



OSH risks related to global epidemics and drug-resistant micro-organisms

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Background

RO projects: Emerging Biological Risks & Biological Risks and Pandemics

- Biological risks – emerging risk according to the experts survey
- Global Village – globalisation makes spread of diseases easier and faster
- Request from EU Commission following the appearance of avian flu cases in Europe
- Biological risks as opposed to chemical risks: higher potential for spreading, difficult evaluation of risk



Background *continued*

- Known diseases – new outbreaks
 - Tuberculosis
 - Drug-resistant micro-organisms
- New diseases – AIDS- HIV
- Haemorrhagic diseases – Ebola, Marburg
- World-wide outbreaks – SARS, avian flu
- Bio-terrorism - anthrax



Occupational exposure *expected*

Groups at risk:

- Travel and transport
- Health care – human and animal
- Emergency services
- Animal breeding and food production – abattoirs
- Waste treatment
- Laboratory workers - research



Information sources

- International organisations (WHO, ILO), EU & national sources
- Agency and RO Website info
 - ▶ Dangerous substances/Biological agents/zoonoses
 - ▶ Sectors: Health care, Education, Agriculture
- Emerging risks literature search and report on emerging biological risks



Pandemic *definition*

An epidemic (outbreak) of an infectious disease, affecting a large number of people, and

- occurring over a very wide area – continent or even the world
- Implied - high level of severity of the disease

⇒ 'Global epidemic' – used as a synonym



Pandemics *examples*

- Bubonic plague ('black death')
- 'Spanish flu' – 1917-20
- AIDS *and other blood-borne diseases (hep. B, C)*
- SARS
- Avian flu
- *Forecasted severe flu, caused by a new, highly pathogenic strain of human influenza virus could spread worldwide in less than 3 months*



Pandemic *examples*

- HIV, HBV and HCV
 - '80 - Unsubstantiated fears at workplaces, followed by attention focused on accidental exposure to contaminated blood, mainly in health care
 - Chronic carrier stage – universal precautions to be implemented at all times
 - Endemic, highly infectious disease, highly prevalent world-wide, with a low transmission rate after accidental occupational exposure*
- EU – 1994-2003 - 85% ↑ in number of new cases, ↓ AIDS cases – 3.5x
 - Out of 20 million health care workers in EU, 1.2 mln exposed to HBV, HCV and HIV every year via percutaneous injuries (severe under-reporting!), with 51000 potentially developing HepB, C or HIV. (WHO)*
 - In 2005, 24.5 million workers lived with HIV out of 38.6 infected persons worldwide. Also affects sex workers, transport and mobile workers.



Pandemics *examples*

SARS

- Outbreak in 2002-2003 in South-East Asia
- Coronavirus different to known strains, suspected animal reservoir
- WHO – 8000 cases, 10% fatal in 26 countries, including EU (Fr, De, It, Ie, Ro, Es, Se, Sch, UK)
- At risk – workers in health care, laboratories, funeral services, public transport, including airline crews, border control personnel



Pandemics *examples 2*

Influenza

- 5-15% of population – affected yearly by influenza
- Monitoring - European Influenza Surveillance Scheme
- High risk – healthcare personnel: care for patients, transport, but also those performing autopsies
- Medium risk – high-frequency contact with general population – schools, high-volume retail, public transport, high-density working environments
- Low risk - office



Pandemics *examples 3*

Avian flu

- Zoonotic origin, first reports – 1997, Hong Kong – H5N1
- 18 cases, 6 fatal
- 2003-2006 – 231 confirmed human cases reported in 10 countries, 133 (57%) fatal, until 07.2006 – none in EU (*WHO*)
- 2003 – H7N7 strain – in 83 poultry workers and their families in the Netherlands, veterinarian - died
- 2007 – H7N2 strain – UK, human cases confirmed, mostly mild symptoms (*ECDC*)
- At risk: workers at commercial poultry farms, live poultry markets, culling, veterinarians, healthcare



