HIV/AIDS management.

Scope and content:

The guide is directed mainly to employers', representatives of management and workers and includes 10 following steps:

- Basic information on HIV and AIDS;

⁶² <http://www.ilo.org/public/english/protection/trav/aids/publ/bcc toolkit.htm>

⁶³ <http://www.ilo.org/public/english/protection/trav/aids/steps/index.htm>

- The benefits of acting at the workplace;
- First steps;
- Agreeing a workplace policy;
- Starting a workplace programme;
- Preventing HIV transmission;
- Care, support and treatment;
- Human rights;
- Gender;
- Getting more help and information.

This document is related to occupational safety and health.

4.2.12. Guidelines on addressing HIV/AIDS in the workplace through employment and labour law, ILO 2004⁶⁴

Objective:

To provide specific, workable and practical examples of how to include in labour and employment laws the concepts of prevention, protection and care/support of persons living with HIV/AIDS.

Scope and content:

Guidelines are designed for policy-makers within governments, legislators, workers' organizations, employers' organizations, national AIDS Councils, labour lawyers and judges and, indeed, all practitioners and technicians involved in labour rights and the quest for decent work.

They provide information on how best to incorporate, taking into account the various national circumstances and legal traditions, the body of international principles that have arisen in the field of labour law, in particular citing innovative and successful examples of the substantive content of employment and labour laws. In addition, it provides some examples in the area of enforcement.

This document is related to occupational safety and health.

4.2.13. SARS: Practical and administrative responses to an infectious disease in the workplace, InFocus Programme on Safety and Health at Work and the Environment (SafeWork, ILO), 2004⁶⁵

Objectives:

- Setting informal guidelines on coping with the threat of SARS at the workplace.
- Stimulating and encourage an appropriate future response to SARS.
- Linking the situation with SARS to pre-existing ILO standards on occupational safety and health and working conditions.

Scope and content:

The document provides information on SARS as occupational hazard and actions to be taken at workplace and at national level as a response to a possible case of SARS at the workplace.

This document is related to occupational safety and health.

⁶⁴ <http://www.ilo.org/public/english/dialogue/ifpdial/downloads/papers/hivaids.pdf>

⁶⁵ <http://www.ilo.org/public/english/protection/safework/accidis/sars.pdf>

4.2.14. Protect poultry - Protect people. Basic advice for stopping the spread of avian flu, ECTAD – Emergency Centre for Trans-boundary Animal Diseases, FAO, Agriculture Department, Animal Production and Health Division, 2007⁶⁶

Objectives:

To provide information on the correct practices to avoid the spread of the avian flu among animals and thus reduce the risk of spread to humans.

Scope and content:

FAO provides the basic guidelines on how to reduce the risk of animal-to-animal infection and animal-to-human infection for different categories of people – ranging from poultry keepers, veterinarians and culling teams to the general public. The guidelines are not intended as rules that must be followed but as advice and, where necessary, they should be adapted to fit local situations.

This document is related to public health, veterinary health and occupational safety.

4.3. European policies and practices concerning infectious biological agents/diseases

4.3.1. Council Directive of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work (the framework Directive)⁶⁷

All workers are protected by the framework Directive. The directive's basic principle is risk prevention which requires risk assessment by the responsible employer, and imposes general duty on employers to ensure the health and safety of workers in every aspect related to the work. The main points of the directive specify obligations of employers and workers concerning OSH.

The framework directive 89/391/EEC is supplemented by individual directives to cover safety and health requirements.

4.3.2. Directive 2000/54/EC of the European Parliament and of the Council of 18 September 2000 on the protection of workers from risks related to exposure to biological agents at work (seventh individual directive within the meaning of Article 16(1) of Directive 89/391/EEC)⁶⁸

Objective:

The protection of workers against risks arising or likely to arise from exposure to biological agents at work.

Main elements:

a. Determination and assessment of risks

All the risks arising from exposure to biological agents should be identified and assessed taking into account all available information including:

⁶⁶ http://www.fao.org/docs/eims/upload/207623/FAO_HPAI_messages.pdf

⁶⁷ http://eurlex.europa.eu/smartapi/cgi/sga_doc?smartapi!celexplus!prod!DocNumber&lg=en&type_doc=Directive&an_doc=1989&nu_doc=391

⁶⁸ http://europa.eu/smartapi/cgi/sga_doc?smartapi!celexapi!prod!CELEXnumdoc&lg=EN&numdoc=32000L0054&model=quichett

- classification of biological agents;
- recommendations from a competent authority;
- information on diseases related to the work performed;
- potential allergenic or toxigenic effects of to the work performed.

b. Employers' obligations

Employers' obligations include particularly:

- reduction of risks;
- provision of information for the competent authority;
- provision of means to maintain hygiene and individual protection;
- information and training of workers;
- preparing and keeping the list of workers exposed to group 3 and/or group 4 biological agents;
- consultation and participation of workers;
- notification to the competent authority of the use for the first time of biological agents of the group 2, 3 or 4.

According to the Directive, the classification covers four groups of biological agents, classified according to their level of risk of infection.

- c. **Health surveillance:** each worker shall be able to undergo relevant health surveillance prior to exposure and at regular intervals thereafter.
- d. **Health and veterinary care facilities other than diagnostic laboratories; special measures for industrial processes, laboratories and animal rooms.**

The directive provides also **the Community Classification of Biological Agents and Indicative list of Activities** which may result in exposure to biological agents.

4.3.3. Commission Recommendation concerning the European schedule of occupational diseases (2003)⁶⁹

Objectives:

The development of a European schedule of occupational diseases has three main aims: to improve knowledge of the subject at European level (collection and comparability of data); to step up prevention: the Member States are asked to define quantified objectives with a view to reducing the rate of these diseases and to provide assistance to the workers concerned to enable them more easily to prove the link between their occupational activities and their disease and apply for compensation.

Scope and content:

The Commission recommends, without prejudice to more favorable national laws or regulations, that the Member States:

- introduce into their national legislation the European schedule. This list covers the diseases which have been scientifically recognised as being occupational in origin, which are liable for compensation and which must be the subject of preventive measures;
- work to introduce into their national legislation a law on compensation for occupational diseases whose origin and occupational nature can be proved;
- progressively make their statistics concerning occupational diseases;

⁶⁹ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32003H0670:EN:HTML>

- develop preventive measures, by involving all interested parties and, where appropriate, by exchanging information, experience and good practice through the European Agency for Safety and Health at Work (EU-OSHA);
- establish national quantified objectives with a view to reducing the rate of recognised occupational diseases;
- take special account of medical information notices on diseases in the European schedule and supply other Member States, on request, with all the relevant information on diseases or agents recognised in their national legislation;
- encourage national health systems to contribute actively towards disease prevention, in particular by raising the awareness of medical personnel in order to improve knowledge and diagnosis of these diseases;
- introduce a system for the collection and exchange of data on the epidemiology of diseases;

The Member States themselves determine the criteria for recognising each occupational disease.

4.3.4. Council Directive 89/656/EEC of 30 November 1989 on the minimum health and safety requirements for the use by workers of personal protective equipment at the workplace (third individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC)⁷⁰

Objective:

The Directive describes the minimum health and safety requirements for the use by workers of personal protective equipment at the workplace.

