



## COUNTRY VISIT REPORT

### **Country visit to discuss antimicrobial resistance (AMR) and healthcare-associated infections (HAIs)**

Finland, 28-30 October 2012



## **Suomenkielinen yhteenveto**

### **Maavierailun tarkoitus**

Euroopan tautien ehkäisy- ja torjuntakeskus ECDC vierailee jäsenmaissa niiden hallitusten kutsusta keskustelemassa mikrobilääkeresistenssin ja hoitoon liittyvien infektioiden tilanteesta ja kansallisista ehkäisy- ja torjuntatoimista. ECDC hyödyntää indikaattori- ja kysymysluetteloa, joka perustuu pitkälti mikrobilääkkeiden maltillista käyttöä ihmislääketieteessä koskevan Neuvoston suosituksen (2002/77/EY) avainkohtiin sekä Neuvoston suositukseen potilasturvallisuudesta ja hoitoon liittyvien infektioiden ehkäisemisestä ja torjunnasta (2009/C 151/01). Suomen sosiaali- ja terveysministeriö kutsui ECDC:n ja Euroopan elintarviketurvallisuusviranomaisen (EFSA) yhteisvierailulle keskustelemaan mikrobilääkeresistenssistä ja hoitoon liittyvistä infektioista ihmisten ja eläinten hoidossa.

### **Johtopäätökset**

Mikrobilääkeresistenssiä ja hoitoon liittyviä infektioita koskeva lainsäädäntö: tartuntatautilaki (583/1986), tartuntatautiasetus (786/1986), terveydenhuoltolaki (30.12.2010/1326) ja asetus laadunhallinnasta ja potilasturvallisuuden täytäntöönpanosta laadittavasta suunnitelmasta (341/2011). Nykyisessä laissa ei kuitenkaan ole erikseen määrätty mikrobilääkeresistenssiä ja hoitoon liittyvien infektioiden ehkäisemistä koskevasta kansallisesta strategiasta. Tartuntatautilaki ja -asetus ovat parhaillaan käsiteltävinä, ja terveydenhuoltorakenteen uudistus on vielä kesken. Uusi lainsäädäntö tulee sisältämään mikrobilääkeresistenssiä ja hoitoon liittyviä infektioita koskevia määräyksiä.

Kansallinen mikrobilääkeresistenssin torjumiseen keskittynyt monisektorinen asiantuntijaryhmä on osa alojen välistä mekanismia (Intersectoral Coordination Mechanism, ICM), jonka toimintakausi jatkuu vuoteen 2015 saakka. Asiantuntijaryhmän rooli on siinä mielessä epäselvä, ettei sillä ole selkää mandaattia eikä velvollisuuksia eikä se ole laatinut strategiaa, jolla vastataan mikrobilääkeresistenssin kasvuun. Ryhmälle ei ole määritetty budjettia eikä vielä ole selvää, käsitteleekö sama ryhmä myös hoitoon liittyviä infektioita vai perustetaanko sitä varten toinen asiantuntijaryhmä.

Mikrobilääkeresistenssin ja hoitoon liittyvien infektioiden torjunnasta vastaa THL:n Tartuntatautiseurannan ja -torjunnan osasto (TATO) ja erityisesti Suomen tartuntatautirekisteri, johon tiedot tärkeimmistä taudeista ja mikrobikannat kootaan keskitetysti, yhteistyöhön perustuva mikrobilääkeresistenssin tutkimusryhmä FiRe (Finnish Study Group for Antimicrobial Resistance) ja Sairaalinfektio-ohjelma SIRO, joka seuraa ja torjuu hoitoon liittyviä infektioita. Hoitoon liittyvien infektioiden seuranta ei ole kaikissa sairaaloissa pakollista, vaan perustuu vapaaehtoisuuteen. SIRO-ohjelmaan osallistuu suuri osa Suomen sairaaloista, mutta eivät kaikki. Suomessa on toteutettu prevalenssitutkimuksia, joista viimeisin julkaistiin vuonna 2005. Vuonna 2011 Suomessa tehtiin prevalenssitutkimus, joka oli osa ECDC:n toteuttamaa prevalenssitutkimusta hoitoon liittyvistä infektioista ja antibioottien käytöstä eurooppalaisissa ensiavuuksissa ja päivystyssairaloissa.

### **Infektioiden torjunta**

Suomessa infektioiden torjunta on kirjattu lakiin vain joiltain osin. Infektioiden torjuntaa, mikrobilääkeresistenssiä ja hoitoon liittyviä infektioita koskeva lainsäädäntö puuttuu eikä asiaa koskevaa valtakunnallista toimintasuunnitelmaa tai strategiaa ole. Hoitoon liittyvien infektioiden seuranta ja torjunta on sairaanhoitopiirien vastuulla, eikä lainsäädäntö määrää sairaaloita laatimaan ja toimeenpanemaan infektioiden torjuntaan tähtääviä rakenteita ja prosesseja. Tämän seurauksena sairaanhoitopiireissä ja eri kunnissa on päädytty noudattamaan erilaisia käytäntöjä. Valtakunnallisesti ei ole tunnistettavissa mitään tahoja, jonka vastuulla olisi reagoida resistenssin lisääntymiseen ja infektioepidemioiden esiintymiseen sekä valvoa ja torjua mikrobilääkeresistenssiä ja hoitoon liittyviä infektioita Suomessa.

## **Mikrobilääkeresistenssi**

Suomessa monilääkeresistenttien mikrobien määrä on vähäinen, mutta määrä kasvaa hitaasti. Eri terveydenhuollonlaitosten välillä leviävät resistentit kannat ovat kasvava ongelma. Vuonna 2010 MRSA-prevalenssi on keskimäärin 3 %, mutta joillakin alueilla osuus on suurempi, mikä osoittaa näiden toimivan alkulähteenä bakteerien leviämiseksi ympäristöön. Laajakirjoisia beetalaktamaasientsyymejä (ESBL) tuottavien enterobakteerien määrä on Suomessa kasvanut eksponentiaalisesti ja kaksinkertaistunut jo yli 4 prosenttiin. Myös useille tai kaikille saatavissa oleville antibiooteille resistenttejä bakteereja (esimerkiksi karbapenemaasia tuottavat enterobakteerit, CPE) on tavattu ja niiden esiintyvyys kasvaa hitaasti. Tämä esiintyvyyden lisääntymisen torjunta sairaalaepidemiaosta endeemiseen tilanteeseen saakka on jäänyt paikalliselle tasolle ja lähinnä sairaaloiden omalle vastuulle, eikä infektiorjunta ole ollut systemaattista koko maassa.

## **Antibioottien käytön valvonta**

Suomessa antibioottien käyttöä valvoo kaksi tahoa: Lääkealan turvallisuus- ja kehittämiskeskus Fimea ja Kela. Tietojen raportointi ja lääkemääräysten indikaatioiden kerääminen ei kuitenkaan ole pakollista. Tietoja antibioottien käytöstä käyttöaiheen perusteella ei ole saatavissa eikä laskelmia antibioottien kulutuksesta avoterveydenhuollossa ja sairaalahoidossa pystytä tekemään.

## **Suosituks**

- Infektioiden torjuntaa koskevaa lainsäädäntöä pitäisi tarkistaa, esimerkiksi vertaamalla sitä muiden Euroopan maiden vastaavaan lainsäädäntöön. Joissain maissa, kuten Isossa-Britanniassa ja Ranskassa, mikrobilääkeresistenssiä ja hoitoon liittyviä infektioita koskevien lakien säätäminen on saanut valvovat viranomaiset ja terveydenhuollon tahot toteuttamaan ja seuraamaan valtakunnallisia strategioita.
- Lainsäädäntö voisi sisältää selkeän mandaatin ja budjetin alojen väliselle mekanismille (ICM), mikrobilääkeresistenssiä ja hoitoon liittyviä infektioita koskevien valtakunnallisten strategioiden ja toimintasuunnitelmien laatimiselle ja toimeenpanemiselle sekä valvojan tahon määrittämiselle ja strategioiden toimeenpanon valvonnassa käytettävillä rakenteilla ja prosesseilla.
- Mikrobilääkeresistenssin ja hoitoon liittyvien infektioiden torjuntaa ja valvontaa on ehdottomasti vahvistettava Suomen sairaaloissa ja muissa terveydenhuoltolaitoksissa. Kasvun hillitsemiseen on osallistuttava laajasti sekä paikallisella että valtakunnallisella tasolla.
- Keskeisellä sijalla on laatia ja toimeenpanna valtakunnallinen toimintasuunnitelma, valtakunnalliset ja paikalliset mikrobilääkeresistenssin torjuntaohjeet, mikrobilääkkeiden maltillinen käyttö ja hoitoon liittyvien infektioiden torjuminen.
- Vastuu mikrobilääkeresistenssin ja hoitoon liittyvien infektioiden torjunnasta tulee määrätä valtakunnalliselle taholle, joka myös koordinoi ja valvoo toimintaa sekä kantaa niistä vastuun. Myös laillinen toimintavalta ja vastuu tulee määrätä tälle samalle taholle.
- Asianomaisen viranomaisen on seurattava myös indikaattoreita, jotka valvovat mikrobilääkeresistenssiä ja hoitoon liittyviä infektioita koskevien strategioiden toimeenpanoa. Mikrobilääkeresistenssiä ja hoitoon liittyviä infektioita koskevaa viestintää ja yhteistyötä kaikkien asianosaisten välillä tulee kehittää.
- Alojen välisen yhteistyön (ICM) valtuuksia on laajennettava. Lisäksi sillä tulee olla vahva poliittinen tuki, selkeä mandaatti ja määritelty budjetti.
- Osana ICM:n mandaattia voisi olla mikrobilääkeresistenssin ja hoitoon liittyvien infektioiden torjuntaa koskevien valtakunnallisten strategioiden ja toimintasuunnitelmien kehittäminen sekä niiden toimeenpanon valvominen. ICM voisi lisäksi arvioida resistenssin vaikutuksia terveyteen ja talouteen.

- Myös infektioiden torjuntaan ja seurantaan, sekä infektiosairauksiin erikoistuneiden lääkäreiden ja muiden ammattilaisten roolia tulisi vahvistaa sairaaloissa ja heidän osallistumistaan hoitoon liittyvien infektioiden diagnosointiin ja tietojen keräämiseen tulisi lisätä.
- Sairaaloissa hoitoon liittyvien infektioiden seuranta tulisi tehostaa ja tiedot välittää viipymättä infektioiden torjuntaan ja seurantaan sekä infektiosairauksiin erikoistuneille lääkäreille ja muille ammattilaisille, jotta he voisivat seurata hoitoon liittyvien infektioiden määrää sairaalassa ja puuttua tarvittaessa tilanteeseen.
- Tiedot hoitoon liittyvistä infektioista olisi syytä kerätä systemaattisesti ja ilman turhia viiveitä nykyistä useammasta sairaalasta ja tiedot raportoitava SIROlle, joka kokoaa ajantasaiset tiedot ja kattavat epidemiologiset tiedot.
- Mikrobilääkkeiden käyttöä voisi tilastoida indikaatioiden perusteella hyödyntämällä Kelan tietoja paremmin. Vastaavien tietojen keräämistä FIMEAsta olisi myös syytä harkita.
- Mikrobilääkkeiden maltillista käyttöä olisi tuettava perustamalla sairaaloihin poikkitieteellisiä mikrobilääkevalvontaryhmiä, jotka seuraisivat mikrobilääkkeiden käyttöä infektio lääkäriin johdolla.
- Mikrobilääkkeiden käyttöä koskeva palaute voitaisiin välittää lääkäreille sairaaloissa ja avoterveydenhuollossa, jotta lääkkeiden määräyskäytäntöjä saadaan kohennettua.
- Ihmisten ja eläinten terveydestä ehdotetaan laadittavaksi vuosittain yhteinen, mikrobilääkeresistenssin esiintyvyyttä koskeva raportti. Eurooppalaiselle mikrobilääkeresistenssin valvontaverkostolle (EARS-Net) ehdotetaan raportoitavan vuosittain. Tähän määritetään tarvittavat resurssit.



