Deaths from infectious diseases have declined in developed countries in recent decades due to improvements in hygiene and sanitation, widespread immunisation and effective drug treatments. But infectious diseases can continue to catch the world off guard – they are an ever-moving target. Some medicines are losing their effectiveness and the world is becoming a smaller place with the rapid increase in air travel allowing for diseases to be transported from one continent to another in a matter of hours. Diseases once thought to be retreating have made a deadly comeback, whilst new killer diseases have emerged.

Below is a brief summary of some current issues making headlines in infectious diseases.

**Antibiotic resistance**

Antibiotic resistance is developing at such a pace there are real fears we could soon face a future where many common infections would no longer have a cure, and a range of medical treatments would be seriously threatened. Just last week (30th April 2014) WHO in its first global report on antibiotic resistance gave a stark warning that the problem is serious, worldwide and a major global threat. It described a “post-antibiotic era” where people would die from simple infections that have been treatable for decades.

The report, which focused on seven different bacteria responsible for common serious diseases including pneumonia, diarrhoea and blood infections, suggested that two key antibiotics no longer work in more than half of people being treated in some countries.

The problem is a global one with resistance happening currently in every region of the world. Misuse of antibiotics is one of the key factors underlying the crisis and is rife in some parts of the world. Experts are concerned with inappropriate use such as overprescribing or self-medication where antibiotics are available over the counter. It is also thought that the widespread use of antibiotics in animals has led to resistant strains of some bacteria being transmitted to humans via the food chain, although Europe has banned the use of antibiotics to boost the growth of livestock. Compounding this is the sale of counterfeit drugs in some regions which, as well as causing deaths, contributes to growing resistance. Individual’s adherence to a full course of an antibiotic treatment prescribed is also a factor.

There has been no new class of antibiotics since 1987 and few in the development pipeline, whereas new pathogens are emerging every year and existing bugs are developing resistant to current treatments. It has reached a point where there is only one effective antibiotic treatment for gonorrhoea which may soon become untreatable as no vaccines or drugs are
in development. The market incentive for pharmaceutical companies to develop new antibiotics is somewhat limited as antibiotics will only be used for a week or two, and have a limited life span because of possibility of resistance.

Coordinated action is needed between governments, the medical community, the pharmaceutical industry and the general public. A renewed focus on developing new antibiotics is required, and appropriate use of the ones that still work, alongside improved education in antimicrobial resistance for medical students and doctor, general public education and awareness, screening, and a range of surveillance systems that collect data on antibiotic/antimicrobial resistance and drug susceptibility.

Polio
On 5 May 2014 WHO declared the spread of polio an international public health emergency following outbreaks in Asia, Africa and the Middle East which are seen as an “extraordinary event” that requires coordinated international response. It is only the second time in WHO’s history it has made such a declaration (the first being during the swine flu pandemic of 2009). There were 417 recorded cases of polio worldwide for the whole of 2013, but the figure in 2014 has already reached 68 recorded cases by the end of April – up from 24 in the same period last year. Following an emergency meeting in Geneva, WHO says Pakistan, Cameroon and Syria pose the greatest risk of further wild poliovirus exportations in 2014, with Afghanistan, Equatorial Guinea, Ethiopia, Iraq, Israel, Somalia and Nigeria posing an “ongoing risk”. Syria was polio-free for 14 years but was re-infected with the virus from Pakistan.

Polio, which mainly affects children under five years old, is a virus transmitted through contaminated food and water, multiplying in the intestine, which can then invade the nervous systems causing paralysis in one in every 200 infections. Whilst it is endemic in only three countries – Pakistan, Afghanistan and Nigeria – attacks on vaccination campaigns for example in Pakistan have allowed the virus to spread across borders.

WHO is warning that if unchecked the situation could mean a failure to eradicate globally one of the world’s most serious vaccine preventable diseases.

MERS Coronavirus
The number of new cases of the Middle East respiratory syndrome coronavirus has seen a worrying increase in April 2014 with new cases and deaths reported by the Saudi Arabian Health Ministry. The number of known cases of MERS-CoV is more than 300 in Saudi Arabia, including 102 deaths, and 400 globally.

MERS-CoV was discovered in September 2012, but with the sudden increase, concerned officials are stepping up efforts to combat the virus and there are discussions planned on the production of a vaccine.

MERS-CoV comes from the same group of viruses that can cause the common cold and attacks the respiratory system which can lead to pneumonia and kidney failure. The majority of cases have occurred on the Arabian Peninsula, but there have been deaths from
infection elsewhere, including Europe, although all the cases originated in the Middle East. The first case in the US has been confirmed recently in a traveller to the country.

Officials are unclear on how exactly the virus spreads. Although the virus does not seem to spread easily between people, one theory is that it originally came from bats but can also infect camels which is now spreading the virus to humans somehow. There is a stress on good hygiene practice, such as diligent hand-washing.