Main elements:

- The term "personal protective equipment" means the equipment designed to be worn or held by the worker to protect him against hazards encountered at work. A number of items are excluded from the definition, such as equipment used by emergency and rescue services, self-defence or deterrent equipment. Such equipment must be used when the existing risks cannot be sufficiently limited by technical means of collective protection or work organisation procedures.
- Personal protective equipment must comply with the relevant Community provisions on design and manufacture with respect to safety and health and with the conditions set out in the Directive. The employer must provide the appropriate equipment free of charge and ensure that it is in good working order and hygienic condition.
- Assessment of personal protective equipment: before choosing personal protective equipment, the employer is required to assess the extent to which it complies with the conditions set out in the Directive. This includes analysis of risks which cannot be avoided by other means and definition and comparison of the requisite characteristics of the equipment.
- Rules for use: Member States shall ensure that general rules are established for the use of personal protective equipment and/or covering cases and situations where the employer must provide such equipment. There must be prior consultation with employers' and workers' organisations. Workers shall be informed of all measures to be taken. Consultation and participation shall take place on the matters covered by the Directive.

⁷⁰

http://eurlex.europa.eu/smartapi/cgi/sga_doc?smartapi!celexplus!prod!DocNumber&lg=en&type_doc=Directive&an_doc=1989&nu_doc=656

4.3.5. **Adapting to change in work and society: a new Community strategy on health and safety at work 2002–2006, Brussels, COM(2002)118 of 11.03.2002⁷¹**

Objectives:

Safety and health at work now constitutes one of the European Union's most concentrated and most important social policy sectors. Creating more and better jobs was the objective the European Union set itself at the Lisbon European Council in March 2000. Health and safety are essential elements of the quality of work. The objective of the Community's policy on health and safety at work must be to bring about a continuing improvement in well-being at work, a concept which is taken to include the physical, moral and social dimensions.

Scope and content:

The strategy has three novel features:

- it adopts a global approach to well-being at work, taking account of changes in the world of work and the emergence of new risks, especially of a psycho-social nature. As such, it is geared to enhancing the quality of work, and regards a safety and healthy working environment as one of the essential components,
- it is based on consolidating a culture of risk prevention, on combining a variety of political instruments — legislation, the social dialogue, progressive measures and best practices, corporate social responsibility and economic incentives — and on building partnerships between all the players on the safety and health scene,
- it points up the fact that an ambitious social policy is a factor in the competitiveness equation and that, on the other side of the coin, having a “non-policy” engenders costs which weigh heavily on economies and societies.

For a global approach to well-being at work, the need of an analysis of new or emerging risks is emphasized, with special reference to risks associated with the interaction between chemical, physical and biological agents, and those associated with the general working environment. In an increasingly feminised society, preventive measures, and the assessment arrangements and the rules for awarding compensation, must take specific account of the growing proportion of women in the workforce, and of the risks to which women are particularly liable. These measures must be based on research covering the ergonomic aspects, workplace design, and the effects of exposure to physical, chemical and **biological agents**.

4.3.6. **Improving quality and productivity at work: Community strategy 2007 – 2012 on health and safety at work (COM (2007) 62 of 21.02.2007)⁷²**

Objectives:

An ongoing, sustainable and uniform reduction in accidents at work and occupational illnesses continues to be the prime objective of the Community strategy for the period 2007-2012. In the Commission's view, the overall objective during this period should be to reduce by 25% the total incidence rate of accidents at work per 100 000 workers in the EU 27.

Scope and content:

In order to achieve this ambitious goal, the following main instruments are proposed:

- guarantee the proper implementation of EU legislation;

⁷¹ http://ec.europa.eu/employment_social/news/2002/mar/new_strategy_en.pdf

⁷² http://eur-lex.europa.eu/LexUriServ/site/en/com/2007/com2007_0062en01.pdf

- support SMEs in the implementation of the legislation in force;
- adapt the legal framework to changes in the workplace and simplify it, particularly in SMEs;
- promote the development and implementation of national strategies;
- encourage changes in the behaviour of workers and encourage their employers to adopt health-focused approaches;
- finalise the methods for identifying and evaluating new potential risks;
- improve the tracking of progress;
- promote health and safety at international level.

The Risk Observatory of the European Agency should enhance risk anticipation to include risks associated with new technologies, **biological hazards**, complex human-machine interfaces and the impact of demographic trends. Certain types of occupational illnesses becoming more common (musculo-skeletal disorders, **infections** and illnesses associated with psychological stress). The nature of occupational hazards is changing in tandem with the acceleration of innovation, the emergence of new risk factors and the transformation of work.

4.3.7. The European Guidelines for Control and Prevention of Travel Associated Legionnaires' Disease, 2005⁷³

Objectives:

- To promote a standardized, harmonized approach to procedures for preventing and detecting legionella infections associated with travel among Member States.
- To provide reporting and response procedures for clusters of cases.

Scope and content:

The Guidelines provide information on the nature of legionnaires' disease and define the roles and responsibilities in response to reports of single cases and clusters of Legionnaires' Disease, procedures for the risk assessment, environmental investigation and control and prevention of legionella in water systems and methods for the investigation and control of an outbreak of legionnaires' disease in an hotel or other accommodation site.

4.3.8. ECDC Guidelines: Minimise the Risk of Humans Acquiring Highly Pathogenic Avian Influenza from Exposure to Infected Birds or Animals⁷⁴

Objectives:

To provide information on the basic principles of prevention for person working with infected birds or animals.

Scope and content:

The Guidelines provide information on the basic rules of protection persons working with infected birds animals. According to the guidelines effective protection is based on the following eight principles:

⁷³ http://www.ewgli.org/data/european_guidelines.htm

⁷⁴ http://www.ewgli.org/data/european_guidelines.htm

- Control infection in birds.
- Minimise the number of people possibly exposed to the virus – as far as possible separating people from the avian viruses and potentially infected birds and animals.
- Technical measures.
- Organisational measures.
- Proper use of personal protective equipment and adoption of technical and organisational measures for those directly involved in the work with potentially infected animals.
- Proper but controlled limited use of antiviral drugs.
- Considering seasonal influenza vaccination, especially if seasonal influenza is circulating.
- Careful surveillance for infection among those potentially exposed.

Each preventive measure should follow a local risk assessment.

4.3.9. Regulation (EC) No 1831/2003 of the European Parliament and of the Council of 22 September 2003 on additives for use in animal nutrition⁷⁵

Objectives:

This measure is in line with the Commission's overall Strategy to combat the threat to human, animal and plant health posed by anti-microbial resistance.

Scope and content:

Antibiotics have been widely used in animal production for decades worldwide. Added in low doses to the feed of farm animals, they improve their growth performance. However, due to the emergence of microbes resistant to antibiotics which are used to treat human and animal infections ("anti-microbial resistance"), the Commission decided to phase out, and ultimately ban, the marketing and use of antibiotics as growth promoters in feed. Antibiotics will now only be allowed to be added to animal feed for veterinary purposes. This decision was based on opinions from the Scientific Steering Committee, which recommended the progressive phasing out of antibiotics used for growth stimulation, while still preserving animal health.

The EU has already banned antibiotics used in human medicine from being added to animal feed. The new Feed Additives Regulation completed measure with the total ban on antibiotics as growth promoters from January 1st 2006. On that date, the following 4 substances will be removed from the EU Register of permitted feed additives:

- Monensin sodium used for cattle for fattening,
- Salinomycin sodium used for piglets and pigs fattening,
- Avilamycin used for piglets, pigs for fattening, chickens for fattening and turkeys,
- Flavophospholipol used for rabbits laying hens, chickens for fattening, turkeys, piglets, pigs, calves and cattle for fattening.

⁷⁵ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:2003R1831:20050325:EN:PDF>

4.4. *National policies and practices concerning infectious biological agents/diseases at workplaces*

4.4.1. General characteristic

Workers in the EU are protected by the framework Directive (89/391/EEC). The directive is supplemented by their individual directives to cover safety and health requirements. All the EU countries have implemented the Directive 2000/54/EC and established national policies related to biological agents at workplaces in their legal acts. The national regulations reflect EU legislation with regard to national needs and priorities and provide general framework for activities related to identification and prevention of all biological agents.

