

The role of medical technologies in the fight against Antimicrobial Resistance and Healthcare Associated Infections

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Executive summary

Antimicrobial resistance (AMR) is a serious global threat that puts in jeopardy the effective prevention and treatment of an ever-increasing range of infections as well as modern medicine, including intensive surgeries, chemotherapies, transplantations etc¹. It is essential to acknowledge the relation between Healthcare-Associated Infections (HAIs), the inappropriate use of antibiotics² as well as the development of resistance. HAIs are often caused by resistant bacteria³. Preventing and detecting these infections in primary care or healthcare settings at an early stage is essential to reduce antibiotic usage, consequently reducing the risk of developing resistance. This is critical for the safety of both patients as well as healthcare professionals (HCPs) alike.

The findings of a recent literature research, led by Imperial College London, looking at the relation between COVID-19 and co-bacterial infections, demonstrated widespread use of broad-spectrum antibiotics for patients with COVID-19 (~72%).⁴ On the other hand, for patients with actual bacterial or fungal infections, the usage was considerably lower (8%).⁵ In the same context, the European Commission has highlighted the importance of re-activating hospital infection control plans to eliminate the transmission of COVID-19 in healthcare and social care settings⁶.

Medical technologies (medical devices and in vitro diagnostics) can help prevent, diagnose and control infections, stopping the spread of resistant bacteria throughout the patient pathway. Prevention and management of HAIs contribute to the control of bacterial resistance, by limiting the transmission of multi-drug resistant organisms, and consequently lowering the need for antibiotic therapy.

MedTech Europe encourages policymakers to consider the medical technology industry as a solution-provider. We recommend the following actions at both EU and Member States (MS) levels:

1. The European Commission is encouraged to monitor the implementation of the current EU Action Plan on the fight against AMR and develop new EU guidance or joint action reinforcing the link between AMR and infection prevention/management.
2. The European Commission is encouraged to support Member States in enhancing awareness, as well as implementing and monitoring national targets and surveillance systems aimed at the reduction of AMR through holistic action plans under the "One Health approach".
3. The EU, as well as Member States, are encouraged to promote the development by the European Centre for Disease Prevention and Control (ECDC) of evidence-based guidance on infection control as well as best practice-sharing between Member States.

1) [Factsheet on antimicrobial resistance, WHO, 2016](#)

2) Holmes AH, Moore LS, Sundsfjord A, Steinbakk M, Regmi S, Karkey A, et al. Understanding the mechanisms and drivers of antimicrobial resistance. *Lancet*. 2016 Jan 9;387(10014):176–87. [http://dx.doi.org/10.1016/S0140-6736\(15\)00473-0](http://dx.doi.org/10.1016/S0140-6736(15)00473-0) pmid: 26603922

3) [ECDC website: AMR and HAI Programme](#)

4) [Rawson et al. 2020 Clinical Infectious Diseases, ciaa530](#)

5) *Ibid.*

6) [EU health preparedness: Recommendations for a common EU testing approach for COVID-19](#)

4. The European Commission, as well as Member States, should support the development of new funding and business models for improved access to innovative technological solutions that help to prevent and control AMR/HAIs.
5. The European Commission, as well as Member States, could foster the uptake of solutions to diagnose and prevent AMR/HAIs.
6. Equally, the Member States are encouraged to promote the implementation of antibiotic stewardship and infection control programmes in hospitals and healthcare facilities, as well as providing transparency on infection rates.
7. The Member States could support educational programmes developed with and for healthcare professionals and patients.
8. The European Commission could further encourage EU Member States to promote a prevention culture.

AMR/HAI: A cross-border challenge

Across the EU, 33 000 people die each year from drug-resistant infections⁷. On a global level, this number will increase to 10 million by 2050, according to the UK AMR Review⁸. This is 1.8 million more deaths than those attributed to cancer. Not only will this impact patient safety and recovery, but it risks going back to a 'pre-antibiotic era', where patients could die from simple bacterial infections and life-saving treatments can no longer be performed safely⁹. AMR also puts a heavy burden on the economy due to loss of income and productivity, as well as informal care requirements. In Europe, the annual extra healthcare costs and productivity losses due to multidrug-resistant bacteria amount to 1.5 billion euros¹⁰.

