SUMMARY

1. The first meeting of EUNID, a network of infectious disease clinicians with expertise in highly infectious diseases, was attended by national officials and national representatives from 13 of the 16 states involved in EUNID.

2. Participants agreed a working consensus definition of ‘a highly infectious disease’ and a working list of relevant agents.

3. Participants discussed diagnostic criteria for selected highly infectious diseases, and the difficulties of developing guidance on early detection of suspected cases.

4. Participants reviewed the results of the initial questionnaire designed to provide information for a EUNID inventory of HSIDUs in Europe and agreed that a revised questionnaire would be prepared in consultation with national officials and representatives.

5. Participants agreed to review the information given about them on the EUNID website (www.eunid.com) and to inform the EUNID coordinator of any necessary changes.

6. Participants agreed to send (if they had not already done so) copies of any national guidelines on specific highly infectious diseases (smallpox, SARS, MDRTB, plague, viral haemorrhagic fevers) and any national guidelines relevant to infection control of highly infectious diseases, together with any related weblinks, to the EUNID coordinator for inclusion in the EUNID archive of national guidelines on highly infectious diseases.

7. Participants agreed that there should be a EUNID working group on respiratory protective equipment. The working group would review current evidence (including efficacy, relevant legislation on worker protection, cost, and availability) and would report back to EUNID, with draft recommendations for EUNID minimum safe standards for respiratory protective equipment for airborne infection at (or before) the next EUNID meeting.

8. Participants agreed that the EUNID project group should prepare draft flow charts showing the order in which PPE should be put on and removed, for further discussion by EUNID national officials and representatives.

9. EUNID will meet next in London in 2006.
1. Background

The European Network of Infectious Disease Physicians (EUNID) is a newly formed pan-European network, funded by the European Commission through the public health programme. EUNID consists of partners from 16 states (the original 15 EU member states, plus Estonia), who together have broad, multi-disciplinary experience of the management and control of highly infectious diseases. The main aims of EUNID are to enhance and maintain co-operation, communication, and exchange of information on highly infectious diseases among infectious disease clinicians, and to enhance preparedness and response within Europe to health threats from highly infectious diseases, whether naturally occurring, newly emergent, or deliberately released. The project started in mid 2004; this was the first meeting of national officials (or their alternates).

Dr G Ippolito, Scientific Director, INMI, Lazzaro Spallanzani, Rome, EUNID Project Leader opened the meeting and welcomed participants. Recent events, including the deliberate release of anthrax in the US in 2001, the global SARS outbreak in 2003, and the unprecedentedly large, and continuing, current outbreak of Marburg virus in Angola had shown that infectious diseases were, and would continue to be, of public health importance, and highlighted the need for a real network of infectious disease clinicians in Europe that was both strong and functional, and would complement initiatives both in Europe (where laboratory networks and surveillance networks were well developed, but where networks for clinicians were less so), and in resource-poor countries.

2. Participants (see appendix 1 for details)

Participants from infectious disease units, national institutions, and/or public health authorities in Austria, Belgium, Denmark, Estonia, Finland, Germany, Greece, Italy, Luxembourg, the Netherlands, Portugal, Sweden, the United Kingdom, and the European Commission were present at the meeting; national officials from France, Ireland and Spain were not able to attend.

3. Request for feedback

Dr Baka, (Hellenic Centre for Infectious Diseases, Athens, Greece) asked for feedback on the manual on communicable diseases and deliberate release incidents originally prepared for use during the 2004 Olympics, as a new edition is planned and expert comment would be welcomed.

4. Consensus definition of ‘a highly infectious disease’

(EUNID deliverable 2.4.1: Definition and specification of highly infectious diseases including criteria for patient admission)

The group discussed the proposed definition:

“Highly infectious diseases pose a very high concern because of their potential ease of dissemination or transmission and high morbidity and mortality”

