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The story of Anthony Van Loo

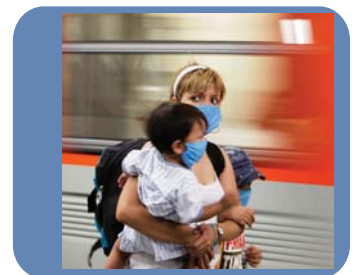
Europe's biggest health threat today: Cardiovascular Diseases

With an ageing population, the scope of diseases has radically changed in the last years. It is not only due to advances in research and innovation in medical devices but also to the change in lifestyle of the world population. Several years ago the leading causes of death in the world were infectious or communicable diseases such as diarrhoea, HIV, tuberculosis, neonatal infections and malaria. The WHO predicted in 2008 that over the next 20 years, they will become less and less important globally. What are today's and tomorrow's biggest killers then? One certainty though: diseases have become more and more linked to people's lifestyles' choices which make them more complex and difficult to prevent and to treat. Those diseases have been given the names of chronic, non-communicable and even lifestyle diseases and they are considered today as Europe's biggest killers. On top of the list, cardiovascular diseases (CVD) remain the main disease burden as the major causes of illness, disability and death in Europe. CVD cost the EU economy €192 billion a year, of which 57% is due to healthcare costs, 21% to productivity losses and 22% due to informal care of people with such diseases [1].

– The shift from communicable to non-communicable diseases

A couple of years ago, communicable diseases were still considered the biggest threat to global health. Communicable diseases do not respect national frontiers and can spread rapidly from one person to another if actions are not taken to combat them. Advances in medicines (antibacterial treatments, vaccines) and in medical technologies have contributed to prevent the spread of such diseases and decrease their numbers globally.

Among those medical devices, condoms are probably the most used and known and have been playing an important part of modern life. Condoms are the only effective protection against HIV/AIDS. The HIV virus can also spread from one person to another if the care is unsafe. Reused single-use syringes and needle stick injuries are amongst the causes of the spread of blood borne infections such as HIV and Hepatitis B and C. To help combat the spread of infections the medical technology industry has designed products such as auto-disable syringes that cannot be reused, closed catheter systems, devices incorporating safety-engineered needle protection, devices incorporating antimicrobial coatings, rapid screening technologies and monitoring systems. (See Focus On 64 on Patient Safety for more information)



Although communicable diseases are decreasing globally and their spread is well contained, the world is always at risk of the emerging and spread of new viruses as their nature is unpredictable. For

the last months, countries globally have been faced with the spread of the new influenza virus H1N1. In Europe, the WHO informed beginning August 2009 that 44 of the 53 countries in the WHO European Region had reported confirmed cases. They account for a total of 26,089 cases and 41 deaths [2]. However the number of cases is increasing and the pandemic could last a long time, countries and organisations such as the WHO are working to minimise its impact on people and businesses, which must include the provision of efficient testing technologies and appropriate medical devices to deliver vaccine in the most effective way.

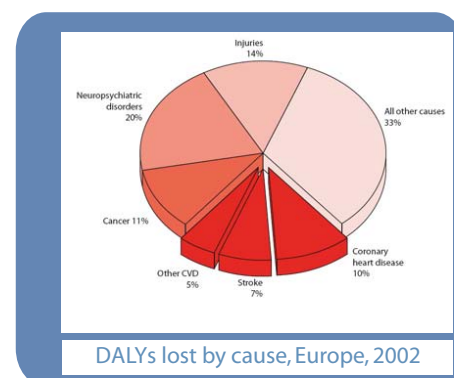
Despite pandemics, Europe today has a high prevalence of non-communicable diseases such as cancer, diabetes, cardiovascular diseases, obesity disorders and musculoskeletal disorders. Those diseases have a different approach than communicable diseases as they usually can be attributable to the interaction of various genetic, environmental and especially lifestyle factors, including smoking, alcohol abuse, unhealthy diets and physical inactivity. Age is the most important factor to their development [3].