Specific regulations which have been developed with the aim monitoring and preventing infectious diseases are mainly related to public health and in some cases also to the most exposed workplaces, such as health care, veterinary and air transport. As a result of the project, the example of national policies and practices related to biological agents has been gathered from: Belgium, Cyprus, Czech Republic, Germany, Italy, Finland, France, Hungary, Netherland, Poland, Portugal, Slovenia and Spain. Selected examples are given in Table 5.

The presented examples do not include all the EU countries with numerous policies related to this issue. The main aim to present them is to show different areas for which the policies have been established at national level including all the workplaces, specific groups of workers or sectors or specific agents.

Table 5: Examples of national policies and practices related to infectious biological agents

Country	Name and URL of the document	Agent/ Disease	Area of implementation
Finland	<p>Valtioneuvoston päätös työntekijöiden suojelemisesta työhön liittyvältä biologisten tekijöiden aiheuttamalta vaaralta 1155/93</p> <p>Government's decision the protection of workers from work-related biological factors caused danger</p> <p>http://www.finlex.fi/fi/laki/alkup/1993/19931155</p> <p>Sosiaali- ja terveysministeriön päätös biologisten tekijöiden luokituksesta 229/1998</p> <p>Ministry of Social Affairs and Health, biological agents classification</p> <p>http://www.finlex.fi/fi/laki/alkup/1998/19980229</p>	All	All workplaces.
Finland	<p>Legionelloosiin seuranta ja torjunta tehostuvat</p> <p>(Towards improved surveillance and prevention of legionellosis)</p> <p>http://www.fimnet.fi/</p>	Legionella	Health care personnel. Public health.
Finland	<p>SARS - uusiin uhkiin valmistautumista</p> <p>(SARS - improving preparedness to meet new threats)</p> <p>http://www.ktl.fi/attachments/suomi/julkaisut/ohjeet_ja_suositukset/sarssuomen_aakarilehti2004.14.pdf</p>	SARS	General public. Health care personnel.
Finland	<p>Riskiryhmiin kohdistuva tuberkuloosin torjunta</p> <p>(Control of tuberculosis in high risk groups)</p> <p>http://www.ktl.fi/attachments/suomi/julkaisut/ohjeet_ja_suositukset/sll122005-1415.pdf</p> <p>Tuberkuloositartunnalle altistumisen aiheuttamat toimet</p> <p>(Recommendations for contact investigation of tuberculosis cases)</p> <p>http://www.ktl.fi/attachments/suomi/julkaisut/ohjeet_ja_suositukset/sll232003-2529.pdf</p>	Tuberculosis	Health care workers. Health care workers. Hospital personnel.

Country	Name and URL of the document	Agent/ Disease	Area of implementation
	Tuberkuloositartunnan torjunta sairaalassa (Prevention of tuberculosis transmission in hospitals) http://www.ktl.fi/attachments/suomi/julkaisut/ohjeet_ja_suositukset/sll92004-909.pdf		
Finland	"Verenvuotokuumeet". Kappale kirjassa "Infektioiden torjunta sairaalassa". Kuntaliitto, 2005 ("Viral Haemorrhagic Fevers", a chapter in a book "Infection control in hospitals") URL not available	Viral haemorrhagic fevers	Health care workers
Finland	Isorokko (Smallpox) http://www.ktl.fi/portal/suomi/julkaisut/ohjeet_ja_suositukset/isorokko_(smallpox)/ Toiminta pernaruttoepäilyn tai pernarutolle altistumisen yhteydessä (Guidelines for health care professionals: management and prophylaxis after a suspicion of anthrax exposure) http://www.ktl.fi/attachments/suomi/julkaisut/ohjeet_ja_suositukset/pernaruttotoimintaohje_v20.pdf	Bioterrorism issues	Health care workers.
France	Décret n° 94-352 du 4 mai 1994 relatif à la protection des travailleurs contre les risques résultant de leur exposition à des agents biologiques et modifiant le code du travail, Journal Officiel, 6 mai 1994, pp. 6620-6623. Decree No. 94-352 of 4 May 1994 on the protection of workers against the risks resulting from exposure to biological agents and amending the Labour Code, the Official Journal, 6 May 1994, pp. 6620-6623. http://www.legifrance.gouv.fr/	All	All workplaces
France	Arrêté du 18 juillet 1994 fixant la liste des agents biologiques pathogènes Journal Officiel, 30 juillet 1994, pp. 11078-11081. Order of 18 July 1994 establishing the list of biological pathogens, Official Journal 30 July 1994, pp. 11078-11081 http://www.legifrance.gouv.fr/	All	All workplaces

Country	Name and URL of the document	Agent/ Disease	Area of implementation
France	<p>Arrêté du 13 août 1996 fixant les mesures techniques de prévention, notamment de confinement, à mettre en oeuvre dans les industries et les laboratoires de recherche et d'enseignement où les travailleurs sont susceptibles d'être exposés à des agents biologiques pathogènes, Journal Officiel, 7 septembre 1996, pp. 11379-13382.</p> <p>Order of 13 August 1996 laying down the technical preventive measures, including containment, to be implemented in industries and research laboratories and teaching where workers are likely to be exposed to biological pathogens, Official Journal 7 September 1996, pp. 11379-13382.</p> <p>http://www.legifrance.gouv.fr/</p>	Bioterrorism	Deliberate use of biological agents, in industrial process or in laboratory research
France	<p>Décret n° 97-1048 du 6 novembre 1997 relatif à l'élimination des déchets d'activités de soins à risques infectieux et assimilés et des pièces anatomiques et modifiant le code de santé publique, Journal Officiel, 18 novembre 1997, pp. 16675-16676.</p> <p>Decree No. 97-1048 of 6 November 1997 on the disposal of clinical waste at risk of infection and treated anatomical parts and amending the code of public health, Official Journal, 18 November 1997, pp. 16675-16676.</p> <p>http://www.legifrance.gouv.fr/</p>	Bloodborne pathogens	Healthcare sector and healthcare infectious waste transport and destruction
France	<p>Arrêté du 7 septembre 1999 relatif aux modalités d'entreposage des déchets d'activités de soins à risques infectieux et assimilés et des pièces anatomiques, Journal Officiel, 3 octobre 1999, pp. 14685-14691.</p> <p>Order of 7 September 1999 on procedures for waste storage of care activities at risk of infection and treated anatomical parts, Official Journal, 3 October 1999, pp. 14685-14691.</p> <p>http://www.legifrance.gouv.fr/</p>	Bloodborne pathogens	Healthcare sector and healthcare infectious waste transport and destruction
France	<p>Arrêté du 4 novembre 2002 fixant les procédures de décontamination et de désinfection à mettre en oeuvre pour la protection des travailleurs dans les lieux où ils sont susceptibles d'être en contact avec des agents biologiques pathogènes pouvant être présents chez des animaux vivants ou morts, notamment lors de l'élimination des déchets contaminés, ainsi que les mesures d'isolement applicables dans les locaux où se trouvent des animaux susceptibles d'être contaminés par des agents biologiques des groupe 3 et 4.</p>	Biological agents related to zoonosis	Any workplace in any sector if there is contact with live or dead animals or their products.