Ebola
An outbreak of Ebola in Guinea in February 2014, with confirmed or suspected cases in Liberia, Mali and Sierra Leone, has been described by WHO as "one of the most challenging Ebola outbreaks we have ever dealt with" and could take another four months to contain”. There were some 155 deaths in Guinea by early May.

The outbreak is unusual because the disease is typically found in central or eastern Africa and this is the first known outbreak in Guinea - most recent cases have been thousands of miles away in the Democratic Republic of Congo and Uganda.

Ebola is spread by close contact and there is still no cure for disease which has an incubation period between two and 21 days and carries a fatality rate of up to 90%. Formerly known as Ebola haemorrhagic fever, it is described as one of the world's most virulent diseases.

The geographical spread of the outbreak has made it especially challenging to contain as past outbreaks have involved much smaller areas. Although WHO has not yet recommended that any travel or trade restrictions be applied to Guinea or Liberia, Senegal did close its border with Guinea for over a month.

Focus on vector-borne diseases
Vector-borne diseases – such as malaria, dengue and yellow fever, chikungunya, Lyme disease and leishmaniasis – are the result of bites from a mosquito, tick or sandfly and infect more than a billion people every year. Despite being found mainly in the tropics and subtropics, they are being observed more often in temperate climates and WHO currently estimates 77,000 cases occur annually in Europe. The majority of vector-borne diseases in Europe are brought in by those who were abroad. To mark World Health Day 2014 this year WHO "declared war" on so-called vector-borne illnesses.

Among vector-borne diseases, dengue fever appears to be spreading around the globe faster than others and this viral infection is described as a “silent danger”. 50 years ago dengue only occurred in nine countries but today this mosquito-borne illness can be found in over 100 countries. Some 40 percent of the world population is therefore at risk of catching it with a 30-fold increase in dengue cases around the globe during the last 50 years. There is no licensed vaccine and the most severe form of the illness, dengue hemorrhagic fever, can lead to shock, coma and death.

After malaria, dengue has become the second-most-common fever illness brought back by Europeans travelling abroad. In Germany alone, there are 500 cases per year. Experts say that the Aedes mosquito, which transmits dengue as well as yellow fever and chikungunya,
could also spread in Europe as the climate warms. Since 2010, local cases have been recorded in Portugal, southern France and Croatia. In 2012 Europe experienced its first sustained transmission of dengue fever since the 1920s with more than 1,300 people infected with the mosquito-borne disease in the Portuguese archipelago of Madeira. Last year Brazil reported 1.4 million cases of dengue, which is endemic in three of the 12 host cities for this summer’s World Cup.

**Update on Vaccines**

Vaccines are one of the major achievements of public health care and the most effective and efficient strategy to prevent infectious diseases. Yet vaccination rates in industrialised countries have been declining for the past decade due to a distrust of vaccinations and concerns about vaccine safety, as well as the belief that new outbreaks of diseases which have been nearly eliminated over the past decade are unlikely to occur.

Vaccine-preventable diseases are costly both at an individual and societal level and the current measles outbreaks being seen in Europe clearly demonstrate the consequences of under-vaccination. A 1996 outbreak of polio in Albania, Greece and former Yugoslavia showed how easily a disease can be reintroduced to countries once free of the disease if immunisation coverage is allowed to drop.

Anti-vaccination activists continue to spread the message that childhood immunisations are unnecessary and harmful. In the US 20 states now allow parents to refuse immunisations based on philosophical exemptions, whilst religious exemptions are allowed in all but two states. Discredited research in the UK by Andrew Wakefield is being blamed for wrongly linking the MMR vaccine to autism which has left a 10-15 year “legacy” of concern around the vaccine. ESCMID has established a new Vaccine Study Group which focuses on comparing immunisation and vaccine data across countries, how to counter the anti-vaccine messages, and identify priorities for research and education on vaccines.

**New Meningitis B Vaccine**

A new Meningitis B vaccine to protect children against one of the most common and deadly forms of meningitis has been approved for use in Europe. The Bexsero vaccine is the first to cover meningococcal B meningitis and is thought to provide some 73% protection.

Meningitis B is a bacterial infection that leads to inflammation of the brain and spinal cord and usually affects children under one year old. It is fatal in one in 10 cases and can kill within hours, although with early diagnosis and antibiotic treatment a full recovery is usually possible. A quarter of survivors are left with life altering effects including amputation, deafness, epilepsy and learning difficulties. There are effective vaccines against other strains of meningitis but until now not against meningitis B.

The UK looks set to become the first country in the world to include the jab in its routine childhood vaccination programme following pressure from experts and campaigners to make it available for all babies. Britain has one of the highest meningitis B rates in the world – with some 1,870 people affected every year. The vaccine has not yet been approved for use in the USA.
The HPV vaccine
The human papillomavirus (HPV) vaccine has been introduced in 21 European countries for girls to immunise them against the virus that causes cervical cancer. Worldwide cervical cancer is the second most common and the fifth deadliest cancer in women with an estimated 60,000 cases and 30,000 deaths in the WHO European region each year. Yet, uptake of the HPV vaccine is lower than expected, despite most countries providing the vaccine for free. It is reported that rates in EU counties range from 17 - 84%. Only 7 countries have achieved coverage rates of 80% or more (Denmark, Italy, Luxembourg, Portugal, Spain, Switzerland and the United Kingdom).