There was considerable debate. Whilst all participants knew instinctively what was meant by the term ‘highly infectious disease’, and, in general, preferred this term to others (‘dangerous infection’, ‘dangerous infectious disease’, ‘severe infectious disease’), producing a concise definition suitable for use throughout Europe was more problematic. It was agreed that ‘dissemination’ was a word best reserved for use in the context of deliberate release, and agreed also that ‘life-threatening’, a term used in German guidelines, was a helpful phrase, since it implied severity and potential lethality, and could be readily understood by health care workers and the public alike. The use of the phrase ‘transmissible from person to person’ was preferable to terms such as ‘highly/transmissible’, ‘highly/infectious’, or ‘highly/contagious’, since it avoided some of the difficulties associated with their use. It was also felt that any definition needed to be future-proof, such that it would encompass newly emergent diseases which might, at least
Initially, be of unknown lethality and transmissibility, and flexible enough to be adaptable to advances in treatment, prevention, and understanding of natural history and epidemiology. The group recognised that some existing hazard categorisations (eg EC Directive 2000/54/EC; UK Advisory Committee on Dangerous Pathogens hazard categorisation of biological agents) refer specifically to the availability of treatment or prophylaxis, but thought that it could be confusing to refer to these within the EUNID definition, and concluded that a direct reference to treatment was best omitted.

The group agreed the following working definition for EUNID:

A highly infectious disease is transmissible from person-to-person, causes life-threatening illness, and presents a serious hazard in health care settings and in the community, requiring specific control measures.

The group agreed also that the working definition would be used in conjunction with the following list of agents that cause infections that satisfy the definition:

- Viral haemorrhagic fevers (marburgvirus, ebolavirus, Crimean Congo haemorrhagic fever virus, and Lassa virus), and South American haemorrhagic fever (Junin, Machupo, Sabia, and Guanarito) viruses;
- SARS Co-V;
- Multidrug resistant M tuberculosis (known or suspected infection);
- Emerging highly pathogenic strains of influenza virus;
- Smallpox and other orthopox infections (eg monkeypox, camel pox, but excluding vaccinia virus);
- Other emerging highly pathogenic agents, including agents of deliberate release (eg pneumonic plague).

Multidrug resistant tuberculosis was included because it is of concern in many EUNID countries, particularly Estonia and Austria, and because of wider concern about transmission risks associated with imported cases from the Ukraine and other countries in the former Soviet Union, where multi drug resistant tuberculosis has become a problem. The group recognised that, although person-to-person transmission of avian influenza H5N1 had not yet been conclusively proven, there was great concern that the virus might become transmissible, and concurred with WHO that suspect cases should be managed as though the virus was highly infectious.

It was also agreed that the following agents would not be included in the list of highly infectious diseases: Group A streptococci, Neisseria meningitidis, Clostridium difficile, methicillin resistant Staphylococcus aureus, other multidrug resistant (eg GISA, VRSA) strains of S aureus, other multidrug resistant organisms (eg vancomycin resistant enterococci), dengue and yellow fever viruses, measles virus, hepatitis A virus, varicella zoster virus, vaccinia virus, and rabies virus.

5. Diagnostic criteria and admission to HSI DUs

((EUNID deliverable 2.4.1: Definition and specification of highly infectious diseases including criteria for patient admission)

The topic was introduced by three short presentations (on fever and rash illness, haemorrhagic symptoms, and pulmonary symptoms). Participants then discussed diagnostic criteria in small groups and reported back to the main group.

Diagnosis of any highly infectious disease involved a synthesis of the available clinical, epidemiological, laboratory and surveillance data, and continuing re-assessment. This information was used to assess and stratify risk; most decisions about case admission and management were based on a process of risk assessment and risk stratification. Signs that could indicate that a patient with otherwise non-specific symptoms might have a highly infectious disease included thrombocytopenia and raised ALT. Epidemiological information included detail obtained from the patient through a good clinical history (recent travel history, exposure to sick human/ animal/ blood/ body fluids, vaccination history, occupation) coupled with awareness of the global situation.
(eg recently reported outbreaks, travel advisories, security information), the usual incubation period, and the current national alert level. Recent advances in laboratory techniques now meant that it was often possible to rapidly (within 24 hours) confirm or exclude the diagnosis of some infections (eg PCR for confirmation of viral haemorrhagic fevers, electron microscopy and orthopox PCR for smallpox v VZV). In the UK management decisions about a patient with a suspected VHF would now be based at least partly on the results of PCR testing (since a negative test result made it possible to lower the patient’s risk category, thus avoiding the necessity for admission or transfer to a HSID bed); however, clinicians in some EUNID countries did not have easy access to such tests.