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## Executive Summary

### Rationale and purpose of the country visit

The European Centre for Disease Prevention and Control (ECDC) performs country visits upon invitation from the respective governments to discuss the status and national infrastructure for the prevention and control of antimicrobial resistance (AMR) and healthcare-associated infections (HAIs). ECDC uses a list of indicators and questions which are primarily based on key statements from the Council Recommendation on the prudent use of antimicrobial agents in human medicine (2002/77/EC), as well as the Council Recommendation on Patient Safety, including the Prevention and Control of Healthcare -Associated Infections (2009/C 151/01). An invitation from the Finnish Ministry of Social Affairs and Health was sent requesting a joint visit from ECDC and the European Food Safety Authority (EFSA) to discuss issues related to AMR and healthcare-associated infections (HAI) in both human and veterinary settings.

### Conclusions

Legislation for AMR and HAIs falls under the Communicable diseases Act 504/1986, the Communicable Diseases Decree 786/1986, the Health Care Act 30.12.2010/1326, the Health Care Decree 341/20. At present this Act, however, does not include a section for a national strategy for the prevention of AMR and HAIs. The Communicable Disease Act and Decree are undergoing revision and a reorganisation of the healthcare structure is in progress. Specific legislation for AMR and HAI will be included in the new legislation.

The current National Advisory Committee on Antimicrobial Resistance Prevention is a multi-sectoral committee that has the role of Intersectoral Coordination Mechanism (ICM) and has a life expectancy until 2015. This committee does not appear to have a well-delineated role, as it has no clear mandate, responsibilities and has not yet outlined a strategy to address the rise in AMR. Furthermore, it has no dedicated budget and it is not yet known whether this committee or whether a separate committee will be formed will also address HAI.

Surveillance of AMR and HAIs is performed by the Department of Infectious Disease Surveillance and Control (TATO) and more specifically by the National Infectious Disease Register (NIDR), the register for notifiable diseases and microbial strain collection, the collaborative network on Antimicrobial Resistance Surveillance (FiRe), the Healthcare-Associated Infections Programme (SIRO) which performs national HAI surveillance. Surveillance for HAIs in all hospitals is not mandatory, but rather voluntary. Although SIRO involves a large number of hospitals, not all hospitals in the country currently participate. Finnish point prevalence surveys (PPSs) have been performed, the last one published in 2005. In 2011, Finland performed a PPS, thus participating in the ECDC PPS of HAIs and antimicrobial use in European acute care hospitals.

## Infection control

Infection control in Finland is currently included only in some parts of the legislation, but there are no specific laws for infection control and the prevention of AMR or HAIs, nor is there a national action plan or strategy. Control of HAIs is under the responsibility of the hospital districts and there are no mandatory legal requirements for infection control structures and processes in hospitals. This has led to the development and practice of different approaches within and between health districts and municipalities. At a national level, there appears to be no coordinating body that has full responsibility of addressing this rise in resistance, outbreaks and the monitoring of AMR and HAIs in Finland as a whole.

## Antimicrobial resistance

Rates of multidrug-resistant bacteria in Finland are low, but are slowly rising. There is clear interchange and spread of resistant bacteria between healthcare settings and has been identified as a rising problem. Data for MRSA from 2010 show 3% prevalence, with some areas reporting higher percentages, clearly representing reservoirs for spread to surrounding areas. The percentage of extended-spectrum beta-lactamase (ESBL)-producing Enterobacteriaceae has increased in an exponential fashion in Finland, doubling to over 4%. Bacteria that are resistant to almost all or all-available antibiotics, e.g. carbapenemase-producing Enterobacteriaceae (CPE) have been reported and their incidence is slowly rising. Management of this increase, starting from hospital outbreaks and leading to establishment of endemicity, has been addressed mostly at the local, hospital level and infection control measures are not homogeneously implemented across the country.

## Antibiotic use and monitoring

Two institutions monitor antibiotic use in Finland: the Finnish Medicines Agency (FIMEA) and the Social Insurance Institution of Finland (KELA). Data reporting and collection on indications for the prescription are not, however, mandatory and no data can be obtained about antibiotic use by indication, nor can calculations be made for the consumption of antibiotics in outpatient or inpatient care.

## Recommendations

- There is a need for an overview of the current legislation on infection control, which could be compared to similar legislations in other European countries. In some countries in Europe, examples of which are the United Kingdom and France, the creation of a legal infrastructure has been able to empower monitoring bodies and healthcare structures to implementation and monitor national strategies for AMR and HAIs.
- Included in this legislation could be a clear mandate and budget for the ICM, the creation and implementation of national strategies and action plans for AMR and HAIs, having a specific responsible body for the oversight and using structure and process indicators to monitor the implementation of the strategies.
- It is essential that prevention and control of AMR and HAIs in Finnish hospitals, in other healthcare facilities and the community be strengthened. Efforts to control this rise must involve all stakeholders at all levels, national and local.
- It would be important to develop and implement a national action plan, national and local guidelines for AMR, prudent use of antibiotics and the prevention of HAIs.
- Responsibility for combating AMR and HAIs in Finland should be clearly assigned to a national overseeing body that will coordinate, monitor and have the overall responsibility for this. Legal authority and responsibility should be assigned to this body and be exercised.
- This overseeing body should also follow indicators that monitor the implementation of the strategies for AMR and HAIs. Communication between all relevant parties and collaboration should be enhanced with regard to the overall status of AMR and HAIs in Finland.
- There is a need to empower the current ICM. It should have strong political endorsement and support and should be given a clear mandate and dedicated budget.
- The ICM could, as part of its mandate, develop national strategies and action plans for the control AMR and HAIs and monitor their implementation. The ICM could also evaluate the impact of resistance on health and economic outcomes.
- It is important to strengthen the role of infection prevention and control practitioners (ICPs) and infectious disease (ID) physicians in hospitals, and their involvement in diagnosing and collecting data on HAIs.
- Active surveillance of HAIs in hospitals should be enhanced and data fed back in a timely manner to ICPs and ID physicians in hospitals to be able to monitor their HAI rates and make appropriate interventions.

- Data on HAI could be collected in a systematic and timely fashion and from more hospitals and reported to SIRO, allowing for timely information and more complete epidemiological data.
- Measurement of antibiotic use in the community according to indication could be obtained by optimal use of indication data from KELA. Ways to also obtain such data from FIMEA could be considered.
- Prudent use of antibiotics should be strengthened by formation of multidisciplinary antibiotic monitoring teams in hospitals led by ID physicians.
- Feedback of data on antibiotic use could be fed back to physicians at the hospital level and the community level for improvement of prescribing practices.
- An annual, joint human and veterinary report on prevalence of AMR from humans and animals is suggested. Annual reporting to EARS-Net is suggested and necessary resources should be allocated for this purpose.

# 1 Background

## 1.1 Rationale for country visits to discuss antimicrobial resistance (AMR) issues

After the introduction of antibiotics in the 1940s, it soon became clear that antibiotic usage promotes the rise of antibiotic-resistant bacterial strains in bacteria such *Staphylococcus aureus* and *Mycobacterium tuberculosis* (TB). During the following decades, the increasing number of antibiotic-resistant strains could still be treated because of the availability of new antibiotics giving the possibility of therapeutic options for patients infected with resistant bacteria. In the 1990s, however, the development of new antibiotics began to and continued to markedly decrease following a simultaneous rise in the emergence of bacteria resistant to multiple antibiotics, resulting in limited availability for agents for the treatment of patients. Today, bacteria that are totally (or almost totally) resistant to antibiotics, many with new resistance mechanisms, are emerging and spreading in Europe and worldwide. The emergence and spread of bacteria that are resistant to antimicrobials is a threat to patient safety and is associated with higher morbidity and mortality in infected patients

In 1998, the Chief Medical Officers of the European Union (EU) Member States (MS) recognized this evolving problem and took the initiative to the first major conference on AMR in Copenhagen, Denmark, which resulted in the **Copenhagen Recommendations (Report from the Invitational EU Conference on the Microbial Threat, Copenhagen, Denmark, 9 -10 September 1998)**.

In November 2001, the EU Health Ministers (Council) adopted a **Council Recommendation on the prudent use of antimicrobial agents in human medicine (2002/77/EC)**, which covers most topics of importance for prevention and control of AMR including the development of an Intersectoral Coordination Mechanism (ICM).

In 2005, the European Commission reported to the Council on this progress in Member States in the **Report from the Commission to the Council on the basis of Member States reports on the implementation of the Council recommendation (2002/77/EC) on the Prudent Use of Antimicrobial Agents in Human Medicine (COM (2005) 0684)**. In this report, it is stated that: "*The ECDC should be able to assist the Commission in the future preparation of implementation reports and of recommendation proposals.*"

In June 2009, the EU Health Ministers adopted a **Council Recommendation on Patient Safety, including the Prevention and Control of Healthcare -Associated Infections (2009/C 151/01)**, which discusses the importance of combating both AMR and HAI, issues that are key to patient safety.

The European Centre for Disease Prevention and Control (ECDC) performs country visits upon invitation from the respective governments, to discuss the status and national infrastructure

for the prevention and control of antimicrobial resistance (AMR) and healthcare-associated infections (HAIs). ECDC has so far visited 16 countries: 14 European Union (EU) Member States, four of these more than once, and 2 EU enlargement countries.

In order to systematically discuss all aspects of the policies, practices and infrastructure that involve AMR and HAI in countries, ECDC uses a list of indicators and questions which are primarily based on key statements from the Council Recommendation 2002/77/EC, as well as the Council Recommendation 2009/C 151/01. At the end of the visit an oral, preliminary report is presented to the country, containing observations and conclusions made during the visit and suggestions are proposed. The final report is subsequently prepared in collaboration with the key stakeholders in the country.

During these visits ECDC meets with stakeholders involved in the monitoring, prevention and control of AMR, antibiotic use and HAIs exchange views and facts and ideas about the present situation and future goals of their country. These stakeholders are from all areas of public health, veterinary and human medicine, social security, national insurance, medicines agency as well as the Ministry of Health and any other involved party.

An invitation from the Finnish Ministry of Social Affairs and Health was sent requesting a joint visit from ECDC and the European Food Safety Authority (EFSA) to discuss issues related to AMR and healthcare-associated infections (HAIs) in both human and veterinary settings, which took place from 29 October to 2<sup>nd</sup> November 2012.

## 1.2 Purpose

**Council Recommendation of 15 November 2001 on the prudent use of antimicrobial agents in human medicine (2002/77/EC)** outlines the threat that AMR poses to human health and advocates for a range of actions to be taken for its prevention and control. **Council Conclusions on antimicrobial resistance (AMR) of 10 June 2008** reiterated this call for action.

To assist Member States, candidate and potential candidate countries in implementing the Council Recommendation, ECDC has developed a process for and is carrying out, upon invitation from national authorities, country visits to specifically discuss and assess the situation of the country regarding prevention and control of AMR through prudent use of antibiotics and infection control. These country visits also help document how Member States have approached this implementation and deployed national activities and support the European Commission in evaluating this implementation.