Country	Name and URL of the document	Agent/ Disease	Area of implementation
	Order of 4 November 2002 establishing procedures for decontamination and disinfection to be implemented for the protection of workers in places where they may be in contact with biological pathogens may be present in animals living or dead, including disposal of waste contaminated and the isolation measures applicable in areas where there are animals that may be contaminated with biological agents of group 3 and 4. http://www.legifrance.gouv.fr/		
Germany	Ordinance on safety and health protection at work involving biological agents (Biological agents ordinance - BioStoffV) of 27 January 1999 (Federal Gazette I p. 50) as amended by Article 8 of the Ordinance of 23 December 2004 (Federal Gazette I p. 3758) http://www.baua.de/nn_74828/de/Themen-von-A-Z/Biologische-Arbeitsstoffe/Rechtstexte/pdf/biological-agents-ordinance.pdf?	All	All workers performing activities involving biological agents including activities in their risk area
Germany	<i>Technischer Regel für Biologische Arbeitsstoffe – TRBA 250</i>	All	Activities involving handling of biological agents in health care and veterinary
Germany	Protective Measures for Specific Technical Rules for and Non-specific Activities involving Biological Agents in Laboratories, TRBA 100 http://www.baua.de/nn_14914/en/Topics-from-A-to-Z/Biological-Agents/TRBA/TRBA-100.html?_nnn=true	All	Specific and non-specific activities involving the handling of biological agents in laboratories
Germany	Guideline for Risk Assessment and for the Instruction of Employees in relation to Activities with Biological Agents, TRBA 400 http://www.baua.de/nn_74858/en/Topics-from-A-to-Z/Biological-Agents/TRBA/pdf/TRBA-400.pdf?	All	Risk assessment and instruction of the employees in relation to targeted and non-targeted activities with biological agents
Germany	Protective Measures for Activities involving Biological Agents in rural areas Schutzmaßnahmen bei Tätigkeiten mit biologischen Arbeitsstoffen in der Land- und Forstwirtschaft und vergleichbaren Tätigkeiten http://www.baua.de/de/Themen-von-A-Z/Biologische-Arbeitsstoffe/TRBA/TRBA-230.html?_nnn=true	All	Activities involving handling of biological agents in rural areas

Country	Name and URL of the document	Agent/ Disease	Area of implementation
Germany	Beschluss 608 "Empfehlung spezieller Maßnahmen zum Schutz der Beschäftigten vor Infektionen durch hochpathogene aviäre Influenzaviren (Klassische Geflügelpest, Vogelgrippe)" http://www.baua.de/nr_15398/de/Themen-von-A-Z/Biologische-Arbeitsstoffe/TRBA/pdf/Beschluss-608.pdf	Avian influenza	All employees for which contact with avian influenza is possible
Germany	Beschluss 609 "Arbeitsschutz beim Auftreten von nicht impfpräventabler Influenza unter besonderer Berücksichtigung des Atemschutzes"	Avian influenza	
Italy	Decreto del Ministero della Sanità del 28-9-90: "Norme di prevenzione del contagio professionale da HIV nelle strutture sanitarie e assistenziali pubbliche e private" Decree of the Ministry of Health of 28-9-90: "Rules of prevention of occupational HIV infection in health facilities and public welfare and private" http://www.omceo.me.it/sportello/leg_san/aids/DM_28_09_90.pdf	Bloodborne pathogens	Healthcare sector
Italy	Ministero della Salute - CCM-16/10/2006 "Febbri Emorragiche Virali - Raccomandazioni e indicazioni per il trasporto". Ministry of Health - CCM-16/10/2006 "Viral haemorrhagic fevers - Recommendations and guidelines for the transport." http://www.ministerosalute.it/dettaglio/pdfFocus.jsp?area=promozione&colore=3&id=403	Viral Haemorrhagic Fevers	Transports
Italy	"Prevenzione e controllo dell'influenza: raccomandazioni per la stagione 2006-2007". "Prevention and control of influenza: recommendations for the 2006-2007 season." http://www.ministerosalute.it/imgs/C_17_normativa_762_allegato.pdf	Influenza	All
Italy	"Linee Guida sull'attività di sterilizzazione quale protezione collettiva da agenti biologici per l'operatore nelle strutture sanitarie". "Guidelines on sterilization as a collective protection from biological agents for the operator in healthcare facilities." http://www.ispesl.it/linee_guida/fattore_di_rischio/LGAgeBiolSter.htm	All	Healthcare sector

Country	Name and URL of the document	Agent/ Disease	Area of implementation
Portugal	<p>Viral hemorrhagic fevers (Marburg). Procedures for identification of suspected cases.</p> <p>Surveillance of the travelers. Guidelines for the Airline companies, Airports, Health authorities, National Institute for Medical Emergency (INEM) and Hospitals.</p> <p>Surveillance of the travelers. Guidelines for the Shipping agents, Port and Maritime authorities, Health authorities, National Institute for Medical Emergency (INEM) and Hospitals.</p> <p>Recomendations concerning personnel protective equipment. Guide for personnel protective equipment of professionals of reference hospitals and INEM (Recomendações sobre equipamento de protecção individual. Guia sobre equipamento de protecção individual para os profissionais dos Hospitais de Referência e INEM)</p> <p>Laboratory procedures. Guide for handling of biological samples of possible cases of Viral haemorrhagic fevers (Marburg) aim to personnel of investigation laboratories and reference hospitals (Procedimentos Laboratoriais. Guia para a colheita das mostras biológicas destinadas à investigação laboratorial de possíveis casos de Febre Hemorrágica de Marburgo, a aplicar pelos Hospitais de Referência.)</p> <p>URL for all documents: http://www.dgs.pt/default.aspx</p>	Viral haemorrhagic fevers (Marburg)	<p>Travellers.</p> <p>Ports and Airports.</p> <p>Crew.</p> <p>Hospitals.</p> <p>Healthcare workers.</p>
Portugal	<p>Doença dos Legionários. Guia Prático. Direcção-Geral da Saúde & Direcção-Geral do Turismo, Lisboa 2001</p> <p>(<i>Legionella disease. Practical guide. D.G. Health and D.G. Tourism. Lisboa 2001</i>).</p>	Legionella	General public. Tourists. Tourism workers. Maintenance workers.
Spain	Real Decreto 664/97, on the protection of workers from risks related to exposure to biological agents at work.	All biological agents.	All workplaces.
Spain	<p>NATIONAL INFLUENZA PREPAREDNESS AND RESPONSE PLAN. Ministry of Health.</p> <p>(Plan Nacional de Preparación y Respuesta ante una Pandemia de Gripe. Ministerio de Sanidad y Consumo)</p> <p>Procedimiento a seguir ante la detección de infección humana por el virus de la gripe A/H5</p>	Influenza. Zoonotic influenza	General population. Health care professionals. Workers and people in general exposed to infected animals.

Country	Name and URL of the document	Agent/ Disease	Area of implementation
	<p>Medidas de control de la infección (Anexo II)</p> <p>Protocolo de actuación para trabajadores y personas expuestas a aves o animales infectados por virus de la gripe aviar altamente patógenos, incluyendo el H5N1 (Anexo III)</p> <p>http://www.msc.es/ciudadanos/enfLesiones/enfTransmisibles/docs/PlanGripeEspaol.pdf</p> <p>http://www.msc.es/en/ciudadanos/enfLesiones/enfTransmisibles/docs/PlanGripelngles.pdf</p> <p>http://www.msc.es/ciudadanos/enfLesiones/enfTransmisibles/docs/anexoI.pdf</p> <p>http://www.msc.es/ciudadanos/enfLesiones/enfTransmisibles/docs/anexoII.pdf</p> <p>http://www.msc.es/ciudadanos/enfLesiones/enfTransmisibles/docs/anexoIII.pdf</p>		
Spain	<p>ORDEN 827/2005, de 11 de mayo, de la Consejería de Sanidad y Consumo de la Comunidad de Madrid, por la que se establecen e implantan los procedimientos de seguridad y el sistema de vigilancia frente al accidente con riesgo biológico en el ámbito sanitario de la Comunidad de Madrid.</p> <p>(Regulation of the Health and Consume Authority of the Autonomous council of Madrid that states and develop the safety procedures and surveillance systems about work accidents with biological risk of the health system of the Autonomous community of Madrid)</p> <p>http://www.csi-csif.es/madrid/Article481.html</p>	Bloodborne pathogens.	Personnel of the centers and sanitary establishments of the Madrilenian Service of Health.
Spain	<p><u>REAL DECREEE 865/2003</u>, of 4 of July, by which the hygienic criteria for the prevention and control of the legionellosis are settle down</p> <p>(<u>REAL DECRETO 865/2003</u>, de 4 de julio, por el que se establecen los criterios higiénico-sanitarios para la prevención y control de la legionelosis)</p> <p>http://www.mtas.es/insht/legislation/tl_hig.htm#biologicos</p> <p>Recommendations for prevention and control of legionellosis</p> <p>http://www.msc.es/ciudadanos/saludAmbLaboral/agenBiologicos/legionelosis.htm</p> <p>NORMA UNE 100030:1994 IN- CLIMATIZACION. GUIA PARA LA PREVENCIÓN DE LEGIONELA EN INSTALACIONES</p>	Legionella.	Aimed mainly at the general public, although there is emphasis on the occupational health and safety of workers involved in maintenance of Additionally, the information is valid for engineers, architects (responsible for design), installers (assembly supervisors) and maintenance companies.