There were other difficulties: highly infectious diseases might have early signs and symptoms that were so non-specific as to make it unlikely that any ‘first case’ would be rapidly diagnosed and effectively isolated, even if the healthcare worker to whom the case presented was well informed, well trained, and clinically astute. If the infection was also (as was smallpox) highly infectious in the phase before specific signs appeared, further transmission was almost inevitable. This was one reason why ‘cough etiquette’ protocols – designed to limit transmission of both common but mild (eg rhinovirus) and rare but serious (eg SARS Co-V: emerging highly pathogenic influenza viruses) respiratory infections – were now being developed. Syndromic surveillance systems were also being developed (eg, in the UK, using NHS Direct, a nurse-led telephone advice line for patients, call records were reviewed weekly, and could be reviewed more often if necessary), but might have limited capacity to detect sporadic cases or small, localised outbreaks. It was important to recognise that, in practice, in any outbreak, secondary cases might be the first cases to be detected. It was also important to recognise that case definitions were developed for use as epidemiological tools, not as diagnostic aids.

Admission to a HSIDU might not always be possible or advisable. Some countries had secure transport systems (though many had not), but the patient might be too sick to travel, and patients who were infectious but not unwell enough to require hospital care could pose less of an infection threat if they were managed at home. In many countries, HSIDUs and/or experienced infectious disease clinicians provided assessment services to less experienced clinicians, by telephone, or by travelling from their home centre to assess the patient, secure infection control, and advise on admission and transport, and would also routinely alert the public health authorities to any confirmed or suspected case of a highly infectious disease. Admission of relatively low risk cases as ‘suspected’ cases provided an opportunity for team training, and the number of ‘false alarms’ provided some measure of the awareness of general and emergency clinicians (if there are never any false alarms, perhaps the system is turned off) and of the efficiency of alerting mechanisms. However, no country had a formalised system for routinely recording or reviewing ‘false alarms’ at national level, and it was well recognised (eg in 2001, after the deliberate release of anthrax in the US; in 2003, during the SARS epidemic; in the UK, after a training programme on smallpox for clinicians) that ‘false alarm’ rates varied, could rise rapidly (and to such an extent as to overwhelm health care systems) in response to media reporting, and then decline rapidly as interest waned.

6. European experience of managing HSIDUs, VHF and other HID

(EUNID deliverables 2.4.2: Inventory of isolation facilities, and 2.43: Minimum requirements for isolation facilities in Europe)

a) Netherlands

The University Medical Centre (UMC) Utrecht, 30 km from Schipol airport, is one of eight UMCs, and the largest medical centre in the Netherlands, with 9000 employees. UMC Utrecht was formed in 1999 through a merger of the Academic Hospital, the Wilhelmina Childrens Hospita and the Medical Faculty of Utrecht University. It works closely with the military hospital, with which it shares premises, and is also the site of the national ‘disaster’ hospital, capable of dealing with 200 emergency admissions. It is the national designated HSIDU, with 6 beds. Patients with a viral haemorrhagic fever may be admitted to UMC Utrecht, or to another UMC (Medische Spectrum
Twente, Leiden UMC, Erasmus UMC Sophia, UMC Nijmigen, Havenziekenhuis, Amsterdam MC, Academische Zekenhuis Groningen). Isolation guidelines (from LCI) on the management of VHFs distinguish ‘low’ from ‘high’ infectivity (presence of bleeding, vomiting, diarrhoea). Cases in the ‘low infectivity’ group would be cared for in a negative-pressure isolation room by staff wearing disposable long sleeved gowns; cases in the latter group in a negative-pressure isolation room with additional PPE, including goggles and an FFP2 mask.

Two confirmed cases of VHF have been managed in the Netherlands. The first case, in 1980, was a male development worker, who had been working in Burkina Faso, developed a febrile illness with rash that was unresponsive to antimalarials, and returned by air to the Netherlands. He was not critically ill, and the diagnosis of Lassa fever was made serologically, after his symptoms had resolved and he had been discharged. There was no secondary spread, even though he was cared for with only routine barrier nursing precautions.