— CVD: Facts and figures

Cardiovascular diseases affect the heart and surrounding blood vessels and can take many forms, such as high blood pressure, coronary artery disease, coronary heart disease (CHD) and stroke. Each year, CVD cause over 4.3 million deaths in Europe, accounting for nearly half of all the deaths in Europe (48%). Over a third of deaths from cardiovascular diseases are caused by coronary heart diseases and just over a quarter are due to stroke [4].

Coronary heart disease is the UK's biggest killer, with one in every four men and one in every six women dying from the disease. In the UK, approximately 300,000 people have a heart attack each year [5].

CVD are also the main cause of death before the age of 65 in Europe with over 800,000 deaths each year. More than 190,000 of them are attributable to stroke. This also means that CVD are the main cause of years of life lost due to early death and disability. In 2002, the WHO established a measurement to estimate the burden of diseases. The main measure is the DALY, Disability Adjusted Life Year, an aggregate of years of life lost due to premature death and years of healthy life lost due to disability. In 2002, in Europe, over 34 million DALYs are lost each year to cardiovascular diseases which amounts to 23% of the total, before neuropsychiatric disorders (20%), injuries (14%) and cancer (11%) (See graph on the right) [6].



In 2006, production losses due to mortality and morbidity associated with CVD cost the EU almost €41 billion, with around two-thirds of this cost due to death (€26.9 billion) and one-third due to illness (€13.9 billion) in those of working age. The cost of informal care for people with CVD in the EU is another important non-healthcare cost. In 2006, the total cost of providing this care was just under €42 billion. Just over one-fifth of these costs were due to CHD (€9.1 billion) and over one-quarter were due to stroke (€11.1 billion) [7].

On the positive side, unlike many other diseases, cardiovascular diseases can be slowed over time. Early detection is therefore critical as the sooner doctors can identify the diseases and their potential risks, the sooner they can tell patients how to stop them.

Advances in medical technologies, particularly in imaging technologies, are playing a key role in detecting heart diseases. Ultrasound in particular is a really non-invasive technology which allows physicians to look at the overall functions of the heart and evaluate the condition of its valves [8].

— Coronary heart disease (CHD)

Coronary heart disease is the term used to describe what happens when the heart's blood supply is blocked or interrupted by a build-up of fatty substances in the coronary arteries. Over time, the walls of the arteries can become furred up with fatty deposits. This process is known as atherosclerosis, and the fatty deposits are called atheroma. If the coronary arteries become narrow due to a build-up of

atheroma, the blood supply to the heart will be restricted. This can lead to angina (chest pains). If a coronary artery becomes completely blocked, it can result in a heart attack. According to a British study, about half of the patients who have had a heart attack die within the next month, and 75% of that half die within 24 hours after the attack [9].

Making lifestyle changes can often help prevent or treat CHD. For some people, these changes may be the only treatment needed:

- **Healthy eating:** to follow a heart healthy eating plan prevents or reduces high blood pressure and high blood cholesterol and maintains a healthy weight;
- **Increased physical activity:** regular physical activity can lower many risk factors, including LDL ("bad" cholesterol), high blood pressure, and excess weight. Physical activity can also lower the risk of diabetes and raise the levels of HDL ("good" cholesterol);
- **No smoking and avoid secondhand smoke:** smoking can damage and tighten blood vessels and therefore raise the risk for CHD;
- **Limit the consumption of alcohol.**

If the change in lifestyle is not enough, other medical treatments are currently available to patients:

- **Specific medicines,** such as anticoagulants, aspirin, nitroglycerin, etc. which prevent the blood from clotting;
- **Medical procedures** such as the angioplasty and coronary artery bypass surgery.

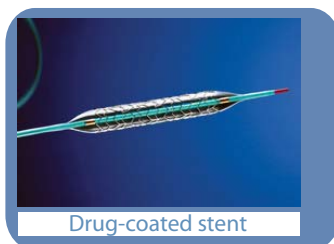
Angioplasty can improve blood flow to the heart, relieve chest pain and possibly prevent a heart attack. Moreover, the use of medical technologies such as stents have allowed better results during and after surgery. This minimally-invasive procedure has proven great success in the last years [10].