The main output of the visit is a report from the ECDC Team provided to the inviting national authority. To help the ECDC Team ensure consistency of the visits and follow-up of progress of countries, an **assessment tool** has been developed. The assessment tool includes ten topics. These topics are regarded as core areas for successful prevention and control of AMR

and are based on Council Recommendation 2002/77/EC and on Council Conclusions of 10 June 2008. The assessment tool is used as a guide for discussions during the visit.

## 2 Overview of the situation in Finland

### 2.1 Healthcare structures

#### 2.1.1 The Ministry of Social Affairs and Health (MSAH)

The MSAH is responsible for all health care legislation and regulations and for the overall planning, management and monitoring of the fight against infectious diseases. Provisions for the control of infectious diseases can be found in the infectious diseases legislation, specified in regulations. The MSAH represents the legal and political body for the administration of the health care system and prevention of infectious diseases. There are currently two experts on infectious diseases working at MSAH and monitoring the status of infectious diseases in Finland.

#### 2.1.2 Legislation for AMR and HAI

The provision of health care services is regulated by Health Care Act 30.12.2010/1326. The main legislation that refers to AMR and infection control (IC) are the Communicable diseases Act 504/1986, the Communicable Diseases Decree 786/1986, and the Health Care Act, as well as a number of amendments to these laws. The areas of AMR and HAIs that are included in the Communicable Diseases Act cover focus only on certain points, e.g. that Hospital Districts are in charge of HAIs (3§ etc.) and that THL can perform surveillance of infectious diseases and laboratory-based investigation and collect data on resistant to antimicrobial agents (23a§). At present this Act does not include a section on the development of a national strategy for the prevention of AMR and HAIs.

In 2011 a Health Care Decree (341/2011) was passed for patient safety and quality assurance and in June 2011 a new governmental programme included four items that pertained to patient safety, although they did not refer directly to AMR and/or HAIs. The Communicable Disease Act and Decree are currently undergoing revision and a reorganisation of the healthcare structure is in progress. Specific legislation for AMR and HAIs will be enhanced and included in the new legislation. The new legislation and the structural changes may affect the involvement, responsibility and organisation of municipalities and all other stakeholders in this field.

#### 2.1.3 Municipalities

In general, public health in Finland is the responsibility of the municipalities. The majority of Finnish health care services are organised and provided by the municipal health care system. Municipalities are legally required to organise adequate health services i.e. specialised care for their residents. There are currently 336 municipalities in Finland with a median size of less than 6,000 inhabitants. To fund these services, municipalities levy taxes and receive state

subsidies.

#### **2.1.4 Health centres**

Primary health care in Finland is provided through "health centres". Smaller municipalities may merge their health centres into a joint "health centre". Generally, the range of services provided by the health centres is very broad and includes a wide set of preventive and primary care, specialized care, rehabilitation, long-term-care (together with social services) and dental care services. In the absence of national minimum coverage standards, each municipality is free to determine its own scope of services it provides. Since the Finnish health care system is decentralized and national steering is rather weak and consequently, each municipality determines its own scope of coverage within general limits set by national legislation, a fair amount of variation exists geographically and outpatient service volumes for primary care visits, dental care, mental health care and elective surgery differ across municipalities.

#### **2.1.5 Hospitals**

Municipalities are organised into "hospital districts" There are 20 + 1 hospital districts, each of which is owned and funded by its member municipalities, which provide specialist care to the municipal system. Each hospital district has one or several hospitals, one of which is the central hospital. In addition, there are 5 University hospitals, which are tertiary hospitals in Finland and which provide care for the hospital districts.

#### **2.1.6 National Supervisory Authority for Welfare and Health (Valvira)**

Valvira is a nationwide authority which operates under the MSAH and which guides municipalities and Regional State Administrative Agencies (AVIs) on issues of legislation associated with Valvira's jurisdiction. There are six regional agencies that started operating on 1<sup>st</sup> January 2010. These agencies tasks are those of the former state provincial offices e.g. occupational health, safety districts, environmental permit agencies and regional environmental centres. The agencies work in close collaboration with local authorities. In addition, Valvira supervises the implementation and compliance of various fields of healthcare and welfare with legal regulations. This is done by the AVIs fostering regional parity by executing all legislative implementation, steering and supervision of functions in the regions. The AVIs strengthen implementation of the public's basic rights and legal protection, access to basic public services, environmental protection, environmental sustainability, public safety and a safe and healthy living and working environment in the regions.

#### **2.1.7 National Institute for Health and Welfare (THL)**

The National Public health Institute (KTL) and the National Research and Development Centre for Welfare and Health (STAKES) were merged in 2009 to create the THL. THL's functions are defined by the following Decree: "to function as an expert authority in matters concerning social welfare, special care of persons with intellectual and developmental

disabilities, public health, specialised health care, mental health work, infectious diseases, environmental health, gene technology and other matters related to the Institute's sphere of activity. Its functions are not limited to the Health Care Act and Decree, but are also responsible for many other tasks that fall under the Communicable Disease Act and Decree. The main functions of THL are to promote the welfare and health of the population, prevent diseases and social problems and develop social and health services for Finland. It pursues and carries out its objectives by means of research, development activities and official tasks, steering through information as well as international co-operation. In its capacity as the statutory statistical authority for health and welfare, THL maintains and promotes the use of a strong knowledge base within the field. THL, however, has no legal authority.

## 2.2 Monitoring of antimicrobial resistance (AMR)

### 2.2.1 The Department of Infectious Disease Surveillance and Control (TATO)

TATO is part of THL and has branches both in Helsinki and Turku. It contains both the epidemiological and microbiological expert functions for communicable disease surveillance, outbreak investigations and preparedness. The statutory basis of surveillance is by the Communicable law and Decree from 1986.

The surveillance systems that belong to TATO are: the National Infectious Disease Register (NIDR), the register for notifiable diseases and microbial strain collection, the collaborative network on Antimicrobial Resistance Surveillance (FiRe), the Healthcare-Associated Infections Programme (SIRO)

which performs national HAI surveillance and guidance and is a part of "patient safety". The mandate of the department also contains early outbreak recognition, investigation and control, and the syndromic surveillance in primary health care.

For epidemiological and microbiological investigations, TATO jointly collaborates with the Finnish Food Safety Agency (EVIRA), especially in the case of food- and waterborne outbreaks. In contrast to TATO, EVIRA has a clear mandate and responsibility for intervening when there are outbreaks.

### 2.2.2 National Infectious Disease Register (NIDR)

Certain bacterial species that display specific AMR profiles belong to the statutory Infectious Disease Registry monitoring in Finland and are mandatorily reported to the NIDR which is located in Helsinki. The NIDR strain collection of antimicrobial-resistant bacteria, submitted systematically in accordance to the Communicable Disease Decree, is maintained by the Bacteriology Unit in Helsinki and the Antimicrobial Resistance Unit in Turku. The data sources are the clinical microbiology laboratories, most of which are located in the 20 central hospitals. These supply 97% of all laboratory notifications.

The notification is performed electronically from the laboratory mainframe computers to the NIDR database within 3 working days of the results. The remaining 3% of notifications are made from the smaller laboratories using paper forms. Subsequently, reference laboratories

at THL submit species confirmation, susceptibility testing, sub-typing and other data of the submitted isolate, to the NIDR main database electronically. Some reference laboratories have this process completely integrated into their daily laboratory data processing activities. Some THL reference laboratories use a separate computer program to enter the isolate testing data, which are then uploaded into NIDR in batches. By 2013, all THL bacteriological reference laboratory functions will be using the same IT software for their daily work and also to send notifications to the main register.

All data/cases in the NIDR have a unique national person identifier, which is common across the entire healthcare and numerous other administrative systems, including all national registers. This is used for linking data from different sources with cases with predefined computer algorithms.

### 2.2.3 Feedback and accessibility of data

Each hospital district and primary health care centre has the right to access all data in the NIDR that concern cases in their own area, including data produced by the reference laboratories. THL has instituted a process by which individuals who belong to the infectious disease control teams are nominated by the Hospital Districts and Primary Health Care Centres and have the right to access the NIDR.

Feedback is provided by the NIDR to clinical microbiology laboratories every six months regarding detailed, isolate-specific data for each isolate that was submitted to THL. Weekly updates are performed at the NIDR public web service and the results are reported annually in the Communicable Disease Report. In addition to this, the THL reference laboratories also directly report back the results of their testing to the referring clinical microbiological laboratories.

The following bacteria that display certain antimicrobial resistance profiles are reported to NIDR and in most cases also sent to reference laboratory at THL:

- *Enterobacter cloacae* (strains with reduced susceptibility or resistance to carbapenems)
- Enterococci (strains with reduced susceptibility to vancomycin - VRE)
- *Escherichia coli* (strains with reduced susceptibility to third -generation cephalosporins)
- *Escherichia coli* (strains with reduced susceptibility or resistance to carbapenems)
- *Klebsiella pneumoniae* (strains with reduced susceptibility to third- generation cephalosporins)
- *Klebsiella pneumoniae* (strains with reduced susceptibility or resistance to carbapenems)
- *Staphylococcus aureus* (methicillin resistant *Staphylococcus aureus* -MRSA)
- Staphylococci (vancomycin-resistant strains - VRSA)
- *Streptococcus pneumoniae* (blood or CSF isolates with reduced susceptibility to penicillin)

## 2.2.4 The Finnish Study Group for Antimicrobial Resistance (FiRe) network and Finnish Study Group for Antimicrobial Resistance (FinRes)

### a. FiRe

FiRe is a coalition of all 24 major clinical microbiology laboratories and is a voluntary co-operation body. The Antimicrobial Resistance Unit of THL in Turku coordinates the FiRe network. Financing for meetings comes from the pharmaceutical industry, and for the data management development project, from the MSAH and THL. The FiRe laboratories receive no financial compensation for their work.

FiRe's primary role is to provide reliable and comparable data on clinically important bacteria and the prevalence of antimicrobial resistance in Finland. The network monitors the antimicrobial susceptibility of the 15 most important clinical bacterial species annually.

### b. FinRes

FinRes is a working group within FiRe that has been monitoring data on antimicrobial susceptibility since 1991. FinRes has been submitting data to the European Antimicrobial Resistance Surveillance Network (EARS-Net) starting in 2010. Since 2011, all laboratories in Finland are using EUCAST breakpoints.

The network includes all major Finnish clinical microbiology laboratories (24 laboratories in 2012) and is geographically and at the population level, quite comprehensive. The network follows the antimicrobial susceptibility profiles of the 15 most important clinical bacterial species annually (one isolate/patient/specimen type/follow-up period). Annually FinRes monitors 400,000 bacterial isolates, and more than 3 million antimicrobial susceptibility results, i.e. approximately 95% of results from Finland. The last internal report by FiRe is from 2010.

Unfortunately, a printed FinRes report has not been published since 1999. A printed report covering the years 1997-2010 is in press and will be published on the FinRes website in November 2012 ([www.finres.fi](http://www.finres.fi)).

## 2.3 Monitoring of healthcare-associated infections (HAIs)

### 2.3.1 General

In Finland, surveillance for HAIs in all hospitals is not mandatory, but rather voluntary. Hospitals can voluntarily participate and report to the Healthcare-Associated Infections Programme (SIRO). Participating hospitals can submit uniform surveillance data only for certain surgical site infections and for bloodstream infections using standardised HAI case definitions. Although SIRO involves a large number of hospitals, not all hospitals in the

country currently participate. For hospitals that do not participate in SIRO, case definitions and data reporting are not uniform and reporting to a national body is not performed. Finnish point prevalence surveys (PPSs) have been performed in the past, the last one published in 2005. Most recently, in 2011, Finland performed a PPS, participating in the ECDC PPS during which all hospitals involved used uniform case definitions.