The second case was a male Afghan surgeon, infected with Lassa virus in Sierra Leone, admitted with a fever unresponsive to artemisinine. He was treated as a suspected case of typhoid, and three days after admission, when MRSA was isolated, was transferred to a negative-pressure isolation room. When his fever failed to resolve despite antibiotics, and laboratory tests for malaria, and S. typhi were negative, the diagnosis of Lassa fever was considered and he was started on ribavirin, and strict isolation was extended by using face shields in addition to gloves, a mask and protective clothing. He died 14 days after the onset of symptoms. 128 persons had direct unprotected contact with the case; 3 developed a fever during the surveillance period, but none of 83 contacts tested seroconverted.

b) Germany:

Germany will eventually have 5 centres (Frankfurt, Hamburg, Berlin, Munich and Leipzig) with HSIDUs, each forming part of one of five ‘centres of competence’ in infectiology, which will link together a clinical centre, the state public health department, and the state department responsible for transport/logistics. The units in Berlin (2 beds) and Hamburg (6-8 beds) are under construction; those in Frankfurt, Liepzig and Munich (2 beds) are operational. Plans are also being made for an additional centre in SW Germany. ID clinicians are networked through ‘STAKOB’, with the aim of developing guidelines for training, common treatment protocols, common (and therefore interchangeable) equipment, bulk purchasing, and providing mutual support and assistance.

Infections for which high security isolation is required are: viral haemorrhagic fevers (Marburg, Ebola, CCHF, South American haemorrhagic fevers), Rift Valley fever, pulmonary plague, smallpox, and monkeypox.

The HSIDU in Hesse, at Johann Wolfgang Goethe University in Frankfurt has 6 beds (2 highly secure beds for patients needing intensive care or surgery, and 4 lower dependency beds). The unit is attached to an infectious disease ward; suits and PAPRs are used (‘Breatheasy’ system, soon to be changed to ‘Tyvek Astrosprotect’). Suspect cases are reported via 24 hour emergency contact numbers to the Fire Prevention Department (which provides transport and logistics) and an infectious disease clinician or counsellor will visit the case to assess the patient in situ and advise on infection control and initial management.

The unit managed three SARS cases in 2003, and has also managed three recent cases of Marburg, two of whom were transferred by air. Equipment in the unit is multifunctional (allowing it to be used for high-risk and ‘normal’ risk patients, as necessary). There had been some recent discussion about changing to FFP3 masks, rather than PAPRs, but staff prefer to remain in suits.

c) United Kingdom:

Policies for management of HIDs in the UK are conservative, and, largely for historical reasons, patient isolators are used rather than suits. There are two HSIDUs, in London (3 beds) and
Newcastle (2 beds), funded by the Department of Health via local NHS management. London is the busier of the two units because of its proximity to international airports. Both HSIDUs have dedicated BSL3 laboratories and specially trained multidisciplinary laboratory staff capable of performing the range of tests needed for clinical management; viral diagnostic and confirmatory testing is provided by Health Protection Agency BSL4 laboratories in London (Colindale) and Porton Down.

Both HSIDUs have risk-based SOPs, both select and train their own team members, both are inspected by the Health and Safety Executive, and both audit all admissions. Both facilities have routine maintenance and performance testing programmes for the isolator and autoclaves. HSIDU isolation is mandatory in the UK for high risk and proven cases of VHF (Marburg, Ebola, CCHF, Lassa fever), and for smallpox. Isolators have the advantages of being cheap to run compared with suited facilities, of being relatively easy to maintain, and of allowing staff to work longer shifts, relatively well protected from major bleeding. However, being in an isolator is confining for the patient, only one, or at most two, patients can be cared for at a time, and though some forms of intensive care can be managed (monitoring, IPPV, haemofiltration), haemodialysis can not. Suits (Jupiter) are available as an alternative for the care of larger numbers of cases (eg cohort nursing of cases in a SARS outbreak), and would be used if a patient in an isolator needed surgery or haemodialysis. Patients are admitted on the basis of risk assessment (audit shows that 25% of high-risk VHF patients have a final diagnosis of VHF); medium risk patients (who are most likely to have malaria, and who require urgent, expert, treatment) are admitted to an intermediate ‘holding’ unit. From 2000-2005, five patients required high-level isolation. An air transportable patient isolator is available (service provided by RAF on behalf of the Department of Health; requires Hercules aircraft) for emergency aeromedical evacuation of British nationals overseas.

d) Sweden

There are 30 departments of infectious diseases in Sweden, and an estimated total of c. 820 ID beds; an updated inventory is planned for 2005. Two infectious disease units have HSID beds, and are designated as HSIDUs: Linkoping University Hospital (2-3 beds, with an intensive care facility, and an attached laboratory), and Huddinge, Stockholm (1-2 beds); reference laboratory facilities are available in the BSL 4 laboratory in Stockholm.