Country	Name and URL of the document	Agent/ Disease	Area of implementation
	REAL DECRETO 1751/1998, de 31 de julio, por el que se aprueba el Reglamento de Instalaciones Térmicas en los Edificios (RITE) y sus Instrucciones Técnicas Complementarias (ITE) y se crea la Comisión Asesora para las Instalaciones Térmicas de los Edificios, modificado por el <u>Real Decreto 1218/2002</u> , de 22 de noviembre. http://www.mtas.es/insht/legislation/RD/RD1751_rite.htm		
Spain	Protocol for viral hemorrhagic fever (approved for the Interterritorial Council of the National health system 26-03-2003) (Protocolo de fiebres hemorrágicas virales. Aprobado por el Pleno del Consejo Interterritorial del Sistema Nacional de Salud el 26 de marzo de 2003.) Handling and controlling viral hemorrhagic fevers. Instituto de Salud Carlos III. Ministry of Health. (Manejo y control de las fiebres hemorrágicas virales. Instituto de Salud Carlos III. Ministerio de Sanidad y Consumo) http://bvs.isciii.es/mono/pdf/bes0334.pdf http://aevi.isciii.es/Documentos/ManejoControl/Manual.PDF	Viral haemorrhagic fevers	Health professionals
Spain	Protocol of activities in case of deliberate dissemination of <i>Bacillus anthracis</i> http://www.isciii.es/	Bacillus anthracis,	General population. Health professionals: emergency departments and family centres
Spain	Relevant information about main terrorism biological agents (document for internal use in health facilities) http://www.gencat.net/salut/depsan/units/sanitat/pdf/esbioterror.pdf	Bacillus anthracis, viruela	Health centres of Catalunya
Spain	Antibiotic use guidelines	Antibiotic-resistant microorganisms	Health centres

The policies and practices developed at national level for the all infectious agents are related mainly to health care sector where exposure is the highest. The biological agents/diseases for which the specific national policies have been established include blood borne pathogens, legionella, viral haemorrhagic fevers, SARS, tuberculosis, influenza and zoonotic influenza, bacillus anthracis, smallpox and viruela. In the last years still new policies and practices are developed directed at specific agents or sectors which positively influence prevention at the workplace level.

The examples of policies show the diversity of legal solutions concerning infectious biological agents at workplaces and the complexity of the risk assessment and prevention with regard to all the legal requirements. The policies concern both: the public health and occupational health areas. They cover biological hazard in general or are focused on hazard of specific agent/diseases and are addressed to related sector/occupations.

The legal requirements and guidance has established general framework for identification and prevention of infectious diseases at workplaces. The fulfilment of legal obligations would be easier and most effective in the case of availability of appropriate good practices supporting these activities. General overview of activities in this area indicates that in some (but till now not in the all) EU countries good practices directed at workplaces have been developed and made available for all interested parties. Some examples are presented in next sections.

4.4.2. National guidelines for preventing infections with antibiotic – resistant microorganisms

For preventing of some specific issues, such as for example spreading of antibiotic – resistant microorganisms, national guidance has been developed in some countries with the main focus on patient and public. However, these guidelines influence implementation of good practices at workplaces - in hospitals. An example can be guidelines for the prevention of nosocomial (hospital-acquired) infections, developed in a number of EU countries.

Antibiotic – resistant microorganisms: Recommendations for the prevention of nosocomial infections

National guidelines specifically devoted to prevention of nosocomial infections have been issued in Finland (for MRSA and VRE), Germany, Italy, Scotland, Sweden (National Board of Health and Welfare), Denmark (National Centre for Hospital Hygiene, Statens Serum Institut), England and Wales (Standards and Performance indicators, DOH/PHLS guidelines), The Netherlands (WIP, Working Group on Infection Prevention), Greece, Portugal (Hospital Infection Control Commission), Austria, Belgium (GDIPEH-GOSPIZ, Groupe de Dépistage d'Etude et de Prévention des Infections Hospitalières, a non-profit independent professional association), and Ireland.

Austria's ABS project includes guidelines for the development of an 'antibiotic culture' (including a more rationed use of antibiotics) in hospitals. Belgium's recommendations include, among others, antibiotic prophylaxis in surgery. They concern both: hospital and non-hospital settings (other guidelines are currently at a development stage).

In France, a committee in charge of technical issues related to nosocomial infections, the CTIN (Comité Technique des Infections Nosocomiales) has published several recommendations for the prevention of hospital acquired infections since 1992 (18).

In Greece, hospital committees for the prevention, surveillance, and control of hospital infection and for the control of antimicrobial resistance were set up in 1986 in the context of the National Greek Nosocomial Infection Control Committee established within the health ministry. In this context, recommendations concerning hospital staff working in laboratories, operating theatres, etc, have been issued.

The situation is similar in Luxembourg, where a national group in charge of the prevention of nosocomial infections (GNPIN, Groupe National de Guidance: Prévention des infections nosocomiales), under the auspices of the DGS (Directeur Général de la Santé), was created in 1997. Since 1998, each hospital must have its CLIN (Comité de Prévention de l'Infection nosocomiale) and a UPI (unité de prévention des infections).

Spain does not have real national guidelines, but each hospital has its own specific guidelines.

The European countries are progressively taking initiatives to prevent antimicrobial resistance, by, for example, training health professionals, providing information to the population, implementation national surveillance systems for resistant microorganisms and antibiotic consumption, creating new agencies, groups, or committees, issuing national recommendations, etc. In the specific field of nosocomial infections, several countries have specific committees in charge of this surveillance. In comparison with the data from the European project HELICS (Hospital in Europe Link for Infection Control through Surveillance), a growing number of countries monitor or collect data on resistant microorganisms from nosocomial infection.

The guidelines are mainly public health focused, but they indirectly affect related occupational health area⁷⁶.

Specific strategies and actions directed at mainly at hospitals and general public were developed and implemented in some countries to prevent antibiotic – resistance:

Antibiotic – resistant microorganisms - Preventive policies at national level: Belgium [31], [32], [33], [34]

General strategy

In 1999, a scientific body called BAPCOC (Belgian Antibiotic Policy Coordination Committee⁷⁷) was set by royal decree. Its remit is to coordinate and initiate actions in the field of antibiotic resistance and to involve other parties. Up till now, BAPCOC produced various evidence-based therapeutic guidelines and arranged for postgraduate training in the use of these guidelines and in the design of locally adapted antibiotic policies for hospitals. BAPCOC also organised large-scale health education campaigns and issued recommendations concerning indications for fluoroquinolones, macrolides and lincosamides. Legislation was amended to create and fund regional hospital hygiene meeting groups.