A stent is a small, expandable, mesh metal tube that acts like a structural scaffold in an artery. It holds the artery open and allows the blood to flow to the heart. Once placed, a stent remains in the artery permanently.

There are two kinds of **heart stents** [11]:

- Uncoated stents

These were the first heart stents and were also known as bare metal stents (BMS). These stents improve the outcomes of angioplasty procedures by reducing the need for re-intervention in the treated area of the artery.

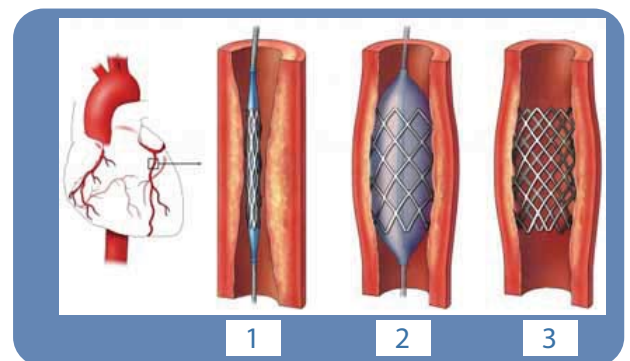


Drug-coated stent

- Drug-coated stents

Drug-coated or "drug-eluting" stents (DES) are designed to control the release of a medicine into surrounding tissue in an artery. The action of this medicine is intended to limit the overgrowth of natural tissue as the healing process occurs following the placement of the stent.

Angioplasties were originally performed by dilating the blood vessel with the introduction of large stiff catheters through the narrowed space available to reach the heart. The complications that resulted from this approach led researchers to develop ways to open the vessel with smaller devices. As of 2003, the catheters used to perform angioplasties contain balloons that are inflated to widen the vessel, and stents to provide structural support for the vessel (See picture on the right).



If angioplasty proves unsuccessful, the position of the blockage is too difficult to access by angioplasty, or patients have severe blockages in multiple major vessels, doctors may recommend coronary bypass surgery, also called the **coronary artery bypass graft (CABG) surgery**.

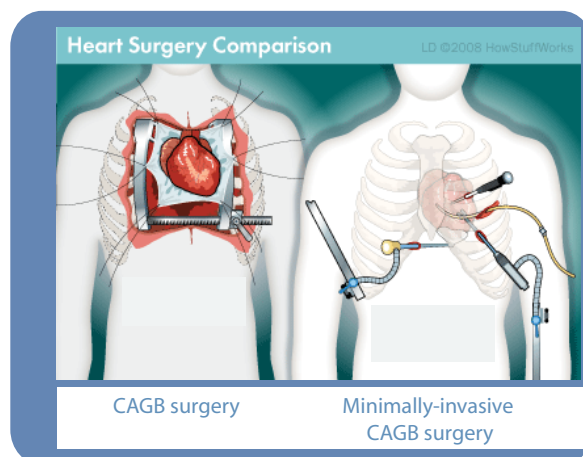
Coronary artery bypass surgery uses a healthy blood vessel taken from the leg, arm, chest or abdomen of the patient to connect it to the other arteries in your heart so that blood is bypassed around the diseased or blocked area. After a coronary bypass surgery, normal blood flow is restored. The medical procedure takes two to six hours, is invasive and involves a long recovery period. During the surgery, the chest bone is separated, and the ribs are spread apart to allow visible and physical access to the heart. In most instances, blood circulation and breathing functions will be taken over by a heart-lung machine [12].

Patients can now benefit from minimally-invasive bypass surgery by making significantly smaller incisions (3 or 4 holes instead of a 20 cm scar). This is possible by using an endoscope or using other innovative techniques to operate (See picture on the right).

Other possible benefits of minimally-invasive heart surgery may include [13]:

- Reduced risk of infection;
- Less bleeding;
- Less pain and trauma;
- Decreased length of stay in hospital after the procedure: the average stay is 3 to 5 days after minimally-invasive surgery, while the average stay after traditional heart surgery is 5 days;
- Decreased recovery time: the average recovery time after minimally-invasive heart surgery is 2 to 4 weeks, while the average recovery time after traditional heart surgery is 6 to 8 weeks.