All ID departments practice a level of general preparedness for HIDs, and carry PPE suitable for nursing a suspected case (impermeable gown, goggles, face shield, double gloves, particulate filter mask); staff in the HSIDUs wear suits, hoods and PAP respirators. Patients can be transferred by road, in one of two specially equipped high security ambulances (complete separation of driver and patient compartments; HEPA filtration of exhausted air from patient compartment) provided that the journey will take no more than 3-4 hours - the maximum shift length possible in a suit is 4 hours, and the set-up does not allow staff rotation. One of the ambulances is flight-approved, has intensive care equipment and a portable anteroom (for safe rotation and decontamination of staff), and can be loaded complete as a ‘closed unit’ into the hold of a transport plane. Using the air ambulance, it is possible to reach the far north of Sweden, and much of the rest of Scandinavia and the Baltic.

The benefits of intensive care for seriously ill patients with viral haemorrhagic fever were discussed. Participants knew of one seriously ill patient who had required intensive supportive care, and had survived, but of five who had died despite receiving intensive supportive care. The practicalities of emergency repatriation/aeromedical evacuation (which usually involves military transport aircraft) of exposed or sick national staff were also discussed. Germany and Switzerland also have aeromedical evacuation systems. Difficulties in convincing national and air/airport authorities of the safety of the exercise were known to be common, and led to delays; international organisations and NGOs who employed staff in the field did not necessarily have a formal policy on emergency repatriation, nor did they have standing agreements with the HSIDUs that would be able to accept a case/contact, or with the aeromedical evacuation teams. The
delays in arranging an aeromedical evacuation could be so protracted that by the time everything had been agreed and organised, the patient was so sick as to make air transfer impracticable.

7. EUNID website
(EUNID deliverable 2.4.11 EUNID website development with public access site for information and members only area)

The EUNID website could be found at http://www.eunid.com. The site was still being developed, and might not always be accessible. Professional and e-mail addresses of national officials and representatives are listed on the website; participants were asked to check these to ensure that they were correct, and to inform the EUNID coordinator of any necessary changes.

8. EUNID inventory questionnaire
(EUNID deliverable 2.4.2 Inventory of isolation facilities and the personnel who work in them)

The results of the questionnaire designed to help compile the inventory were presented and reviewed. Since the questionnaire had been sent only to EUNID national officials, it could provide information only for the 16 countries that participated in EUNID. The EUNID coordinator was exploring with the Commission the possibility of expanding EUNID to include newly joined member states and candidate countries. Questionnaire results had been received for 12 countries by the end of the meeting (though for some, the information remained incomplete): completed questionnaires from Belgium, France, Ireland and Spain were awaited.

A number of problems had been found with the questionnaire: it was complicated to complete, and not always easy to understand; in particular, national officials had not understood that they were being asked to provide information about all HSIDU/beds in their country, not only those in their own unit. Differences between health systems had also contributed to the lack of clarity. It was agreed that a revised questionnaire (excluding data about which there was confidence) should be prepared, piloted, and discussed with national officials and representatives before they were asked to complete it. It was agreed also that national officials and representatives would provide details of cases admitted to HSIDUs in 2004 to complement the data on cases admitted in 2003.

Many participants had already sent copies of their national guidelines on smallpox, VHFs, TB, SARS Co-V, and plague, and/or details of the relevant weblinks for inclusion in the EUNID archive of national guidelines; those who had not were asked to send these to the EUNID coordinator as soon as possible.

9. Standards for isolation rooms
(EUNID deliverable 2.4.3 Define minimum requirements for isolation facilities in Europe)

The UK had recently developed guidance on isolation facilities in acute care settings. (See: www.sykehusplan.org/data/hbn_4_supp_1_2005033191427.pdf), where the detailed engineering drawings presented during the meeting by Malcolm Thomas, and the full design specifications can be seen. This document should be read in conjunction with www.nhsestates.gov.uk/download/r_and_d/B_01_06%20Executive%20Summary.pdf)