*Note: The Finnish results of the ECDC PPS were published in January 2013 in the Finnish Medical Journal.*

### 2.3.2 Healthcare-Associated Infections Programme (SIRO)

SIRO is a surveillance network, which is coordinated by the Epidemiologic Surveillance and Response Unit of THL in Helsinki. It collects standardised data on HAIs as well as antimicrobial susceptibility data from an expanding number of Finnish hospitals since 1999. There are currently 15 voluntarily participating hospitals in Finland, which cover the majority of hospital beds nationally.

The last available data that were published by SIRO are from 1999–2006. The conclusions from these data were that “the rate of nosocomial bloodstream infections (BSIs) in Finland is similar to the rates in other European countries and the United States. BSIs caused by MRSA, VRE and extended-spectrum beta-lactamase (ESBL)-producing *Enterobacteriaceae* are still rare, but their proportion has nearly doubled compared with the past”. The last available published data from SIRO for surgical site infections in orthopaedics specifically, were from 1999–2005. The conclusions from those reports were that: “The SSI rates in Finland are clearly higher than the rates reported by the United States and somewhat higher than the rates in the Netherlands, England and Germany. The higher rates are partly explained by post-discharge surveillance, but even during in-hospital surveillance, the interpretation of the definition of SSI as well as the diagnostic practices may vary.”

At the SIRO website there is a list of publications on different HAIs including a comprehensive estimate of disease burden from HAIs in Finland, but no recent data since 2006, annual data or timely data are available at present.

### 2.3.3 Outbreak investigations and reporting

There is no mandatory notification for HAI outbreaks in hospitals. Healthcare-associated outbreaks are the responsibility of the hospital itself. Small outbreaks in one municipality are the responsibility of the municipal authorities. Outbreaks that occur in more than one municipality as well as large outbreaks are dealt with by regional and national authorities, such as THL and EVIRA and national authorities manage international outbreaks. Because of lack of mandatory notification for HAI outbreaks, information, communication and action about the outbreak depend solely on individual initiative. Microbiology laboratories or infectious disease team members who become aware of an increasing incidence in infections can voluntarily inform relevant parties at a hospital or a higher level. Following this, however, there is no formal or mandatory involvement and any advice or intervention is entirely

voluntary. This may be in the form of informal advice, but there is no mechanism to ensure notification, involvement or follow-up.

In contrast to HAI outbreaks, for food- and waterborne outbreaks, there is mandatory notification and Evira is directly responsible and has a representative present in the municipality with risk management authority.

## 2.4 Infection control

### 2.4.1 General

Infection control in Finland is currently included in only a few sections of the legislation. There are no specific laws, however, pertaining to the infection control and prevention of AMR or HAIs, nor have national action plans or strategies been developed. Comprehensive national guidelines are available for the control of certain alert organisms, namely MRSA, VRE and *C. difficile* for acute care hospitals and long-term care facilities (LCTFs) are published on the THL website (and are now being updated). For other resistant organisms, such as ESBL-producing *Enterobacteriaceae* and carbapenemase-producing *Enterobacteriaceae* (CPE), guidelines are available mostly for laboratory diagnoses and screening, but no comprehensive guidelines for the prevention of HAIs is available.

The control of HAIs is under the responsibility of the hospital districts. Hospitals create, adopt or adapt available international guidelines and/or recommendations from the Finnish Infection Control Society manual, which is distributed to and extensively used in healthcare settings across the country. This has led to the development and practice of different approaches within and between hospitals, health districts and municipalities.

### 2.4.2 Infection control training

The Finnish Society for Infection Control performs training of healthcare workers. Since 1984 a one-year, part-time course for nurses has been available, leading to infection control qualification. In 1994 a subspecialty for physicians was also instituted. Additionally, various training courses for the prevention of HAIs and AMR are available to healthcare workers annually.

## 2.5 Monitoring of antimicrobial consumption

### 2.5.1 Antibiotic consumption data monitoring

Antimicrobial consumption in the community (primary care sector) in Finland has been stable over the last 10 years. The Finnish consumption of antibiotics in 2010 was 18.5 Defined Daily Doses (DDDs) per 1 000 inhabitants and per day, which is at the same level as the ESAC-Net median (18.3) of participating countries from 2010.

## 2.5.2 Antibiotic treatment guidelines and monitoring of compliance

Updated national guidelines are available and published on the internet for the diagnosis and management of the six most common community infectious diseases. After inquiry with physicians during the visit, these guidelines appear to be well known and used by most physicians in primary care. Recent specific data and/or analyses of the physician compliance with antibiotic prescribing with these guidelines are not, however, available.

## 2.5.3 Monitoring of antibiotic consumption

Antibiotics are available in Finland only through prescription and no over the counter sales are permitted. Two institutions monitor antibiotic use in Finland: The Finnish Medicines Agency (FIMEA) and the Social Insurance Institution of Finland (KELA).

FIMEA is the national competent authority for regulating pharmaceuticals. FIMEA provides data to the European Surveillance of Antimicrobial Consumption Network (ESAC-Net) on antibiotic consumption and these data are sales data. The sales figures of the register are based on the sales of the two largest medical wholesalers in Finland. The register does not, however, include any information on antibiotic use or indication for prescription and therefore there is no possibility, amongst others, for feedback to physicians.

KELA, the Social Insurance Institution of Finland, operates under the oversight of the Finnish Parliament. Its administration and operations are overseen by 12 Trustees selected by Parliament and by 8 Auditors selected by the Trustees.

Kelasto is a statistical database produced by KELA, with which custom reports from the statistical data compiled by KELA can be created. Data for reimbursable outpatient prescriptions are available up until 2011. Kelasto collects data on variables for each prescription, e.g. customer (age, sex, medication purchase history), presence of a number of diseases required for special reimbursement, physician (several categories including training, age), prescription date, medication (e.g. active substance, trade name, dose, package size), pharmacy and purchase date.

Data reporting and collection on indications for the prescription are not, however, mandatory and therefore KELA cannot provide information about antibiotic use by indication, nor can it calculate the consumption of antibiotics in outpatient care.

It is notable that, whereas data from these two organisations are collected centrally the submission of the data is not mandatory. This makes it difficult to evaluate the information that is fed back to healthcare districts, physicians and healthcare centres, as it may not be complete. The goal of providing detailed feedback is to improve prudent antimicrobial use, also to do so correlating it with local resistance patterns in order to improve practices.

A www-based database on certain prescription categories is available and individual physicians receive annual reports from KELA on their prescriptions ([http://raportit.kela.fi/ibi\\_apps/WFServlet](http://raportit.kela.fi/ibi_apps/WFServlet)).

### 3 Observations

#### 3.1 Development of an Intersectoral Coordinating Mechanism (ICM)

Three national coordination groups for antimicrobial resistance have been formed in Finland. The formation of these groups, otherwise known as the ICM is in accordance with recommendations from the **Council Recommendation on the prudent use of antimicrobial agents in human medicine (2002/77/EC)**.

The first ICM was formed in 1999 when a fixed-period working group on AMR was appointed by the MSAH. The published output of this working group was a report published in 2000, which contained 8 specific recommendations. After the dissolution of this working group, another national working group came together from 2008-2010, which met five times in those two years and whose published output was a report that reviewed activities for AMR implemented in Finland between 2000 and 2010.

The current ICM (National Advisory Committee on Antimicrobial Resistance Prevention) is a multi-sectoral committee, which was formed in April 2012 and has a life expectancy until 2015. The Director General of THL gave a mandate for the formation of this committee and identified the relevant stakeholders who would be a part of it and the stakeholders appointed the individual members. The composition of the group includes members from THL, the Finnish Food Safety Authority (EVIRA), the Social Insurance Institution of Finland (KELA), the Finnish Medicines Agency (FIMEA), infectious disease physicians, laboratory professionals, the Ministry of Social Affairs and Health, the Ministry of Agriculture, hospital districts, university and regional hospitals, amongst others. Its main goals are to look at previous recommendations, current needs, expert opinion, establish a strategy for the working group, increase awareness for AMR and to increase the collaboration between human and animal sectors.

Despite the fact that this committee was formed with the support of THL and the MSAH, it does not appear to have a concrete, well-delineated role. It has no clear mandate, tasks or responsibilities, and has not yet outlined a strategy for the purpose of addressing the rise in AMR. Furthermore, it has no dedicated budget and to date it has only met two times in 2012. There is no known plan whether HAIs will also be addressed by this committee, or whether a separate committee will be formed.

#### 3.2 Laboratory capacity

Every hospital district is served by at least one microbiology laboratory in which a medically trained microbiologist is always part of the staff. There are approximately 25 major clinical microbiological laboratories in Finland. University microbiology laboratories serve the

university hospitals and the neighbouring district as well as any other municipalities willing to purchase their services. All clinical microbiology laboratories are required to have a license, which is renewed every three years. The renewal conditions include, amongst others, regular participation in rounds of external quality assurance testing.

All university hospital microbiology laboratories that ECDC visited had their own budget lines with their own Boards. As an example, there were 1.2 million tests performed on an annual basis by microbiology laboratories for a population of 1.5 million people in the Helsinki district. Even though the bulk of microbiological and molecular testing is performed in the health district laboratories, there is a trend for externalization and/or privatization of laboratories. Such private laboratories process a small proportion of microbiology samples from a subset of patients from the healthcare districts; this trend is not widespread at present.

In all laboratories that ECDC visited, the reported turn-around time for results of microbiological culture and antimicrobial susceptibility testing is within 48 hours or faster if requested. Positive blood cultures results were reported in a timely fashion and results and notification of alert organisms were communicated directly to the infection control team or a responsible individual. Overall, there appears to be good communication and notification from the laboratory to infection control teams in the hospital districts.

For epidemiological purposes, all isolates of a number of specified antimicrobial-resistant microorganisms are submitted to THL for further molecular sub-typing free of charge. The initial diagnostic testing is funded by the hospitals and clinical microbiology laboratories, but all typing/sub-typing of the isolates of specified resistant microorganisms that are systematically submitted to THL, is free of and covered by THL funding.

### 3.3 Antibiotic resistance in select alert organisms

#### 3.3.1 Meticillin-resistant *Staphylococcus aureus* (MRSA)

Data on the percentage of MRSA were not reported to EARS-Net from Finland for 2011, but previous data from 2010 show a percentage below 3% for MRSA. Some areas in Finland report higher percentages than the national average and these areas clearly represent reservoirs for spread to surrounding areas. Many of these areas, or health districts, have had increasing incidence of MRSA and hospitals and LTCFs have become endemic, with interchange of MRSA patients between such healthcare settings. This demonstrates the slow rise of prevalence of MRSA despite local infection control measures implemented by healthcare settings.

An example of the above is an MRSA outbreak in Pirkanmaa, which started in 2002 involving the Tampere City, Tampere University Hospital and the surrounding healthcare settings. Two initial attempts to stop the outbreak were made through isolated projects, including one that was stopped because of the lack of financial support. This has now resulted in an endemic situation in the health district (hospitals and LTCFs). From 2011, in the university hospital a new approach has been initiated including numerous and resource-demanding infection

control measures in an effort to curb the rising incidence, including active screening of patients.