Patients undergoing angioplasty or bypass surgery will have to take medication several months or years after the surgery to reduce the risks of clotting. However, they also increase their chances of not incurring a stroke in the following years.



— Stroke

A stroke occurs when a blood clot blocks a blood vessel or artery. It can also occur when a blood vessel breaks, interrupting blood flow to an area of the brain. A stroke kills brain cells in the immediate area.

When brain cells die during a stroke, abilities controlled by that area of the brain are lost. These abilities may include speech, movement, and memory. The way a stroke affects a person depends on where the stroke occurs in the brain and how much of the brain is damaged [14].

One of the major risk factors of stroke is [heart disease](#). A healthy heart and a healthy lifestyle contributes therefore significantly in reducing those risks.

Treatment of stroke

Sometimes treating a stroke means treating the heart. The reason is that various kinds of heart diseases can contribute to stroke risk. For example, damaged heart valves may need to be surgically treated or treated with anti-clotting drugs to reduce the chance of clots forming around them. Blood clots can also form in hearts with atrial fibrillation. This is a type of abnormal heart rhythm called an arrhythmia. If clots form in the heart or on the valves, there is a chance they can travel to the brain and cause a stroke.

Stroke is the disease which most frequently leads to permanent disability, necessitating long-term care. Patients surviving a stroke are in most of the cases left with weaknesses or paralysis in some of their body parts, can also sometimes lose their ability to speak or have spasticity for the rest of their lives.

There have been pharmacological and technical advances in the prevention and treatment of a stroke over the last decade:

- [Rehabilitation therapy](#) including physical, occupational or speech therapies;
- [Oral medication](#) such as aspirin and anticoagulants;

Aspirin is the most commonly used medicine to prevent strokes. Anticoagulants are the best method of preventing blood clots that form in the heart because of atrial fibrillation, heart attack, heart valve problems, or heart failure.

- **Neurosurgeries** such as cerebral angioplasty. This surgery also uses medical devices such as balloons, stents and coils. Their widespread use is thanks to their safety and effectiveness.

- **Injection therapy** intended for specific muscles groups;

- **An implanted device to deliver medication.**

This device is intended for patients having severe spasticity. A pump and catheter is surgically placed to deliver a drug directly around the spinal cord. This device can help reduce significantly the symptoms of spasticity [15].

– The European Heart Health Charter

Cardiovascular diseases are eminently preventable. In 2004, the European Union Council under the Irish Presidency called upon the European Commission and EU Member States to ensure that appropriate actions are taken to address cardiovascular diseases. In 2005, The Luxembourg Declaration further established an agreement among representatives from national Ministries of Health and representatives from European and national Cardiac Societies and Heart Foundations to initiate or strengthen comprehensive prevention plans and to ensure that effective measures, policies and interventions are in place in all European countries to fight CVD.



Building upon this, the European Society of Cardiology and the European Heart Network, with the support of the European Commission and the World Health Organization – Regional Office for Europe, have developed the first European Heart Health Charter designed to prevent cardiovascular disease (CVD) in Europe.

The Charter stresses the need for increased public awareness of the risk factors associated with CVD and the responsibility of both the individual and political bodies to address these risks and invite international and European organisations and national governments to adopt it in order to promote cardiovascular health. By adopting it, they also support the 2000 Valentine's Declaration "Every child born in the new millennium has the right to live until the age of at least 65 without suffering from avoidable cardiovascular disease". The Charter also seeks help from politicians and health professionals. Politicians have an important role to play in raising awareness of the social and economic consequences of cardiovascular disease and the necessity of addressing the issue at a national and European level. Health professionals have also an important role to play in providing visibility for the Charter and expressing the need to address cardiovascular disease at a local, regional, national and European level [16].