Single rooms were needed in acute care settings for three main purposes: to provide privacy, to protect immunosuppressed patients from infection, and to prevent the transmission of infection from infected patients. In the UK, there were three types of isolation room: positive pressure rooms (for patients susceptible to infection, generally found in chemotherapy and transplant units), negative pressure rooms (in infectious disease units), and ‘switchable’ rooms – negative-pressure/positive-pressure, as required - (found in general medical wards, intensive care units, high dependency units). In general, simple ventilation systems worked better than complicated ones. It was now possible to install systems with variable air (4-400) changes/hour, but hospitals were increasingly being built by private companies with little understanding of the requirements...
of health care, or of the dangers of infection. Complex systems could be incorrectly installed, were often hard to maintain, and were less likely to be understood by staff. Switchable systems, in particular, were not recommended, and could be dangerous (eg ‘negative’ pressure room in fact ‘positive’ pressure room, unknown to all). The new UK guidance provided details of a new concept in isolation: a neutral pressure room with a ventilated lobby. The ventilated lobby, containing the supply system, is at positive pressure (10 Pa); the patient isolation room is pressure neutral, with 10 air changes /hour; the ensuite lobby, which contains the extract system, is at negative pressure. The system had the advantage of being universally applicable, and of failing ‘safe’ rather than failing ‘dangerous’. The UK guidance included recommendations on the installation of neutral pressure isolation rooms as ‘new build’ units, and guidance on adaptation of existing buildings. The guidance provided detailed advice on design, construction standards, commissioning tests, decontamination, performance monitoring, maintenance, and record keeping systems.

The University of Hong Kong had developed a demountable isolation facility (in effect, a mobile/portable isolation room – ‘flat-packed’ frame construction), which was also being used as a test facility, and, in the UK, a full sized isolation suite of the new ‘neutral pressure’ design had been constructed at Bracknell (Building Services Research and Information Association, BSRIA), where a research programme was underway that would test the practicality of the construction guidelines and the commissioning protocol, define the design limits of the neutral pressure room concept, and define the levels of protection offered.

EUNID members who were interested would be welcome to attend the planned open days, and should contact Malcolm Thomas (engsec@dh.gsi.gov.uk)

10. Critical issues for infection control

(EUNID deliverables 2.4.4 Exchange of good practices on infection control and management of patients with highly infectious diseases, and 2.4.6 Consensus management guidelines including medical procedures)

a) Airborne infections

Important issues included: the relationships between ‘droplet’ infection and ‘airborne’ infection, particle size, and contact distance, and determining which infections were, or could sometimes be, transmissible by the airborne route. Terminology was confusing (‘close contact’, ‘aerosol transmission’). Case and case series reports from the 2003 SARS epidemic, in which 21% of probable cases were health care workers, suggested that infection risks for unprotected health care workers increased with proximity to the patient, but that it would be unwise to regard 3 feet (the distance traditionally quoted in infection control guidelines) as an absolute, since infection had occurred at greater distances. Source control was also clearly important: high-flow oxygen given through an unmodified facemask generated aerosols, as did other aerosol provoking procedures. The Amoy gardens outbreak, and subsequent aerodynamic modelling, suggested that airborne transmission of SARS-CoV could occur, but experience in the SARS outbreak overall suggested that airborne transmission was uncommon and occurred only in unusual circumstances: SARS Co-V could be viewed, therefore, as an opportunistic airborne pathogen, in contrast with M tuberculosis, which was an obligate airborne pathogen.

There was also discussion of the transmissibility of VHF viruses by the airborne route. There was some evidence to suggest that, under laboratory conditions, non-human primates could be infected by small particle aerosols. However, it was also clear that, in outbreaks of VHF, most infections occurred as a result of contact with infected blood/body fluids, through percutaneous or mucocutaneous (exposure of the nose, mouth, or conjunctivae) exposure, and, although the rapidity of nosocomial amplification in some of the early outbreaks in Africa had led to an initial belief that airborne spread from person to person had occurred, there is today thought to be little evidence, if any, for airborne transmission from person to person. The secondary attack rates in health care workers in outbreaks of VHF in Africa were high, but once procedures for patient
isolation had been set up, and health care workers provided with appropriate PPE (gown, apron, gloves, boots, goggles, face shield, and surgical mask, but not, usually, hoods, FFP3 mask or PAPRs) and disinfectants, and taught how to use them, new infections usually ceased.