It is evident from this evolution of outbreaks to an endemic situation that a national strategy for infection control, including management of outbreaks and HAIs and a nationally responsible body oversee the full epidemiological pictures of the country, are needed. Local ID physicians have identified the need for a common strategy in all healthcare settings and health districts and have also stated that adequate funding is necessary to uniformly address the problem across the country.

### **3.3.2 Extended-spectrum beta-lactamase (ESBL)-producing *Enterobacteriaceae***

The prevalence of other resistant bacteria, e.g. ESBL-producing *Enterobacteriaceae*, in Finland has increased in the past few years, in an exponential fashion, doubling to over 4% in *Enterobacteriaceae* isolates. This trend is seen at a national level, but is also observed locally in hospitals and LTCFs.

All data shown locally and nationally demonstrate a fast-rising prevalence of ESBL-producing *Enterobacteriaceae* during the last years. The same trends can be seen in national data from FiRe and in invasive bloodstream isolates reported to EARS-Net (from below 2% to over 4%) as well as trends from other EU Member States. Molecular typing is performed on some isolates and older data show that many of these resistant isolates were due to the presence of CTX-M-15, especially in community-acquired urinary tract infections, which is a global trend. There is no specific strategy or jointly agreed guidelines for the control of ESBL-producing *Enterobacteriaceae* in healthcare settings despite this constant increase in prevalence. Transmission between LTCFs and hospitals is a particular concern and has not been clearly addressed yet.

### **3.3.3 Carbapenemase-producing *Enterobacteriaceae* (CPE)**

Data from EARS-Net from 2010 show no carbapenem-resistant *Enterobacteriaceae* BSI isolate in Finland. Data from individual hospitals, however that were presented during the visit, show that there are reported cases of CPE and that these cases involve all types of carbapenemases. Most cases appear to be imported, although some cases were reported as autochthonous. Experience from other countries shows that EARS-Net data represent only the tip of the iceberg (and also represent only BSIs). Generally, even a few cases can lead to spread if tight control measures are not implemented and infection control guidelines are not created. There is no official specific infection control action plan for the control of spread of CPE although hospitals have developed their own strategies based on international recommendations. The hospitals that were visited during the country visit all performed screening for CPEs when patients were transferred from any a healthcare facility in another country.

## 3.4 Infection control

### 3.4.1 Role of healthcare professionals

The ECDC team visited University hospitals in Helsinki, Turku and Tampere, community healthcare centres and long-term care facilities (LTCF). The ECDC team met with many infectious disease (ID) physicians, many of whom were both infection control (IC) and ID physicians, and with IC practitioners (ICPs). ICPs and IC and ID physicians were present in both larger municipalities and hospitals and smaller municipalities frequently had part-time ICPs. In many of the community healthcare centres, IC nurses were present, and IC physicians were either also employed, or were dispatched regularly or, as needed, from the hospital. It was apparent that there was a lack of full-time equivalent physicians to perform IC duties in some hospitals and in the respective region. Because of these many roles, workflow for IC and ID physicians became fragmented.

In the past decade, the number of ID physicians and ICPs has increased and the ECDC team was informed that this might have been due to the increased awareness of the role of infectious diseases in health care settings due to the rise of AMR.

Despite the fact that in healthcare settings there was a strong presence of ICPs, IC and ID physicians, the authority and ability of the infection control committees to intervene and make clear decisions based on data was unclear and differed from setting to setting. Similarly, the involvement of hospital administrators was also not well defined or consistent everywhere.

As HAI reporting is not mandatory, the decision-making for how to diagnose, report and how HAI rates are fed back to physicians and hospital administrators is up to the hospital itself. Front line ICPs (IC physicians and nurses) are aware of the need to prevent AMR and HAIs and are very actively involved in creating and implementing guidelines for the hospitals, participating in infection control committees and striving towards prudent use of antibiotics. Reporting of HAIs, however, appears to be mostly based on passive surveillance and self-reporting of HAIs by physicians, rather than active surveillance.

### 3.4.2 Multidrug-resistant organisms (MDROs) and active screening

Discussions at hospitals and LTCF focused mostly on MRSA and only minimally on Gram-negative bacteria. Infection control practices differed between hospitals and seemed to depend upon the individual hospital initiative and awareness of their local situation. In addition, there was no homogeneity in the strategies present in hospitals for dealing with different types of MDROs, and, in some of the visited healthcare settings, there was a lack of adequate structures for isolations such as single beds and individual toilets

Because of the increased importance given to the increasing MRSA incidence in some areas in Finland, much of the infection control focus is on MRSA and guidelines for the control of other MDROs (e.g. ESBL-producing *Enterobacteriaceae*) appear underdeveloped or not as clearly defined and were up to the individual hospital initiative to identify these as a problem. Within the same health district there was good communication between hospitals when

patients were transferred as to whether they were colonised or infected with MRSA, but this communication did not exist beyond the health district (as the patient record computer systems differ between health care districts). There was concern about the further spread of resistant bacteria into hospitals from other countries and also between healthcare districts with different practices, when the cross-border initiative is fully implemented in the future. Active screening of patients was discussed in all hospitals and healthcare settings the ECDC team visited. When asked about active screening of high-risk patients, there was no uniform system for evaluating high-risk patients for any of the alert organisms and this was up to the individual hospitals, again most of the emphasis was placed on MRSA.

### 3.4.3 Monitoring of prudent antibiotic use in hospitals

Ensuring prudent use of antibiotics in the hospitals that were visited was mostly done by consultation of ID physicians and their involvement in patient care. In many hospitals there are multidisciplinary teams that promote antibiotic use but there appeared to be no uniform, formalised strategy to evaluate antibiotic utilisation by measuring defined daily doses (DDDs) or any other method. The introduction of the concept of a multi-disciplinary committee in the form of "antibiotic stewardship committee" which would involve pharmacists, pre-approval of antibiotics, involvement of pharmacy and antibiotic utilisation and monitoring, was met with interest. In many hospitals, this task is currently given to the infection control committee of that facility.

### 3.4.4 Hand hygiene

Throughout all healthcare settings there was widespread availability and use of alcohol-based hand rub by all healthcare workers (HCWs). Posters campaigning for hand hygiene were homogeneously present throughout the hospitals and health centres. In some settings patient empowerment for compliance with hand hygiene by HCWs was promoted.

### 3.4.5 Long-term care facilities (LTCFs)

A few LTCFs were visited during the country visit. Data were presented mostly on the prevalence of MRSA and ESBL-producing *Enterobacteriaceae*. In most LTCFs the incidence of ESBL-producing *Enterobacteriaceae* was on the rise, mirroring the picture that is seen for Finland from EARS-Net data, but also for the rest of Europe. There was an increased prevalence of MRSA also in all settings. Despite this worrisome picture of increasing resistance, it was interesting that LTCFs were not actively thought of as important reservoirs for the importation of resistant bacteria into hospitals. Active screening of these patients is currently not routinely performed upon hospital admission. The focus of infection control in LTCFs was mostly on the control of MRSA, even though incidence data both on MRSA and ESBL-producing *Enterobacteriaceae* were presented. Contact precautions and patient cohorting were used due to the increased incidence (reaching endemic status in a few places). It was communicated that it is extremely difficult to implement adequate infection control measures in LTCFs due to the nature of the residents' psychosocial factors.

### 3.4.6 Active patient screening for MDROs

High-risk patients, those who are at high-risk for being colonised with MDROs, are considered those who are either returning from abroad, cross-border transfers from healthcare-settings, or those who are from countries outside of Finland. Active screening for MRSA, ESBL-producing *Enterobacteriaceae*, VRE and CPE is suggested for these patients upon admission to the hospital and is considered "best practice".

The risk associated with other types of patients, such as those who are admitted from LTCFs and especially from LTCFs with known high prevalence of MDROs, has not been fully decided upon and there has been considerable debate about how to proceed and make recommendations. At present, it is mostly up to individual hospitals to decide when and if to perform active screening.

## 3.5 Educational programmes on AMR

This was not discussed in depth. In general, however, ID physicians and nurses appear to provide education and updates on antibiotic stewardship and IC measures to other healthcare workers in the community and hospitals and advice, guidance and education is provided at the point of care through consultations. Annual training courses on AMR and IC are organised for healthcare workers, which are well attended.

## 3.6 Public information related to AMR

Information about attitudes of the public towards antibiotics was assessed through the 2009 Eurobarometer survey ([http://ec.europa.eu/health/antimicrobial\\_resistance/docs/ebs\\_338\\_en.pdf](http://ec.europa.eu/health/antimicrobial_resistance/docs/ebs_338_en.pdf)). The results demonstrated that level of awareness in the Finland was higher than the EU average. As per the information given to us by all stakeholders, the media actively publicised healthcare-associated outbreaks and the issue of AMR and HAIs.

## 3.7 Marketing related issues

This topic was not addressed during the course of the country visit. We were informed, however, that FiRe was partly funded by the pharmaceutical industry due to lack of other resources.

## 4 Conclusions and recommendations

### 4.1 Conclusions

#### Organisation of healthcare system

The Finnish health system appears to be well organised and equipped, with a good infrastructure, laboratory capacity, physicians and nursing staff who are sensitised about issues surrounding AMR and HAIs and who provide quality care to patients.

#### Legislation for AMR and HAI

The legislation for AMR and HAIs falls under the Communicable diseases Act 504/1986, the Communicable Diseases Decree 786/1986, the Health Care Act 30.12.2010/1326, the Health Care Decree 341/20. At present this Act, however, does not include a section for a national strategy for the prevention of AMR and HAIs. The Communicable Disease Act and Decree are undergoing revision and a reorganisation of the healthcare structure is in progress. Specific legislation for AMR and HAIs will be included in the new legislation.

#### Intersectoral Coordination Mechanism (ICM)

The current National Advisory Committee on Antimicrobial Resistance Prevention is a multi-sectoral committee that has the role of an ICM and has a life expectancy until 2015. This committee does not appear to have a well-delineated role, as it has no clear mandate, responsibilities and has not yet outlined a strategy to address the rise in AMR. Furthermore, it has no dedicated budget. It is also not known whether HAIs will also be addressed by this committee or whether a separate committee will be formed for this purpose.

#### Antimicrobial resistance in Finland

Rates of bacteria that are resistant to antimicrobials are low, but are slowly rising. There is clear interchange and spread of resistant bacteria between healthcare settings and has been identified as a rising problem. Management of this increase, starting from hospital outbreaks and leading to establishment of an endemic situation in some healthcare settings, has been addressed mostly at the local, hospital level and infection control measures are not homogeneously implemented across the country. More specifically, the following observations were made for specific multidrug-resistant organisms (MDROs):

- **MRSA**

Data on the prevalence of MRSA were not reported to EARS-Net from Finland for 2011, but previous data from 2010 show 3% prevalence with some areas reporting higher numbers, clearly represent reservoirs for spread to surrounding areas. Many of these areas, or health districts, have had an increasing incidence with interchange of MRSA patients between healthcare settings. This demonstrates the slow rise of prevalence of MRSA despite local infection control measures implemented by healthcare settings. It is evident

from this evolution of outbreaks to an endemic situation, that a national strategy on infection control is needed.

- **ESBL-producing *Enterobacteriaceae***

The incidence of other resistant bacteria, e.g. the ESBL-producing *Enterobacteriaceae* in Finland has increased in the past few years, in an exponential fashion, doubling to over 4%. This trend is seen at a national level, but is also observed locally in hospitals and LTCFs. There is no specific strategy or national guidelines for the control of ESBL-producing *Enterobacteriaceae* in healthcare settings despite this constant increase in incidence, nor is the issue of transmission between LTCFs and hospitals addressed, according to observations.