Risk management approach

- Systematic analysis of emerging infectious diseases
- Public health systems – main source of information
- Analysis of the epidemiological (transmission) chain
reservoir – transmission route/vector – entrance point into the host
- Enables workplaces to implement prevention measures at early stages of chain
- Compliance with directive on protection of workers from risks associated to exposure to biological agents at work
- ▶ In case of uncertainty – precautionary principle



Occupations at risk

- Health Care Workers (HCW)
- Their protection – is a priority
- Very high exposure: SARS – 21%-57% of total cases reported, fatalities
- Legal and reciprocal ethical duty of employers to inform, protect and support HCW
- Incorporating occupational risk management into systems dealing with infection control in health care settings
- Training, information, adequate respiratory protection – filtering devices vs. surgical masks
- ▶ *Public health aspect – ensuring the integrity and viability of the health care system in high workload situation*



Occupations at risk *continued*

- **Workers travelling-** missions to affected areas, flight crew, border control
 - Protecting the workers , but also
 - ▶ *Preventing spread of infection to non-affected areas by contaminated travellers*
- **Workers in contact with animals -** *Breeders, transport, holding yards, slaughterhouses, veterinarians, culling*
 - Information provision, infection control as in health care



Who is at risk from LPAIs? (*Low Pathogenicity Avian Influenzas*)

At the requests from EU Member States and the European Commission, the European Centre for Disease Prevention and Control (ECDC) conducted a risk assessment for avian influenza viruses (excluding H5N1) in relation to human health.

- There is only limited public health risk from LPAIs, but those who are at risk should maintain vigilance and take precautions.
- Most EU Member States have standard guidance for the exposed occupational groups. For the vast majority of people, who have no direct contact with domestic birds or their droppings, the risk of acquiring LPAIs and the risk to health are almost non-existent. Human infection with LPAIs from wild birds has never been reported.



Who is at risk of infection with LPAI *continued*

Group 1. Low but real risk – precautions obligatory

- People in close contact with domestic poultry or their droppings. Owners of small domestic and pet flocks – most at risk, as they are less likely to be able to take precautions than those working in the industry (more likely to be in influenza risk groups)
- Veterinarians and people involved in controlling outbreaks in birds
- People who work on industrial poultry farms

Group 2. Theoretical risk – some precautions recommended

- Persons in close contact with infected persons (person-to-person transmission is not excluded)
- Healthcare workers caring for those with LPAI
- Laboratory workers working with H5N1 viruses
- People who may have close contact with birds – hunters, ornithologists

⇒ Both Groups – are at a greater risk of catching other potentially more serious infections from birds – campylobacter and salmonella. Standard hygienic precautions against these infections are effective also against LPAI.



Drug-resistant micro-organisms

- Definition: bacteria and other micro-organisms that have developed resistance to one or more of the anti-microbial agents
- Contributing factors:
 - Wide use of antibiotics for human health and veterinary purposes (therapeutic, animal growth promotion), including mis-and overuse
 - Natural evolution of micro-organisms
 - ▶ Cross-resistance

Inevitable but controllable



Drug-resistant micro-organisms *continued*

Examples

- MRSA – *methicillin/oxacillin resistant Staph. aureus* – most common cause of health-care associated infections
- E. coli – multi-drug resistant, hospital-acquired urinary tract infections, peritonitis, wound infections
- VRE – *vancomycin-resistant enterococci* – digestive system
- PRSP – *Penicillin-resistant Streptococcus pneumoniae* – lower respiratory tract infections, very high mortality
- MDR-and XDR-Tb- multi-and extensive- drug resistant Tb –
- HIV- resistant to antiretroviral drugs

Rising incidence of community-acquired anti-microbial drugs resistant infections



Prevalence

- European Antimicrobial Resistance Surveillance System – collects information on Strep.pneumoniae, Staph.aureus, E.coli, Enterococcus faecalis and faecium
- In 2004, Strep. Pneumoniae:
 - 9% - non-susceptible to penicillin, 15% - to erythromycin, 5% - to both
 - Observed changes in non-susceptibility to penicillin
 - Stable resistance to erythromycin