Work has also begun on harmonisation of hospital hygiene practice in Belgian hospitals, on campaigns to reduce nosocomial transmission of multiple drug resistant germs, on improving the reporting of multiple drug resistant germs by hospitals and on harmonising laboratory methodologies for susceptibility testing in bacteria of animal and food origin.

In addition, BAPCOC procured government funding for a medical and a veterinary epidemiologist and set up a data collection centre to monitor antibiotic resistance in selected medical and veterinary pathogens. Through this centre, it was also able to start off an evaluation of the feasibility of monitoring antibiotic resistance in indicator bacteria originating from animals and to support a quality assessment of antibiotic susceptibility testing for *Salmonella* and *E. coli* in official laboratories that analyse bacterial isolates originating from food producing animals and food products of animal origin.

The Belgian authorities organized campaigns on the limited and better use of antibiotics. As a result of these campaigns, the use of antibiotics has decreased with 24% between 1999 and 2004.

In February 2005 the Belgian FPS (Federal Public Service) of Health, Food Chain Safety and the Environment organized a national campaign in Belgian hospitals on the promotion of hand hygiene.

The national policies, e.g. Belgian ones covering recommendations for antibiotic prophylaxis in surgery and other preventive initiatives such as public campaigns on better use of antibiotics, rules of hygiene, are complementary. They address hospitals, non-hospital settings and other target groups e.g. general public, reflecting national public health and occupational health needs.

⁷⁶ <http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=227>

⁷⁷ <http://www.health.fgov.be/antibiotics/ndl/antibiotica-homepage.htm>

4.4.3. Preparing hospitals to bioterrorism-related infectious agents – Italian case study

The response model of the Istituto Nazionale per le Malattie Infettive Lazzaro Spallanzani (INMI), Rome, Italy for managing patients suspected of or affected by smallpox or viral haemorrhagic fever (VHF) either in the context of an intentional release or natural occurrence [36]

- The INMI is Italy's leading hospital in its preparedness and response plan to bioterrorism-related infectious agents. All single and double rooms of INMI are equipped with negative air pressure, sealed doors, high efficiency particulate air (HEPA) filters and a fully-equipped anteroom; moreover, a dedicated high isolation unit with a laboratory next door for the initial diagnostic assays is available for admission of sporadic patients requiring high isolation.
- For patient transportation, two fully equipped ambulances and two stretcher isolators with a negative pressure section are available. Biomolecular and traditional diagnostic assays are currently performed in the biosafety level 3/4 (BSL 3/4) laboratories.
- Continuing education and training of hospital staff, consistent application of infection control practices, and availability of adequate personnel protective equipment are additional resources implemented for the care of highly infectious patients and to maintain the readiness of an appropriately trained workforce to handle large scale outbreaks.
- In the mid 1980's, universal precautions to prevent transmission of HIV were implemented. In the following years isolation procedures were strengthened to cope with the re-emergence of tuberculosis, possible cases of emerging infections such as Ebola virus, and the threat of bioterrorism. More recently with the advent of the SARS threat, the hospital protocols, largely based on the Hospital Infection Control Practices Advisory Committee guidelines on isolation precautions in hospitals, have been further reinforced.
- Healthcare workers have been strongly recommended to comply with the required precautions, wearing disposable personnel protective equipment (PPE) consisting of masks or respirators, gloves, gown, head and shoe covers, and eye protection before entering the patient's room. These have to be discarded in the anteroom. Multiple educational and training sessions, including simulations focused on adherence to infection control protocols, have been developed for healthcare and laboratory personnel. Special efforts have been made to stress the importance of seal checking when wearing disposable respirators, and the safe removal of PPE. Tests of respirator fit have been carried out for all health care workers. Protocols for the surveillance and management of health care workers potentially exposed to highly transmissible agents have been issued and updated, including post-exposure treatment when available.
- Available PPE recommended for the management of highly contagious patients consists of Tyvek™ tissue full-body suits with thermo activated closure, full face mask with P3 filtered respirators (EU standard EN 149:2001), and latex obstetric gloves to be used in double gloving. Needle stick prevention devices are also provided.
- All materials used for patients and disposable items worn by staff, in accordance with the Italian Ministry of Health recommendations, must be placed into a secure waste bag and then packaged into a rigid container before leaving the isolation rooms. The containers are then destroyed by incineration.
- In case of patient death, autopsy is discouraged. The corpse must first be wrapped in linens permeated with disinfectants and then double bagged in sealed impermeable body bags before being transported for burial or cremation. All unnecessary handling of the body should be avoided.
- In Italy, immunisation of healthcare workers against smallpox has not yet been implemented. The Italian Ministry of Health will activate immunisation program within the National Response Plan.

4.4.4. Workplace – related good practices: United Kingdom example

United Kingdom example

Health and Safety Executive in the United Kingdom has developed the website “Infections at work”⁷⁸. This website provides information useful for assessment and prevention of risks related to infectious biological agents at workplaces, concerning particularly:

- legal requirements related to infections at work,
- specific infectious diseases, such as:
 - Avian influenza,
 - SARS,
 - Legionella: <http://www.hse.gov.uk/biosafety/diseases/legionnaires.htm>
 - Anthrax: <http://www.hse.gov.uk/biosafety/diseases/anthrax.htm>
 - Zoonoses: <http://www.hse.gov.uk/biosafety/diseases/zoonoses.htm>
 - Enteric pathogens: <http://www.hse.gov.uk/biosafety/diseases/entericpathogens.htm>
 - Bovine spongiform encephalopathy (BSE): <http://www.hse.gov.uk/biosafety/diseases/bovine.htm>
- good practices related to identification and prevention of infectious diseases in specific sectors and works, such as health care, working in laboratory, agriculture, working with sewage etc.

The structure of the website (<http://www.hse.gov.uk/biosafety/infection.htm>) contains other sections, e.g. *Infection information*, providing data that can be useful for identification and prevention of exposure to infectious biological agents (see: <http://www.hse.gov.uk/biosafety/information.htm#a4>).

Some of the useful good practices provided by HSE include:

- Infection at work: controlling the risk. A guide for employers and the self employed on identifying, assessing and controlling the risks of infection in the workplace (<http://www.hse.gov.uk/pubns/infection.pdf>)
- Blood-borne viruses in the workplace. Guidance for employers and employees. (<http://www.hse.gov.uk/pubns/indg342.pdf>)
- Working safely with simians: management of infectious risks (<http://www.hse.gov.uk/pubns/misc134.pdf>)
- Biological agents: Managing the risks in laboratories and healthcare premises (<http://www.hse.gov.uk/biosafety/biologagents.pdf>)
- Common zoonoses in agriculture (<http://www.hse.gov.uk/pubns/ais2.pdf>)
- Working with sewage: the health hazards. A guide for employers (<http://www.hse.gov.uk/pubns/indg198.htm>)
- Legionnaires' disease: a guide for employers (<http://www.hse.gov.uk/pubns/iacl27.pdf>)
- Legionnaires' Disease: Essential information for providers of residential accommodation (<http://www.hse.gov.uk/pubns/indg376.pdf>)
- Controlling legionella in nursing and residential care homes (<http://www.hse.gov.uk/pubns/indg253.pdf>)
- Management of Spa Pools - Controlling the Risks of Infection (http://www.hpa.org.uk/publications/2006/spa_pools/default.htm)

German example

In Germany, the Robert-Koch-Institute⁷⁹ provides general information on infection diseases and their prevention in specific areas, including health care and hospitals. For some infectious agents and

⁷⁸ <http://www.hse.gov.uk/biosafety/infection.htm>

diseases, like anthrax, hepatitis, influenza and SARS guidelines for specific workplaces have been developed and published (see the table 6).