- **CPE**

Bacteria that are resistant to almost all available antibiotics, e.g. CPE, have been reported and their incidence is slowly rising. This poses a significant future risk that needs to be mitigated, and even though most of these isolates imported they have the propensity to spread through healthcare systems once introduced. There is no official specific infection control action plan for the control of spread of CPE although hospitals can develop their own strategy.

## Healthcare-associated infections

In Finland, surveillance for HAIs in all hospitals is not mandatory, but rather voluntary. Hospitals can voluntarily participate and report to SIRO where uniform surveillance data are collected for certain surgical site infections and for bloodstream infections, using standardised HAI case definitions. Although SIRO involves a large number of hospitals, not all hospitals in the country currently participate. For hospitals that do not participate in SIRO, case definitions and data reporting are not uniform and reporting to a national body is not performed. Finnish point prevalence surveys (PPSs) have been performed in the past, and the last one was published in 2005. The last data on HAIs are from 2006. Annual and timely data are not available at present from SIRO. Most recently, in 2011, Finland performed a PPS, as part of the ECDC PPS, during which all hospitals involved used uniform case definitions.

## Infection control

The spread of resistant bacteria like MRSA, ESBL-producing *Enterobacteriaceae* and CPE, all MDROs, should be regarded as a threat to patient safety. As HAIs are under the responsibility of the hospital districts, there are no mandatory legal requirements for infection control structures and processes in hospitals. Hospitals, therefore, create, adopt or adapt available international guidelines and/or recommendations from the Finnish Infection Control Society manual. This has led to the development and practice of different approaches within and between health districts and municipalities. Furthermore, hospitals had developed heterogeneous strategies for the approach of infection control measures for different types of

MDROs. Infection control practices differ between hospitals and hospital control of infections depended on local initiatives depending on the awareness of the situation, the organisation and the financial resources available.

In healthcare settings the presence of infection control physicians and nurses was very strong. They are extremely aware of the issues of AMR and HAIs, but feel that they need to have the more authority to intervene and for infection control committees to make more fundamental changes and to make decisions based on feedback of timely data. Although in many of the hospitals visited, the hospital administrator was either interested or involved in infection control, front line workers stressed that adequate resources were necessary to implement a complete strategy.

At a national level, there appears to be no coordinating body that has full responsibility of addressing this rise in resistance, outbreaks and the monitoring of AMR and HAIs in Finland as a whole. THL is involved at many stages of diagnoses, data collection and voluntary advice, but it has no risk management role and is not formally designated to intervene.

In some countries in Europe, examples of which are the United Kingdom and France by creating a legal infrastructure have been able to empower monitoring bodies and healthcare structures to implementation and monitor national strategies for AMR and HAIs.

### **LTCFs**

While visiting LTCFs, data were presented mostly on the prevalence of MRSA and ESBL-producing *Enterobacteriaceae*. There was an increased prevalence of MRSA in all settings. In most LTCFs, the incidence of ESBL-producing *Enterobacteriaceae* was on the rise, mirroring the picture that is seen for Finland from EARS-Net data, but also for the rest of Europe. Despite this worrisome picture of increasing resistance, LTCFs were not actively considered as important reservoirs for the importation of resistant bacteria into hospitals. Active screening of these patients is currently not routinely performed upon hospital admission. The focus of infection control in LTCFs mostly centred around the control of MRSA, even though incidence data both on MRSA and ESBL-producing *Enterobacteriaceae* were presented. It was communicated that it is extremely difficult to implement adequate infection control measures in LTCFs due to the nature of the residents' psychosocial factors.

### **Antibiotic use and monitoring**

Two institutions monitor antibiotic use in Finland: the Finnish Medicines Agency (FIMEA) and the Social Insurance Institution of Finland (KELA). Data reporting and collection on indications for the prescription are not, however, mandatory and no data can be obtained about antibiotic use by indication, nor can calculations be made for the consumption of antibiotics in outpatient or inpatient care.

It is notable that, whereas data from these two organisations are collected centrally, the submission of the data is not mandatory. This makes it difficult to evaluate the information that is fed back to healthcare districts, physicians and healthcare centres, as it may not be

complete. The goal of providing detailed feedback is to improve prudent antimicrobial use, also to do so correlating it with local resistance patterns in order to improve practices.

### **EU Cross-border healthcare Directive**

The EU Cross-border healthcare directive will allow patients to choose their own treatment facility. This will mostly probably increase the movement of patients within Finland and across borders. Finland has long borders with Russia and may need to consider what implications this might have on AMR.

## **4.2 Recommendations**

### **Legislation for AMR and HAI**

- There is a need for an overview of the current legislation on infection control, which could be compared to similar legislations in other European countries. In some countries in Europe, examples of which are the United Kingdom and France, the creation of a legal infrastructure has been able to empower monitoring bodies and healthcare structures to implementation and monitor national strategies for AMR and HAIs.
- Included in this legislation could be a clear mandate and budget for the ICM, the creation and implementation of national strategies and action plans for AMR and HAIs, having a specific responsible body for the oversight and using structure and process indicators to monitor the implementation of the strategies.

### **National strategies for AMR and HAI**

- It is essential that prevention and control of AMR and HAIs in Finnish hospitals, in other healthcare facilities and the community be strengthened. Efforts to control this rise must involve all stakeholders at all levels, national and local.
- It would be important to develop and implement a national action plan, national and local guidelines for AMR, prudent use of antibiotics and the prevention of HAIs.
- Responsibility for combating AMR and HAIs in Finland should be clearly assigned to a national overseeing body that will coordinate, monitor and have the overall responsibility for this. Legal authority and responsibility should be assigned to this body and be exercised.
- This overseeing body should also follow indicators that monitor the implementation of the strategies for AMR and HAIs.
- Communication between all relevant parties and collaboration should be enhanced with regard to the overall status of AMR and HAIs in Finland.

### **Intersectoral Coordination Mechanism (ICM)**

- There is a need to empower the current ICM. It should have strong political

endorsement and support and should be given a clear mandate and dedicated budget.

- The ICM could, as part of its mandate, develop national strategies and action plans for the control AMR and HAIs and monitor their implementation. The ICM could also evaluate the impact of resistance on health and economic outcomes.

### **Infection control and surveillance**

- It is important to strengthen the role of infection prevention and control practitioners (ICPs) and infectious disease (ID) physicians in hospitals and their involvement in diagnosing and collecting data on HAIs.
- To ensure implementation of strategies and action plans for AMR and HAIs, front-line ICPs and healthcare workers should be empowered and indicators created and monitored at a local and national level.
- Active surveillance of HAIs in hospitals should be enhanced and data fed back in a timely manner to ICPs and ID physicians in hospitals to be able to monitor their HAI rates and make appropriate interventions.
- Hospital administrators should be involved in the regular meetings of the infection control committee and the HAI rates fed back to them to improve infection control practices and provide adequate resources for their prevention.
- Data on HAI could be collected in a systematic and timely fashion and from more hospitals and reported to SIRO, allowing for timely information and more complete epidemiological data.

### **Antibiotic use**

- Measurement of antibiotic use in the community according to indication could be obtained by optimal use of indication data from KELA. Ways to also obtain such data from FIMEA could be considered.
- Prudent use of antibiotics should be strengthened by formation of multidisciplinary antibiotic monitoring teams in hospitals led by infectious disease physicians.
- Feedback of data on antibiotic use could be fed back to physicians at the hospital level and the community level for improvement of prescribing practices.

### **Epidemiological overview for AMR and HAIs**

- Integrating epidemiological work as a part of the health system would strengthen the efforts to contain AMR. Data could be analysed systematically, timely and reviewed continuously and lead to necessary actions.
- Active communication of the overall conclusions and analysis to all hospital districts, relevant national institutions, the public and the Ministry is important.
- To enhance the epidemiological analysis of the current and future status of AMR it is important to use molecular methods to monitor the spread of MDROs. Molecular typing, which is an essential component for epidemiological analysis and can pose a

financial burden, could become a problem in the future if the burden of AMR and HAIs increases.

#### **Annual reporting of joint human and veterinary report**

- An annual, joint human and veterinary report on prevalence of AMR from humans and animals is suggested. Annual reporting to EARS-Net is suggested and necessary resources should be allocated for this purpose.

## 5 Appendices

### 5.1 ECDC Team

- Anna-Pelagia Magiorakos, ECDC
- Nabil Safrany, ECDC
- Peet Tüll, External consultant, Sweden

### 5.2 Persons met

<b>ECDC EFSA AMR COUNTRY VISIT TO FINLAND (Oct 28<sup>th</sup>-Nov 2<sup>nd</sup>, 2012)</b>	
Date and time	ACTIVITY (topic, site, persons to meet)
<b>MONDAY (Oct 29<sup>th</sup>) DAY ONE (JOINT PROGRAM FOR ECDC AND EFSA TEAMS, location HELSINKI)</b>	
8.30-15.30	<p align="center"><b>INTRODUCTION TO AMR FUNCTIONS IN FINLAND</b></p> Site: National Institute for Health and Welfare (THL) Address: Mannerheimintie 166, 00300 Helsinki, Building A, Meeting room Collegium (A5)
9.00-9.15	Welcome Address <ul style="list-style-type: none"> <li>○ Prof. Pekka Puska (THL, Director General)</li> <li>○ Dr. Anni Virolainen-Julkunen (MSAH, Senior Medical Officer)</li> </ul>
9.15-9.45	Ministry of Social Affairs and Health and Ministry of Agriculture and Forestry (MAF) <ul style="list-style-type: none"> <li>○ Dr. Anni Virolainen-Julkunen (MSAH, Senior Medical Officer)</li> <li>○ Dr. Leena Räsänen (MAF, Veterinary Counsellor)</li> </ul>
9.45-10.15	National Institute for Health and Welfare (THL) <ul style="list-style-type: none"> <li>• Overview and discussion on activities related to IDs at THL</li> <li>○ Prof. Petri Ruutu (THL, Head, Dept. of Infectious Disease Surveillance and Control)</li> <li>○ Prof. Juhani Eskola (THL, Deputy Director General)</li> </ul>
10.15-10.35	National Advisory Committee on Antimicrobial Resistance Prevention <ul style="list-style-type: none"> <li>• Multisectoral committee on surveillance, guidance and prevention of AMR. Established 2012.</li> <li>○ Prof Jaana Vuopio (Chairperson of the Committee)</li> </ul>
10.35-11.05	Finnish Study Group for Antimicrobial Resistance (FiRe) <ul style="list-style-type: none"> <li>• A coalition of the Finnish clinical microbiology laboratories and the THL bacteriology units on AMR surveillance. Established 1991. Webpage:</li> <li>○ Dr. Antti Hakanen (Co-ordinator of the Study Group)</li> </ul>
11.05-11.30	The Finnish Society on Hospital Infections <ul style="list-style-type: none"> <li>• A non-profit professional society to promote issues on hospital infections, including training. Established in 1960s.</li> <li>○ Dr. Mari Kanerva (Chairperson of the Society)</li> </ul>
12.30-14.45	<b>Role of THL in AMR and infection control (IC):</b>