There are a number of factors contributing to the slow uptake including the cost as well as the three doses required over a 6 month period. But the European Commission has recently approved a two-dose schedule of the vaccine which could help to extend HPV vaccine coverage and increase uptake as the programme becomes more cost effective. Because routine vaccination is aimed at girls aged 10-14 years - as the vaccine is most effective if given before the onset of sexual activity - these girls require parental permission so parents have a key role to play in the decision. There is a debate around whether boys should receive the HPV vaccine and whether including boys can be cost-effective.

TB vaccine
Experts believe it is a key moment in tuberculosis vaccine research as medical research focuses on an improved tuberculosis vaccine. The current Bacillus Calmette-Guerin (BCG) vaccine was introduced in 1921 and is only partially effective. A vaccine that provides greater and more consistent protection against TB could revolutionise control of the disease as prevention is better than cure.

In February 2013 researchers reported on the failure of a trial of a new booster vaccine which marked a disappointing setback in the fight against TB. But the researchers stressed that it was a significant step as it was the first efficacy trial – the first of a new TB vaccine for nearly a century - and much can be learnt from the work done. Sixteen candidates have advanced to clinical trials and 12 are being tested in the field. All those involved are aware of the urgency to control the global TB epidemic and the role a vaccine can play in this.

HIV vaccine
An AIDS vaccine has long-been elusive after 20 years of research. However, whilst a vaccine still remains far off, researchers say some progress has been towards the goal of a vaccine, despite enormous challenges and disappointing setbacks. An estimated $845 million was spent on AIDS vaccine research in 2011 – by the public sector, private sector and philanthropic donors. Thirty-four million people in the world are HIV-positive, and 2.5 million are newly infected each year worldwide. In the absence of a vaccine, many experts want to focus efforts on prevention. Antiretroviral drugs are the only effective way to treat HIV.

New strain of bird flu (H7N9)
In spring 2013 human infections with a new avian influenza A (H7N9) virus were first reported in China. Most of these infections are believed to have resulted from exposure to
infected poultry or contaminated environments. But the disease is of concern because most patients have become severely ill, of which about one-third have died.

However, there is no evidence of sustained person-to-person spread of H7N9. The first case outside of China was in Malaysia and was reported in February 2014, detected in a traveller from an H7N9-affected area of China. But as experts say, with an influenza virus you need to expect the unexpected, with thorough surveillance and risk assessments.

**Tuberculosis**

TB cases in Europe have fallen by 5 percent, but the region is failing to meet targets to treat multidrug resistant TB. An estimated 353,000 new TB cases were recorded in 2012 with nearly 1,000 people every day across Europe being diagnosed. London has the highest TB rate of any capital city in Western Europe.

Drug-resistant TB – which is hugely expensive and more difficult to treat – is increasing with about one-third of all new TB cases in Eastern Europe resistant to the front-line drugs and cases in the UK increased by 25% in 2011. Some 15 of the 27 countries worldwide with the highest burden of drug-resistant TB are in the WHO European region (includes Russia). Drug resistant strains of TB develop through inappropriate use of anti-TB drugs and poor management of the disease. Experts point to the widespread emergence of drug resistant TB in Asia and Eastern Europe heralding the possibility of virtually untreatable TB. Less than 50% of patients detected with multi-drug resistant TB are successfully treated. More than half of them die, fail treatment or are lost in the follow-up.

There are currently several new TB drugs in the pipeline and a new TB vaccine is needed if the goal of zero TB deaths is to be met. Experts believe it is a key moment in tuberculosis vaccine research as medical research focuses on an improved tuberculosis vaccine. The current Bacillus Calmette-Guerin (BCG) vaccine was introduced in 1921 but is only partially effective. A vaccine that provides greater and more consistent protection against TB could revolutionise control of the disease.

**HIV/AIDS**

There are few signs of a decline in HIV transmission in Europe as cases increased by 8% in 2012 with more than 131,000 new HIV infections reported across the 53 countries in WHO’s European Region. Eastern Europe has the fastest growing HIV epidemic in the world.

Whilst the number of people receiving antiretroviral therapy (ART) increased between 2011-2012, still only one in three people who need them are receiving them. In 2013 WHO issued new guidelines to initiate treatment in adults living with HIV earlier, when their immune systems are still strong (when their CD4 cell count falls to 500 cells/mm³ or less) which will see more people receiving ART in the European region.

Of those newly infected with HIV in the region, some 50% get tested late which impacts on the effectiveness of treatment and longer term outcomes. Efforts to promote HIV counselling and testing are seen as key. In the Europe region HIV is concentrated in specific populations such as men who have sex with men, injecting drug users and people originally from countries with generalised HIV epidemics.