– Conclusion

Cardiovascular diseases are linked by common preventable risk factors related to lifestyle. Strong evidence shows how much of the occurrence of these diseases can be prevented by addressing their factors by developing for instance national nutrition plans, promoting healthier lifestyles through exercise, etc. The WHO estimates that 80% of premature deaths from heart disease and stroke can be avoided. Advances in medical technologies, especially in imaging, play a key role in early detection and prevention of such diseases. Regular check-ups at doctors are therefore crucial. However, while the life of many can be spared by adopting healthier lifestyles, others for whom the change in lifestyle is not sufficient will need effective treatments. Stents used in heart surgeries are modern, reliable and cost-effective devices that can reduce the risk of heart attack and stroke. Devices used to perform minimally-invasive heart surgeries have also proven real benefits for patients during and after the procedures to improve their daily lives. The right political actions and incentives to raise awareness of cardiovascular diseases and the availability of innovative technologies to prevent, detect and treat them can improve the current situation in Europe.

— **Cardiovascular diseases and medical technology in the news:**
The story of Anthony Van Loo [17]

While many cardiovascular diseases are the result of unhealthy lifestyles, some others are less known but still affect patients in Europe. The story of Anthony Van Loo can relate to many of them.

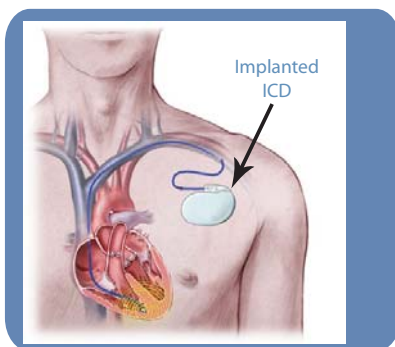
On 7 June 2009, 20 year old Belgian soccer player Anthony Van Loo was saved by his implantable cardiac defibrillator (ICD) while on the pitch.

Everything was going well for this team, Roselaere, but in the 44th minute, a rather unexpected event caught all the other players and referee's attention. Anthony, who was just walking towards the ball, suddenly collapsed on the pitch seemingly for no particular reason (See picture on the right). At that point nobody knew what was happening to Anthony. After 8 seconds, his legs started to twitch and a couple of seconds later, he regained consciousness and stood up as if "nothing had happened". So what did in fact happen?



In July 2008, during a medical check-up, Anthony Van Loo was diagnosed with a heart disorder which can lead to cardiac arrhythmia, meaning that Anthony's heart can beat too fast or too slow, regularly or irregularly. Some arrhythmias are life-threatening medical emergencies that can result in cardiac arrest and sudden death. In August 2008, Anthony and his doctor decided that he would receive an implantable cardiac defibrillator (ICD) to prevent such situation from happening. An ICD can be compared to the airbag of a car: you may not need it for a couple of years but when you are in an accident, it will pop-out and save your life.

On 7 June 2009, Anthony's heart started to beat 400 times per minute (4 times higher than a normal heart would beat) for 10 to 15 seconds which led him to cardiac arrest. His implantable device responded to the situation and fired to restore his heart rhythm. Only a couple of seconds after he had collapsed and his defibrillator fired, he was able to regain consciousness and stand up almost as if nothing had happened. Out of precaution, Anthony was brought to the hospital where the doctors attested that he was no longer in danger. In the meantime, Anthony's doctor, Professor Bugada, knew what had happened to Anthony's heart as all the data were sent directly from the ICD to him. He was then able to analyse the data and draw the correct conclusion on Anthony's medical situation.



Patients suffering from the same disorder as Anthony have only 5% chance of survival without defibrillator. If something happens to their heart, there is usually not enough time to reach the hospital and get treatment. With medical technologies such as ICDs, those patients have the possibility to live their lives without worrying about their condition. Thanks to Information and Communication Technologies (ICT) such as eHealth, doctors can also more easily manage their patient's condition as data from the device is sent directly to their computer. It also allows them to do regular check-ups regardless the location of their patients.

The video of the scene was quickly placed on the internet and has drawn a lot of interest from newspapers, bloggers, organisations and patients. On Youtube alone, this video has been watched more than 500,000 times to witness the power of this life-saving technology and many articles have been published in the Belgian and world press.

To watch the video, please click [here](#).

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