12.30-13.00	<p>National Infectious Disease Register (NIDR)</p> <ul style="list-style-type: none"> <li>• Description of structured ID notification system (physicians and clinical microbiological laboratories), established 1995. Annual report (year 2010): <ul style="list-style-type: none"> <li>○ Dr. Markku Kuusi (THL, Head, Unit of Epidemiologic Surveillance and Response)</li> </ul> </li> </ul>
13.00-13.30	<p>THL Reference Laboratories and National licensure system for clinical microbiological laboratories</p> <ul style="list-style-type: none"> <li>• Overview on bacteriological and virological laboratory activities at THL and description of licensure process. <ul style="list-style-type: none"> <li>○ Prof. Anja Siitonen (THL, Head, Unit of Bacteriology)</li> <li>○ Dr. Mika Salminen (THL, Head, Unit of Virology)</li> </ul> </li> </ul>
13.30-14.00	<p>Finnish Healthcare-Associated Infections Programme (SIRO)</p> <ul style="list-style-type: none"> <li>• Overview of activities of nationwide HAI surveillance program in relation to AMR and IC, established 1997. <ul style="list-style-type: none"> <li>○ Dr. Outi Lyytikäinen (THL, Head of program)</li> </ul> </li> </ul>
14.30-15.00	<p>Finnish Medicines Agency (FIMEA)</p> <ul style="list-style-type: none"> <li>• Sales of antibiotics for human use <ul style="list-style-type: none"> <li>○ Dr. Annikka Kalliokoski (FIMEA, Senior medical officer)</li> </ul> </li> </ul>
15.00-15.30	<p>The Social Insurance Institution of Finland (KELA)</p> <ul style="list-style-type: none"> <li>• Antibiotic prescriptions and reimbursements <ul style="list-style-type: none"> <li>○ Dr. Lauri Keso (KELA, Medical advisor)</li> </ul> </li> </ul>

Name	First Name	Title	Position	Affiliation
<b>Day One</b>				
Puska	Pekka	Pr	Director General	THL
Virolainen-Julkunen	Anni	Dr	Senior Medical Officer	MSAH
Räsänen	Leena	Dr	Veterinary Counsellor	MAF
Ruutu	Petri	Pr	Head of Dpt	THL - Dpt of Infectious Disease Surveillance and Control
Eskola	Juhani	Prof	Deputy Director General	THL
Vuopio	Jaana	Prof	Chair	National Advisory Committee on Antimicrobial Prevention
Hakanen	Antti	Dr	Coordinator	FIRE
Kanerva	Mari	Dr	Chair	Finnish Society on Hospital Infection Control
Kuusi	Markku	Dr	Head of Unit	THL - Unit of epidemiological surveillance and response
Siitonen	Anja	Prof	Head of Unit	THL - Unit of Bacteriology
Salminen	Mika	Dr	Head of Unit	THL -Unit of Virology
Lyytikäinen	Outi	Dr	Head of programme	THL, Finnish Hospital Infection Program, SIRO
Kalliokoski	Annikka	Dr	Senior medical officer	FIMEA
Keso	Lauri	Dr	Medical advisor	KELA
Vuorela	Marjo		Infectious Disease fellow	THL
Polkowska	Aleksandra	Mrs	EPIET fellow	THL
Smit	Pieter	Mrs	EUHEM fellow	THL
Järvimäki	Saija	Mrs		THL - Communications and Customer Relations Unit
<b>Day two</b>				
Ekujansu	Erkki	Dr	Administrative medical director	Tamere University Hospital - TAUH
Syrjänen	Jaana	Dr	Head of Infectious Diseases	TAUH
Vuento	Risto	Dr	Laboratory director	FIMLAB
Arvola	Pertti	Dr	Infectious diseases	TAUH
Huttunen	Reeta	Dr	Infectious diseases	TAUH
Laine	Janne	Dr	Infectious diseases	TAUH
Vuorihuhta	Minna	Mrs	IC Nurse	TAUH
Räsänen	Sirpa	Dr	Epidemiologist	City of Tampere
Aittoniemi	Janne	Dr	Deputy chief	FIMALB
Karlsson	Sari	Dr	Chief physician	TAUH – ICU (

Karhe	Liisa	Mrs	Head nurse	TAUH - ICU
Aho	Hanna	Mrs	Head nurse	TAUH - Hand and plastic surgery
Göransson	Harry	Dr	Head of Hand and Microsurgery	TAUH
Suojalehto	Ella		Director - Head of hospital and institutional care	
Ripsaluoma	Jussi	Dr	Chief physician	Rauhaniemi hospital
Viik	Marjo	Dr	Senior physician	Kauppi hospital
Taskinen	Kirsti	Mrs	Head nurse	Kauppi hospital
Höglund	Ulla-Maija	Mrs	IC Nurse	Koukkuniemi Home of the Elderly
Levänen	Reetta	Mrs	Nurse	Kauppi hospital
Leppänen	Leena	Mrs	Nurse	Koukkuniemi Home of the Elderly
<b>Day three</b>				
Huovinen	Pentti	Pr	Professor of Bacteriology	Turku University Medical School
Jalava	Jari	Dr	Senior lecturer	Turku University Medical School
				Vice unit head - Antimicrobial susceptibility testing-group
Hakanen	Antti	Dr	Senior lecturer	Turku University Medical School
Vuopio	Jaana	Pr	Head of Unit	THL - AMR Unit
Soini	Hanna	Dr	Vice Unit Head	THL - AMR Unit, Mycobacteria group
Österblad	Monica	Dr	Senior researcher	THL - AMR Unit, Antimicrobial susceptibility testing-group
Lindholm	Laura	Ms	Senior researcher	THL - AMR Unit, Hospital bacteria-group
Rintala	Esa	Dr	Head of Hospital Hygiene and Infection Control	Turku University Hospital
Marttila	Harri	Dr	Specialist in Infectious Diseases	Turku University Hospital
Meurman	Olli	Dr	Director	TYKSLAB
Tantakokko-Jalava	Kaisu	Dr	Chief physician	TYKSLAB
Routamaa	Marianne	Mrs	IC Chief nurse	Turku University Hospital
Hohenthal	Ulla		Specialist of Infectious Diseases	Turku University Hospital
Rautio	Sari	Mrs	Head nurse	Turku University Hospital
Marttila	Jane	Dr	Epidemiologist	On-Call Service of the Health - City of Turku
Haapasaari	Marjo	Mrs	IC Nurse	On-Call Service of the Health - City of Turku
Varvikko	Jukka	Dr	Specialist in general practice	On-Call Service of the Health - City of Turku
Rantala	Arto	Dr	Chief Specialist in Surgery	Surgical Hospital of Turku University Hospital

Day four				
Mäkijärvi	Markku	Dr	Medical director	Helsinki University Hospital
Järvinen	Asko	Dr	Head of Infectious Diseases	Helsinki University Hospital
Kolho	Elina	Dr	ID Consultant	Helsinki University Hospital
Kanerva	Mari	Dr	Chief Physician - Infectious diseases	Helsinki University Hospital
Salo	Eeva	Dr	Chief Physician, Pediatric Infectious Diseases	Helsinki University Hospital
Vaara	Martti	Dr	Head, Division of Clinical Microbiology	HUSLAB
Aalto	Anu	Ms	IC Nurse	Helsinki University Hospital
Kaartinen	Johanna	Dr	Chief Physician - Infectious diseases	Helsinki University Hospital emergency department and ICU
Anttila	Veli-Jukka	Dr	Chief physician, Infectious Diseases	Helsinki University Hospital - hematology ward
Volin	Liisa	Dr		Helsinki University Hospital - hematology ward
Honkanen-Buzalski	Tuula	Prof	Director	EVIRA
Raulo	Saara	Dr	Coordinator	EVIRA - Finish Zoonoses Centre
Helin-Soilevaara	Henriette	Dr	Senior officer	EVIRA
Myllyniemi	Anna-Liisa	Dr	Head of Unit	EVIRA - Food and Feed Microbiology Research Unit
Räsänen	Leena	Dr	Veterinary Counsellor	MAF
Aho	Matti	Dr	Director General	EVIRA
Day five				
Sillanaukee	Päivi	Dr	Permanent Secretary	MSAH
Hansson	Aino-Inkeri	Mrs	Director-General for Promotion of Welfare and Health	MSAH
Viirolainen-Julkunen	Anni	Dr	Senior Medical Officer	MSAH
Puumalainen	Taneli	Dr	Senior Medical Officer	MSAH
Niemi	Veli-Mikko	Mr	Director of Food Safety	MAF
Räsänen	Leena	Dr	Veterinary Counsellor	MAF
Ruutu	Petri	Pr	Head of Dpt	THL - Dpt of infectious disease surveillance and control
Koivisto	Taru		Director	MSAH - Health Promotion Group
Vuopio	Jaana	Prof	Chair	National Advisory Committee on antimicrobial prevention
Lyytikäinen	Outi	Dr	Head of programme	THL, Finnish Hospital Infection Program, SIRO
				Vice unit head - Antimicrobial susceptibility testing-group

Jalava	Jari	Dr	Senior lecturer	Turku University Medical School
Hakanen	Antti	Dr	Coordinator	FiRE
Myllyniemi	Anna-Liisa	Dr	Head of Unit	EVIRA - Food and Feed Microbiology Research Unit
Syrjänen	Jaana	Dr	Head of Infectious Diseases	TAUH
Raulo	Saara	Dr	Coordinator	EVIRA - Finish Zoonoses Centre
Mikko	Paunio	Dr		MSAH
Ollila	Liisa	Mrs	Director - international affairs	MSAH

## 5.3 Assessment tool for ECDC country visits to discuss antimicrobial resistance (AMR) issues

The mechanisms behind emerging AMR are complex. However, two main issues that stand out offering opportunity for control efforts are: the use of antibiotics and the epidemiological spread of resistant microbes.

The complexity of the problem makes it difficult to grade which interventions are most successful. Where interventions have been introduced few of them have been evaluated. This may partly be because few systematic interventions have been used.

Council Recommendation on the prudent use of antimicrobial agents in human medicine (2002/77/EC) lists a number of areas that have an impact on controlling AMR. Most of the following tentative indicators are based on the Council Recommendations. Some are based on experience from different countries. These indicators are either structure- or process-related. Outcome indicators are collected by dedicated surveillance networks.

### 1. Development of an Intersectoral Coordinating Mechanism (ICM)

Due to the complexity of the issue there is a need for coordination to make an interventional strategy work. There is need for close cooperation from fields such as epidemiology, microbiology clinical medicine, infection control, veterinary medicine, pharmacology, behavioural sciences, practitioners from different medical specialities as well as government departments and health care providers.

In the Council Recommendation on the prudent use of antimicrobial agents in human medicine (2002/77/EC) and in the WHO Global Strategy for Containment of Antimicrobial Resistance (WHO/CDS/CSR/DRS/2001.2) the establishment of a coordinating group is regarded as essential. Member States have different administrative organizations. There should be a group on the highest administrative level where representatives from regulatory bodies and professionals from the different sectors coordinate.

#### Tentative indicators for 1

##### - Structures

- Multidisciplinary composition
- Regular meetings
- Minutes from meetings
- National strategy plan available
- Defined governmental mandate
- Financially supported by government

##### - Functions

- Coordinates analysis of consumption and, plans and supports interventions
- Proposes national objectives and policies
- Proposes, plans and supports interventions
- Provides policymakers, media and public with continues updated and structured data
- Provides support to local working groups

### 2. Organised multidisciplinary and multisectoral collaboration on local level

One of the main elements for control strategies is to lower the selective pressure of antibiotics by restricting usage to appropriate indications. There is much evidence showing that antibiotics are

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overused. Prescribers need to be well acquainted with the AMR-problem and with the rationale of using antibiotics appropriately.

A non-regulatory intervention that has indicated some influence on prescribing habits are local activities where practicing physicians discuss local data on consumption and bacterial resistance patterns, supported by epidemiologists, pharmacists and infection control. This proves to be an appropriate opportunity to revise local usage patterns, develop local guidelines (based on national guidelines) and organise local meetings with prescribers to promote rational use of antibiotics. In addition, topical issues can be discussed like problems related to MRSA or *Clostridium difficile* 027. Time for practicing doctors is limited. It is essential that there is a good collaboration with and support from the national/regional group to provide background data and help with scientific updates.