Table 6: Examples of work – related practices related to prevention of infectious diseases at workplaces in Germany

Title and URL of the practice	Agents /diseases	Sectors / groups of workers
Arbeiten mit Gefahr einer Infektion mit Hepatitis-Virus (Berufsbedingte Hepatitis-Infektionen) Work with the risk of hepatitis virus (work – related hepatitis) www.uni-duesseldorf.de/AWMF/II/002-012.htm	Hepatitis	Health care workers
Empfehlungen zum Schutz vor gefährlichen Erregern in Poststellen Recommendations for the protection against dangerous agents in mail rooms http://www.rki.de/cln_006/nn_225576/DE/Content/Infekt/Biosicherheit/Empfehlungen/dl_poststellen.html	anthrax	Post workers
Hinweise zum Arbeitsschutz bei Milzbrandgefährdung (Guidelines for workers protection in the case of anthrax risk) www.baua.de/de/Themen-von-A-Z/Biologische-Arbeitsstoffe/Aktuelle-Informationen/Milzbrand.html_nnn=true	anthrax	Post workers, general public
Schweres Akutes Respiratorisches Syndrom <ul style="list-style-type: none"> • recommendations for the handling of specimen • recommendations for the transport of specimen • hygienic aspects in hospitals www.rki.de/cln_006/nn_225576/DE/Content/InfAZ/S/SARS/sars.html	SARS	Health care workers
Influenza: Einschließlich aviäre Influenza (Vogelgrippe) und Pandemieplanung Für Unternehmen <ul style="list-style-type: none"> ▪ presentation “pandemic preparedness plan in enterprises” ▪ example (scheme) for action planning in case of an Influenza pandemic ▪ Decision No. 608 of the committee for biological agents “Recommendation of special actions for the protection of employees against infection by Avian flu” (Beschluss Nr. 608 des Ausschusses für Biologische Arbeitsstoffe: Empfehlung spezieller Maßnahmen zum Schutz der Beschäftigten vor Infektionen durch hochpathogene aviäre Influenzaviren) ▪ Decision No. 609 of the committee for biological agents “Occupational safety in case of an Influenza infection, particularly in terms of respiratory protection ” (Beschluss Nr. 609 des Ausschusses für Biologische Arbeitsstoffe: Arbeitsschutz beim Auftreten von Influenza unter besonderer Berücksichtigung des Atemschutzes) ▪ Technical rules for biological agents No. 230 “Agricultural animal husbandry” (Technische Regeln für Biologische Arbeitsstoffe TRBA 230: Landwirtschaftliche Nutztierhaltung) ▪ Technical rules for biological agents No. 500 “General hygiene - minimum requirements” (Technische Regeln für Biologische Arbeitsstoffe TRBA 500: Allgemeine Hygienemaßnahmen - Mindestanforderungen) http://www.rki.de/cln_006/nn_879808/DE/Content/InfAZ/II/Influenza/IPV/FuerUnternehmen_Node.html_nnn=true	Influenza	All enterprises

⁷⁹ www.rki.de

US example

A lot of good practices which can support effective identification of risks related to infectious biological agents have been developed outside UE. In the Australia and US information useful for workplaces can be found, provided particularly by:

- The Centers for Disease Control and Prevention (CDC) - one of the 13 major operating components of the Department of Health and Human Services (HHS), which is the principal agency in the United States government for protecting the health and safety of all Americans and for providing essential human services, especially for those people who are least able to help themselves,
- The National Institute for Occupational Safety and Health (NIOSH) - the federal agency responsible for conducting research and making recommendations for the prevention of work-related injury and illness. NIOSH is part of the Centers for Disease Control and Prevention (CDC) in the Department of Health and Human Services,
- Occupational Safety & Health Administration (OSHA)
- Some of the good practices concerning infectious diseases are listed below:
- Interim Guidance about Ebola Virus Infection for Airline Flight Crews, Cargo and Cleaning Personnel, and Personnel Interacting with Arriving Passengers,
http://www.cdc.gov/ncidod/dvrd/spb/mnpages/dispages/ebola/Ebola_airline.pdf
- Interim Guidance for Airline Flight Crews and Persons Meeting Passengers Arriving from Areas with Avian Influenza http://www.cdc.gov/travel/other/avian_flu_ig_airlines_021804.htm
- Interim Guidance for Airline Cleaning Crew, Maintenance Crew, and Baggage/Package and Cargo Handlers for Airlines Returning from Areas Affected by Avian Influenza A (H5N1)
http://www.cdc.gov/travel/other/avian_flu_airlines_cleaning_update_120505.htm
- Interim Guidance for Cleaning Aircraft Exteriors after Collisions with Birds in Avian Influenza A (H5N1)-Affected Areas
(http://www.cdc.gov/travel/other/avian_flu_ig_airline_bird_collisions_2006.htm)
- Avian Influenza Protecting Poultry Workers at Risk
<http://www.osha.gov/dts/shib/shib121304.html>
- Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for Postexposure Prophylaxis
(<http://www.cdc.gov/mmwr/PDF/rr/rr5011.pdf>)
- Preventing Occupational HIV Transmission to Healthcare Personnel
<http://www.cdc.gov/hiv/resources/factsheets/hcwprev.htm>
- Recommendations for Protecting Outdoor Workers from West Nile Virus Exposure
<http://www.cdc.gov/niosh/topics/westnile/recout.html>
- Recommendations for Protecting Laboratory, Field, and Clinical Workers from West Nile Virus Exposure <http://www.cdc.gov/niosh/topics/westnile/reclab.html>
- Ebola virus: http://www.cdc.gov/ncidod/dvrd/spb/mnpages/dispages/ebola/Ebola_airline.pdf
- Hospital eTool: <http://www.osha.gov/SLTC/etools/hospital/hazards/hazards.html>

4.4.5. Monitoring of work-related infectious diseases – United Kingdom example

Work-related infectious diseases are reported by specialists to surveillance schemes in the United Kingdom [37]. Data are gathered from:

- occupational physicians (to OPRA),
- consultants in communicable disease control and public health medicine (to SIDAW),
- dermatologists (to EPIDERM),
- respiratory physicians (to SWORD).

There are also three other schemes for reporting of non-infective work-related cases. These seven reporting schemes made up the database ODIN, which was succeeded by The Health and Occupation Reporting network (THOR). The reporting schemes provide estimates of the incidence of occupational diseases or disorders. Within the period: 2000-2003 the total number of estimated cases of infectious diseases reported to the schemes was 5606. The majority was reported to SIDAW database. Diarrhoeal disease was the most frequently reported disease category. It was followed by Scabies, Brucellosis, Hepatitis, Legionellosis, and other categories. The scope of information covers also additional data, such as the distribution of cases by industry, outbreaks and single cases reporting, and other data. Cases from the social care and health sectors made up the majority of reports. The data were followed by other industries, such as: financial intermediation, hotels and restaurants, manufacture, education, agriculture, and others.

4.5. Summary

A number of the policies and practices concerning the prevention of emerging infectious diseases have been established currently at international, European and national levels. Because the biological hazard concerns many aspects of human life, such as health care, transport safety, protection against bioterrorism and many others, the majority of them address public health issues. However, some resources address directly occupational safety. These related to the prevention risks arising from infectious biological agents at workplaces can be considered in the following groups:

- policies and practices related to public health with some elements related to workplaces,
- policies and practices related directly to all the workplaces,
- policies and practices related directly to specific sectors, occupations or workers performing specific tasks.

In each group listed above there are policies/practices which concern all biological agents or only specific agents/agents group.

The policies established by international bodies are related mainly to the HIV/AIDS and to Avian Influenza (see the table 7) and cover all the workers exposed or the most exposed group – health care and laboratories workers. There are also some documents related to tuberculosis and SARS.