Respiratory protective equipment was a further topic of debate. Clinicians needed to be aware of the different forms of protection available, and also of the limitations of such equipment: no respiratory protection is 100% protective, and respiratory protective equipment could augment, but could not replace, other preventive measures (eg source patient isolation, hand hygiene). Information about the efficacy of particulate filtration masks was limited, although they fitted the face better and had greater filtration efficiency than surgical masks. However, they were tiring to wear, some workers (eg asthmatics) found them difficult to use, and they could not be used effectively by those with beards. The incremental benefits from using particulate filtration masks in the prevention of airborne infections had not been assessed; some studies had shown an absence of TB transmission despite the use of surgical masks, rather than particulate filtration masks, for protection. Worker protection legislation, which requires that employers protect workers to the greatest extent possible, might result in changes in infection control practice (eg the requirement, in the US, that health care workers caring for patients with TB use N95 masks). These points were reflected in responses to the inventory questionnaire: all responders would recommend combined standard, contact, droplet and airborne infection isolation precautions for the management of any known or suspected case of VHF or smallpox, and all would recommend that the respiratory protection used should be at the level of an FFP2 mask or higher, but there was considerable variation in the exact type of respiratory protection recommended. Participants thought that there would be benefit in developing EUNID minimum safe standards on respiratory protective equipment for health care workers caring for patients with airborne infections.

b) Infection control: protecting health care workers, patients and the public

Although patient to health care worker transmission of severe infections (eg SARS, VHF) was usually obvious, the extent of nosocomial transmission of infections was sometimes unappreciated: the Safe Injection Global Network (SIGN) had estimated that, globally, 5% of new HIV infections, and 32% of new HBV infections were acquired through unsafe injections. The acronym ABCDE (Alert, Barrier, Clean, Dispose, Evaluate) could be used as a tool when thinking about the essential elements of effective infection control. Implementation of appropriate infection control measures, ideally, should not be an incremental process, but, at the same time, guidance and practice needed to be sufficiently flexible to deal with the unexpected or unusual - the bronchoscopy in the restless patient with pulmonary haemorrhage - and had a role in preventing environmental contamination as well as protecting the health care worker. The intensive investigation of individual cases (involving multiple sampling and the use of advanced diagnostic procedures eg bronchoscopy for respiratory samples) that was often a feature of outbreaks of highly infectious diseases, or of a newly emergent infection of unknown lethality, could be hazardous for health care workers and increase their risk of exposure. Respiratory protection had been much discussed, but less attention had been paid to improving compliance with eye protection, which might be equally important in preventing infection. The use of newer devices, which had built-in anti-fogging, and of commercially available anti-fog liquids might increase the acceptability of eye protection and improve compliance. Similarly, environmental contamination, and subsequent eye/mouth/nose contact by contaminated hands could be important in transmission: guidelines should include advice on hand hygiene, management of spillages, sharps disposal, and the importance of effective routine cleaning of the patient’s immediate environment. Use of both barrier equipment and cleaning materials increased the quantities of clinical waste that required safe disposal, and disposal methods needed to be simple, effective and sustainable.

c) EUNID guidelines
Participants had been asked, before the meeting, to describe three issues that they thought important to include in EUNID clinical guidelines on highly infectious diseases. The issues highlighted most frequently were triage and infection control (particularly for respiratory infections) within emergency departments. The collated responses are shown below.

**HSIDUs:**
- Definition/description of facilities required in order to classify IDU as HSIDU
- HSIDU construction, commissioning, maintenance
- Training of staff
- Lengths of shifts, patient: staff ratios
- Mechanisms for rapid alerts and rapidly updating advice/guidelines

**Pre-hospital assessment and triage**
- Telephone triage/assessment
- When and how to refer to HSIDU
- On-site assessment by ID clinician/expert
- Initial clinical management
- Infection control as part of routine management of respiratory symptoms - cough etiquette, PPE, and source isolation within emergency department/elsewhere

**Safe transport**
- Patients - to HSIDU by land or air, and between departments within hospital
- Specimens - within hospital; from hospital to reference laboratory
- Cadavers (post mortems, transport, funeral arrangements)

**Clinical management**
- Isolation, PPE and management advice for each risk category (ie low, medium, high) so that guidelines are workable
- Diagnostics (which tests to do when, and where to send them);
- Needlestick prevention, safe injections, exposure management policy
- PPE: design specifications; consensus on which type of respiratory protective equipment for which disease, and associated issues eg fit testing, training
- Safe procedures (obtaining blood specimens; sharps management; aerosol provoking procedures)

**Disinfection and disposal clinical waste**
- Cleaning and disinfection in emergency/other department after admission of patient with HID
- Disinfection of aircraft after detection of patient with HID

**Other**
- Aircraft: contact tracing and data management procedures; disinfection after a case has been transported
- International collaboration and cooperation

**d) EUNID training modules**
*(EUNID deliverables 2.4.8 Core curriculum, and 2.4.9 Training modules)*

Participants were asked to provide information about national regulations on training for ID clinicians, to state whether there were special requirements for ID clinicians working in HSIDUs, and to describe the content of any special training courses.