## **Tentative indicators for 2**

### **General**

#### *- Structures*

- Are there local activities in some places?
- Are there nationally disseminated local activities?
- Are activities in hospitals and primary health care coordinated at the local level?

### **Primary health care**

#### *- Structures*

- Are there local activities in primary health care?

#### **If yes:**

- Mostly multidisciplinary
- Private practitioners are taking part
- Have access to local surveillance data on AMR
- Have access to local antibiotic consumption data
- Have public funding
- Meet regularly

#### *- Functions*

#### **Primary areas of work are:**

- Infection control
- Diagnostic practices/habits
- Analysis of local consumption and resistance data
- Educational activities
- Coordination of interventions
- Provide local guidelines
- Convene local meetings with prescribers at least yearly

### **Hospitals**

#### *- Structures*

- Are there local activities in hospital health care?

#### **If yes:**

- Mostly multidisciplinary
- Have access to local surveillance data on AMR
- Have access to local antibiotic consumption data
- Have public funding
- Meet regularly

#### *- Functions*

#### **Primary areas of work are:**

- Infection control
- Diagnostic practices/habits

- Analysis of local consumption and resistance data
- Educational activities
- Coordination of interventions
- Provide local guidelines
- Convene local meetings with prescribers at least yearly

### 3. Laboratory capacity

Laboratory capacity is essential for many reasons:

- To be able to follow trends in antimicrobial resistance;
- To discover newly emergent resistant strains;
- To enable prescribers to make informed antibiotic choices. For this there is a need for timely feedback to clinicians.

It is important to characterise isolates that may have clinical importance. This can often not be done in all laboratories so a referral system to specialised laboratories should exist.

All laboratory work should regularly be quality assessed.

#### Tentative indicators for 3

##### **General**

###### *- Structures*

- How many diagnostic laboratories are appropriately equipped for microbiological diagnostic work (minimum requirement: performance of gram-stain, aerobic culture and antimicrobial susceptibility testing).
- What proportion of microbiological laboratories have at least one specialist clinical/medical microbiologist?
- Is there a formal referral structure to reference laboratories supported by public (alternatively through insurance system or equivalent) funding?
- Does a national external quality assessment scheme exist?
- Does an accreditation system exist for microbiological laboratories that requires regular QC and EQA?

##### **Hospitals**

###### *- Functions*

- What proportion of microbiological laboratories provide preliminary and individual feedback (gram stain, rapid tests, culture results) via telephone or clinical rounds to the submitting clinician within the first 12 h of receipt of diagnostic specimen?
- What proportion of microbiological laboratories provide preliminary and individual feedback (gram stain, rapid tests, culture results) via telephone or clinical rounds to the submitting clinician within the first 24 h of receipt of diagnostic specimen?
- What proportion of microbiological laboratories provides susceptibility test results to the submitting clinician within 48 h of receipt of diagnostic specimen?
- What proportion of microbiological laboratories provides species identification of blood culture isolates to the submitting clinician?
- Who pays for sent in sample analysis?

##### **Out patients**

###### *- Functions*

- What proportion of general practitioners can submit clinical specimen for microbiological investigation to an appropriately equipped microbiological laboratory within 12 hours?
- What proportion of microbiological laboratories provide preliminary and individual feedback (Gram stain, rapid tests, culture results) to the submitting clinician within the first 24 h of receipt of diagnostic specimen?
- What proportion of microbiological laboratories provides susceptibility test results to the submitting clinician within 48 h of receipt of diagnostic specimen?
- Who pays for sent in sample analysis?

#### 4. Monitoring of antibiotic resistance

Resistance patterns should regularly be followed. This should be done with a standardized method. The method should regularly be quality assessed.

To be able to guide prescribers in prudent usage of antibiotics surveys of different clinical conditions should be done to define which pathogens and their susceptibility profiles for antibiotics. The resistance pattern may vary from area to area so local monitoring may be needed. Data should be gathered nationally and internationally to follow long term trends.

##### Tentative indicators for 4

- Local, time limited studies have been performed
- Local continuous, monitoring is done in a few laboratories
  - Are duplicates excluded?
- National monitoring with standardized methodology on clinically and epidemiologically relevant bacterial pathogens is on-going
- Country wide local monitoring with standardized methodology in communities and hospital unites is on-going
- Data from hospitals and out-patient settings are treated separately
- Data collection is financially supported by government
- Regular surveys of resistance patterns for pathogens in population based syndromes are performed
- Regular feedback of resistance patterns to prescribers and local groups is given

#### 5. Monitoring of antibiotic usage

As antibiotic usage is the driving force for emerging resistance it is important to monitor usage. Therefore, reliable surveillance systems of antibiotic consumption are essential to complement antibiotic resistance data and to develop instruments for assessing effective strategies to foster appropriate antibiotic use in all European countries.

Current antibiotic use surveillance systems are mostly monitoring trends and shifts in usage patterns. However, to deepen our understanding of antibiotic prescribing, more detailed information is needed on patients' age and gender, the prescriber, the indication and pathogen. Although prescriber data are felt as sensitive, this kind of data can be used for the self assessment. Aggregated data may be used for local group discussions.

##### Tentative indicators for 5

- Are valid national data on outpatient antibiotic use available?
- Are valid national (or at least representative sample) data on hospital antibiotic use available?
- Is collection of data on antibiotic use legally supported?

- Is data collection financially supported by the government?
- Are data available per prescriber/ clinical diagnosis/micro-organism?
- Is there regular feedback of prescription patterns to prescribers?
- Are anonymous data fed back to local groups?

## 6. Antibiotic utilisation and treatment guidance

Antibiotics should be used properly. "Proper use" is a difficult term both in human and veterinary medicine. Still there is a need to find some common view on what is "proper". Guidelines are a way on agreeing locally or nationally.

Antibiotics allow treatment of serious bacterial infections. The largest volume of antibiotics is prescribed in ambulatory care. This use is increasingly recognized as the major selective pressure driving resistance, which in turn makes them ineffective. Therefore antibiotics should be used appropriately, i.e. (no) antibiotics for those who will (not) benefit from the treatment. In addition, unnecessary use of antibiotics requires more resources, motivates patients to re-consult and exposes them to the additional risk of side effects, whereas under-prescribing could be associated with higher risk of complications of untreated infections.

A "proper" level of usage is difficult to define. The levels are mostly for following trends and shifts in usage patterns. With these data related to other data there might be a way of defining a "proper" range of usage. One benchmark value on European level cannot be given, because for different countries the demographical characteristics and epidemiological situation can influence this indicator. Individual countries should position themselves and define their own benchmark. This should be based on the epidemiology of infectious diseases and national guidelines. A range of acceptable antibiotic use should be defined rather than one threshold value. If the use is outside the limits of the range, more detailed assessment is recommended in order to define the action required. For any action planned explicit targets should be set.

Most guidelines define treatment for specific diagnosis. This means that the diagnosis have to be made correctly before guidelines are applicable.

That also means that antibiotic usage must be directed by medical diagnosis and decisions. That is why systemic antibiotics are prescription-only medicines in EC.

### Tentative indicators for 6

- Availability of OTC (over-the-counter) antibiotics
- Availability of national treatment guidelines
- Availability of locally adapted treatment guidelines
- Has the compliance to guidelines been assessed?
- Defined standardised criteria for clinical diagnosis
- What is the rate of laboratory diagnostics use before deciding on use of antibiotics for sore throat (% of patients)?
- What is the rate of blood cultures before use of antibiotics for perceived bacteraemia with sepsis (% of patients)?

## 7. Infection control

Health care and especially hospitals have historically been a main source of spread of epidemics. This has been shown for a wide variety of microbes. This was true with smallpox and early outbreaks of Lassa fever. A recent well known example is SARS. Another very well known bacterium that spreads in health care settings is MRSA.

All hospitals have defined procedures and hygienic principles although these may not always be based on the latest scientific knowledge. Implementation of guidelines and adherence to procedures is another problem. Surveys have shown that adherence to infection control guidelines many times is poor.

More and more persons with complicated medical conditions are given home-based care. Many of them are elderly. Such patients may have indwelling catheters, have a lower immunity and often use antibiotics. Infection control guidelines are difficult to follow in a home like setting and many of the caring staff has little or no training in infection control. Increasingly MRSA is reported to be a problem also in these settings.

**Tentative indicators for 7****General**

- Is there a national committee on issues related to infection control?

**Hospitals**

- Alcohol based hand disinfection recommended for non-diarrheal disease
- Guidelines for hygienic procedures including standardized barrier precautions in >90% of hospitals
- Specific guidelines for MRSA in >90% of hospitals
- At least one infection control nurse/doctor per hospital
  - Time allocated for infection control?
- What numbers of hospitals do surveillance of healthcare acquired infections (HAI) regularly in ICUs? (% of hospitals)
- What numbers of hospitals do surveillance of healthcare acquired infections (HAI) regularly in surgical wards? (% of hospitals)
- What numbers of hospitals do surveillance of healthcare acquired infections (HAI) regularly in internal medicine wards? (% of hospitals)
- Are there legal requirements for infection control system in hospitals?
- Is implementation of infection control practice regularly evaluated?

**Health care settings outside hospitals**

- Alcohol based hand disinfection recommended for non-diarrhoeal disease
- Alcohol based hand disinfection available in >90% of outpatient clinics
- Alcohol based hand disinfection available in >90% of health care settings for elderly
- Guidelines for infection control are available for elderly and long term care staff
- Implementation of infection control practice in elderly and long term care is regularly evaluated

**8. Educational programmes on AMR**

The understanding of the problem with AMR is the basis for having an impact with interventional programmes. This can partially be achieved with educational programmes. Educational programmes should be an integrated part of undergraduate studies. All healthcare related professionals need to have an understanding of the AMR problem.

“Education” in the context of AMR is more than just pharmacology of antibiotics or resistance patterns in microbes. It encompasses the relation between microbes, antibiotics and the epidemiology of resistant strains. It describes the complex interrelation between all aspects brought up in this document.

Regular, repetitive, independent educational material best provided by locally based colleagues in discussion groups seems to be one of the better success factors.

**Tentative indicators for 8**

- Doctors have in their curriculum AMR as undergraduate course
- Hospital health care workers have some education on AMR
- Community health care workers have some education on AMR
- Specific post graduate courses for doctors in antibiotic resistance are provided
- Regular educational programmes in antibiotic resistance are provided for health staff
- It is compulsory for all prescribers to take part regularly in a session on AMR
- <60% of information on AMR is industry sponsored



## 9. Public information related to AMR

Many prescribers blame patients for demanding antibiotics irrespective of their condition. This can only be changed if the public is well informed about what antibiotics can and can not do. Hence, educational activities of the wider public are important.

### Tentative indicators for 9

- No information provided
- Topic sometimes covered in media
- Some material for media and/or internet from official sources
- Occasional national campaigns
- Repeated, structured national campaigns
- Regular, structured information provided by professional bodies
- Public perception assessed

## 10. Marketing related issues

Economics do have an impact on prescribing habits irrespective of diagnosis or best practice. This should be discouraged.

### Tentative indicators for 10

- Independent (not industry supported) drug information is available
- Ethical guidelines for interrelation between physicians and industry are in place
- Physician's prescriptions do not influence on physician's salary
- Personal gifts from industry to physicians are illegal