Table 7: International policies/practices related to infectious biological agents with regard to workplaces, presented in the report

Title of the policy	Institution	Agents/diseases	Sectors/groups of workers
Global WHO strategy on occupational health for all: The way to health at work	WHO	All diseases and biological agents	All
ILO Convention No. 184 on Safety and Health in Agriculture ILO Recommendation No. 192 on Safety and Health in Agriculture	ILO	All biological agents in agriculture	Agriculture
Laboratory biosafety manual. Third edition: WHO, Geneva, 2004	WHO	All biological agents related to laboratory work	Laboratory workers
An ILO code of practice on HIV/AIDS and the world of work	ILO	HIV/AIDS	All
ILO-FHI HIV/AIDS Behaviour Change Communication Toolkit for the Workplace	ILO-FHI	HIV/AIDS	All

Title of the policy	Institution	Agents/diseases	Sectors/groups of workers
Action on HIV/AIDS at the workplace starts here: A step-by-step guide	ILO	HIV/AIDS	All
Joint ILO/WHO Guidelines on health services and HIV/AIDS	ILO/WHO	HIV/AIDS	Health services
Guidelines on addressing HIV/AIDS in the workplace through employment and labour law, Jane Hodges, ILO – Geneva, January 2004	ILO	HIV/AIDS	All
Avian influenza, including influenza A (H5N1), in humans : WHO interim infection control guideline for health care facilities	WHO	Avian influenza	Health care workers in health-care facilities
WHO Laboratory biosafety guidelines for handling specimens suspected of containing avian influenza A virus	WHO	Avian influenza	Laboratory workers
WHO Interim recommendations for the protection of the persons involved in the mass slaughter of animals potentially infected with highly pathogenic avian influenza viruses	WHO	Avian influenza	All workers exposed to infected animals
Protect poultry - Protect people. Basic advice for stopping the spread of avian flu	FAO, Agriculture Department	Avian influenza	Poultry keepers, veterinarians and culling teams, general public
SARS. Practical and administrative responses to an infectious disease in the workplace, <i>InFocus Programme on Safety and Health at Work and the Environment (SafeWork)</i>	ILO Sub-regional Office for East Asia - Bangkok	SARS	All
Tuberculosis and Air Travel guidelines for prevention and control	WHO	Tuberculosis	Travellers, physicians and health authorities and airline companies

At the European level, the Directive 2000/54/EC of the European Parliament and of the Council of 18 September 2000 on the protection of workers from risks related to exposure to biological agents at work (seventh individual directive within the meaning of Article 16(1) of Directive 89/391/EEC) has been established which provides provisions for all biological agents at workplaces.

Some guidance related to specific infectious biological agents and the specific workplaces have been also developed, including:

- The European Guidelines for Control and Prevention of Travel Associated Legionnaires' Disease European Working Group for Legionella Infections);

- ECDC GUIDELINES: Minimise the Risk of Humans Acquiring Highly Pathogenic Avian Influenza from Exposure to Infected Birds or Animals.

In all EU countries regulations have been established which implement provisions of the Directive 2000/54/EC. Specific regulations concerning infectious diseases are mainly related to public health and in some cases also to the most exposed workplaces, such as for example health care, veterinary and air transport. The good practices which could support employer and employees of these sectors in identification and prevention of infectious biological agents have been prepared only in some EU countries. Therefore fulfilling legal obligations and appropriate prevention of work-related infectious diseases can be difficult in practice.

There are some countries in the EU in which good practices for assessment and prevention of risks related to infectious biological agents have been developed and published. Good practices in this area are also available in the countries outside the EU such as US and Australia.

More effective prevention of infectious diseases at workplaces requires development of good practices, directed to all workplaces as well as to specific agents and specific groups of workers, available in national languages in each country. Risk assessment and measurement methods of exposure on biological agents are still unsatisfactory. There is a need for scientific guidelines improving risk assessment as well as development of exposure standards specific for biological agents⁸⁰.

⁸⁰ http://osha.europa.eu/en/riskobservatory/risks/forecasts/biological_risks

5. Conclusions

Health and safety at work is one of the most important aspects of EU policy related to employment and social affairs. Improving quality and productivity at work – cornerstones of the Lisbon Strategy – requires considerable progress in improving general working conditions and reducing the incidence of work-related and illnesses. It can't be achieved without taking into account the fact of profound changes in the working environment and the emergence of new risks, including biological risks.

The need to investigate workplace exposure to biological agents is stated as one of the key research priorities for the European Union in the area of occupational safety and health. Forecasts of experts confirm that knowledge on workers exposure on biological agents, including the risk of bioterrorism and global pandemic, is still unsatisfactory. The literature survey, carried out in the frame of a Topic Centre Risk Observatory project, coordinated by the European Agency for Safety and Health at Work (EU-OSHA), was a next step in exploration data on the biological risks related to pandemics and major disease outbreaks and relevant prevention and control policies.

The selected content of literature sources was presented. Results of gathering and analyzing data cover the information on selected biological agents and infectious diseases, related to general context and occupational exposure. The survey revealed that there are only limited data on occupational exposure to infectious biological agents in the EU. Statistical data concerning occupational diseases exist, but not all work-related infectious diseases are registered as occupational diseases. Moreover, recognition and notification of occupational diseases vary between the EU countries making presenting a realistic evaluation of level of existing risk and the assessment of the incidence rate of occupational diseases caused by biological agents very difficult. Therefore, in order to better present occupational exposure, in the report were also used other sources of information, from non-European sources (e.g. CDC in the US), information on the outbreaks of diseases causing by emerging infectious biological agents from non-European regions and selected research reports. Importance of drug-resistant microorganisms, which can cause very severe infections, is pointed out by research. Some of the infectious biological agents, such as those causing anthrax, smallpox, tularaemia and plague should be treated as emerging risks because of the possibility that they can be used for bioterrorism purposes.

The report presents examples of EU policies, practices and case studies concerning the prevention of emerging infectious diseases, with focus on national level. All EU workers are protected by the framework Directive 89/391/EEC. The framework directive is supplemented by individual directives to cover safety and health requirements. At the European level the Directive 2000/54/EC of the European Parliament and of the Council of 18 September 2000 on the protection of workers from risks related to exposure to biological agents at work has been established. Provisions of the Directive were implemented in all EU countries regulations. Some guidance and specific regulations related to specific infectious biological agents and the specific workplaces have been also developed.

There are some EU good practices for assessment and prevention of risks related to infectious biological agents/diseases, such as influenza, avian influenza, SARS, tuberculosis, anthrax, etc., but the need of further developing good practices, supporting employers and employees in identification and prevention of infectious biological agents should be emphasised. Good practices, developed in the countries such as US and Australia, could be used as examples for preparing European good practices, addressed to all workplaces as well as to specific agents and specific groups of workers. Availability of good practices' description in national languages could additionally support promotion of the content and awareness raising processes.

Presented data confirm the need of systematic approach to monitoring of biological risks in the context of the state of occupational safety and health, and deep research of the subject. Further development of the European monitoring and surveillance of work-related infectious diseases system is necessary. More detailed information concerning work-related (not only those officially recognised as occupational) infectious diseases, methods and tools for assessment of exposure on biological agents and health outcomes would be necessary in order to improve preventive measures at workplaces and increase awareness among both employers and employees, but also policy makers.

The difficulty of assessment biological risk at the workplace points out the necessity of development of reliable risk assessment/evaluation tools. There is a need for standards and occupational exposure limits related with biological agents. Because of many links between the occupational safety and other areas such as public health, environmental safety, veterinary, and others, the holistic, inter-

disciplinary approach is also an important one. The results of the project prove the importance of links to public health area. The global context of the issues should be emphasised as well as a need for close international cooperation.

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