Training requirements for ID physicians varied, but in most countries, training within a HSIDU was not a required part of training in infectious diseases, and in some countries, training in infectious diseases was not standardised in any way. Several of the HSIDUs (London, units in Germany, Linkoping and Huddinge in Sweden, Lazzaro Spallanzani in Rome) ran regular (annual or more frequently) local training courses for their own staff (including nurses, intensivists,
laboratory staff, ambulance personnel. These were tailored to being able to manage patients with highly infectious diseases within the conditions within the unit (so the London course provided hands-on training in working with the patient isolator, whereas the Swedish courses provided training in working in suits, hoods and PAP respirators). All the participants who responded emphasised the importance of training that backed theory with practice, and of regular top-up training and drills.

e) Personal protective equipment

(EUNID deliverables 2.4.4 exchange of good practices on infection control including PPE, 2.4.3 definition of minimum requirements for HSIDUs, and 2.4.6 consensus management guidelines)

A very robust discussion on the order in which PPE should be donned and removed was stimulated by viewing a video, made at the Lazzaro Spallanzani, and used to train health care workers there. To some extent the order in which PPE should be donned and removed by staff in HSIDUs depended on the mechanism used for patient isolation (suits v isolators), since the PPE used was different. It was agreed that the EUNID project group should prepare a series of flow charts for further discussion by participants.

There was considerable discussion on the evidence base for making recommendations on the types of respiratory protective equipment for use in different clinical situations. Current practice within Europe varied considerably (some countries [Netherlands, Estonia, Luxembourg, Italy] use FFP2 masks, others [UK, Germany] do not; some countries [eg Germany] use FFP3 masks very widely, others [eg UK] use them only in very carefully specified situations). Manufacturers made many claims for respiratory equipment, and the degree of protection offered, but the evidence on protection (v particle size) related to dusts and chemical particles, not biological material. It was agreed that a working group should be formed, which would consider existing evidence on protection, and associated issues such as worker protection and health and safety legislation, and current cost and availability of different forms of respiratory protection within Europe, and report back to the main group at (or before) the next meeting of EUNID, in London in 2006.

11. Highly infectious diseases: prevention, control and public health impact in the EU

Dr Gouvras (European Commission) traced the evolution of the EU response to highly infectious diseases, relating them to key global events (from Ebola in Uganda in 1995, to Marburg in Angola in 2005), which had culminated in the development of ECDC, and described current EU strategy on communicable disease control and health security. Health and safety legislation in the EU was comprehensive, though it is not clear to what extent it had been complied with, or how it should best be controlled and enforced. EUNID was one of the projects (with E-Threat, EPIET, Euronet-P4) funded through or associated with the public health programme. Research strands included Committees, Expert Groups, and the 6th Framework Programme, which was linked to thematic priorities, which included combating the major communicable diseases linked to poverty. Funded activities could take the form of integrated actions (IA), scientific targeted research projects (STREPS), networks of excellence (NoEs), coordination actions (CAs), training (Marie Curie) actions, technology platforms (TPs), or scientific support to policies (SSP) or to actions (SSA). Other relevant EU initiatives included humanitarian aid (through the Red Cross, Red Crescent and WHO), the malaria, TB and AIDS programme, civil protection (providing assistance for first phase emergency actions); broader prevention/control measures (eg plant and animal safety, food and water safety), and international cooperation with the UN and UN agencies (including WHO and GOARN), OECD, ECHO, and other countries (eg Global Health Security Initiative).

Current priorities included the development and evaluation of emergency preparedness and response plans, including health system response plans.

12. Next meeting

The next meeting of EUNID will be held in London in 2006; dates for the meeting will be canvassed shortly.
Meeting participants

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Robert Heyderman, University of Bristol, United Kingdom
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