Occupational exposure

- National and European statistics of occupation-related infectious diseases – do not distinguish drug-resistance of infectious agents
- Direct transmission – from human or animal - is more likely than from wpce environment
- Necessity to consider in the risk assessment higher level of hazard – therapeutic difficulties resulting in increased duration of sickness and higher mortality



Occupational exposure *continued*

Health care workers – most at risk, due to high prevalence of drug-resistant organisms in health care settings

- Protection against exposure to drug-resistant forms of Tb (fatal cases reported) and HIV – of particular importance
- Published guidelines for prevention of occupational Tb – efficacy of respiratory protection (not to be confused with surgical masks!)
- Anti-retroviral post-exposure prophylaxis (PEP) – effective in preventing seroconversion

Prevention: should be incorporated into procedures aiming at reduction of nosocomial infections.

- Basic measure : Careful hand-washing!
- Organisational measures in hospitals: patient isolation, dedicated equipment to one (group of) patient(s), regular cleaning, safety-engineered devices (shields for sharp instruments), workers' training, PPE



Occupational exposure *continued*

Workers in contact with animals, their biological products and excreta –

- likely to be exposed to drug-resistant organisms colonisation
 - *Pig farmers – nasal colonisation with resistant strains of Staph. aureus,
 - *Poultry farmers and slaughterers – colonised with resistant strains E. coli
- exposure to antibiotics used in dry form added to feed – commensal flora may develop resistance to them

Prevention:

- In addition to the ban on use of antibiotics as growth promoters, their use for veterinary purposes needs strict control: use of drugs with limited spectra of activity and guidelines for their proper use.
- Shift away from intensive farming towards better animal housing and hygiene.



Policies and practices *International*

- WHO: Global strategy on occ. health for all: The way to health at work – general framework;
 - Individual documents – e.g. Tuberculosis and air travel – (*used in recent case of exposure to extensively drug-resistant Tb*), Laboratories biosafety manual, Infection control guidelines for health care facilities
- ILO: Convention 184 & ILO Recommendation 192 on Safety and Health in Agriculture – include guidelines /recommendations on dealing with the risk of exposure to biological agents (*risk assessment, control and testing of animals, protective measures for handling animals and biological agents, immunisation, dealing with waste products, provision of safety information*), Code of practice on HIV/AIDS and the world of work, SARS-practical and administrative responses to an infectious disease in the workplace
- FAO guide for stopping spread of avian flu



Policies and practices *European level*

- Directive 89/391 – introduction of measures to encourage improvements in the s&h of workers at work
- Directive 89/656 – minimum h&s requirements for the use of ppe at work
 - Directive 89/686 – approximation of the laws of the MS relating to ppe
 - Directive 2000/54 – protection of workers from risks related to exposure to biological agents at work (notification, hygiene, individual ppe, information and training, list of exposed workers, health surveillance, special measures for industrial processes and laboratories)



Policies and practices *European level 2*

- European Centre for Disease Control –
 - Guidelines: 'Minimise the risk of humans acquiring highly pathogenic avian influenza from exposure to infected birds and animals'



Policies and practices *National*

Implementation of EU directives

- Various level of sophistication,
- Scope – all workplaces - health care - and some other sectors (tourism, maintenance workers), variety of biological agents, depending on national needs and risk perception
- Drug-resistant pathogenes – included in some general policies, in other countries – separate legislation for prevention of nosocomial infections



Multi-disciplinary approach

- ➡ Pandemics are not only a workplace issue because they affects the workforce, but also because the workplace can play a crucial role in limiting transmission
- ➡ Need to be dealt with globally and with participation of various disciplines, such as OSH, public health, animal health, environmental protection and food safety, involvement of customs services and border control.



Public health *continued*

- Example of cooperation and common objectives - control programmes for monitoring of the use of antibiotics in animals and in human health care
- Need for development of the recording system reflecting work-related infections with drug-resistant micro-organisms