Antimicrobial resistance is a global concern according to the World Health Organization (WHO), since new resistance mechanisms are spreading on a global level, jeopardising our ability to treat common infectious diseases¹¹. This global challenge also endangers the achievements of the UN Sustainable Development Goals.

There are multiple challenges to combatting antimicrobial resistance. Not only do we lack new antibiotics, but we also overuse- and misuse existing ones in human medicine and animal husbandry¹². In addition, a lack of public awareness, healthcare system challenges and inadequate infection prevention in healthcare institutions make effective control of AMR more difficult¹³. HAIs are closely tied to the issue of resistance. HAIs are often caused by antibiotic-resistant bacteria¹⁴. According to the ECDC, patients who are infected with bacteria, which are resistant to antibiotics are more likely to face complications and are up to three times more likely to die from the infection¹⁵. Infection prevention should therefore play a key role in avoiding resistance in the first place.

Equally, the administration of antibiotics in healthcare settings should occur after infections have been properly documented by in-vitro diagnostics tools. So far, only a few countries in Europe have developed or implemented a national antimicrobial resistance action plan.

7) Cassini et al., Lancet Infect Dis 2018

8) [Review on Antimicrobial Resistance – Comparative deaths graph](#)

9) [Factsheet for the general public, ECDC](#)

10) [European Commission AMR Factsheet, 2016](#)

11) WHO website: Antimicrobial resistance

12) [Factsheet on antimicrobial resistance, WHO, 2016](#)

13) [Communiqué of Tokyo Meeting of Health Ministers on Antimicrobial Resistance in Asia, 2016](#)

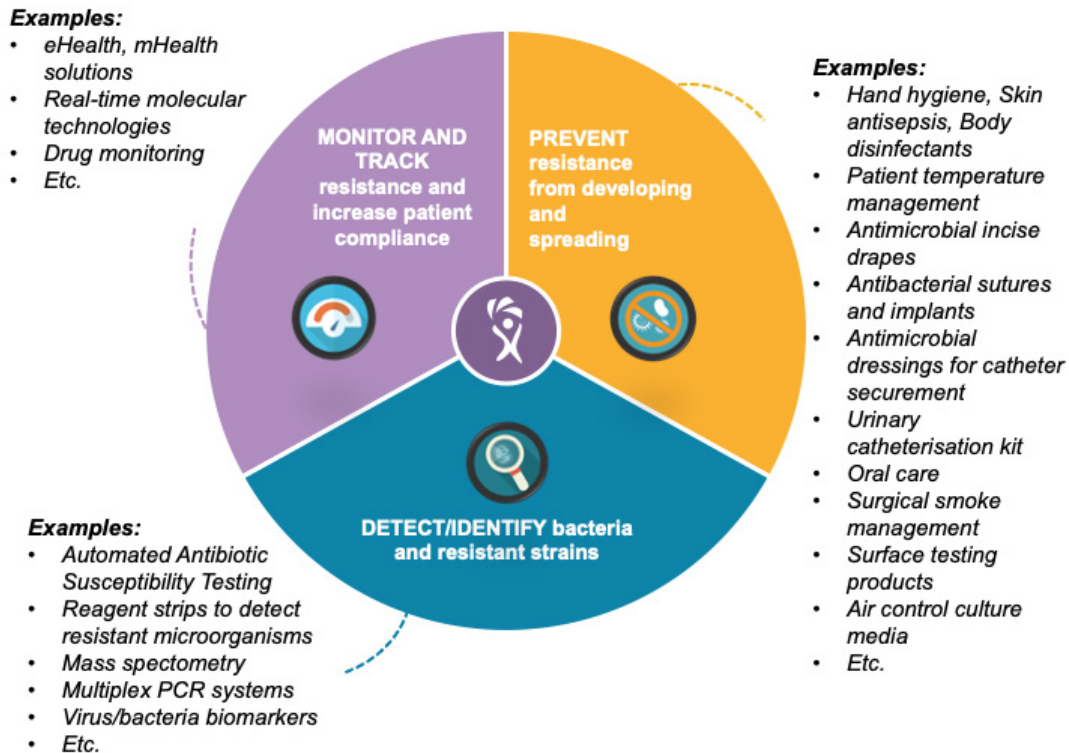
14) [ECDC website: AMR and HAI Programme](#)

15) [ECDC Policy Briefing – Last-line antibiotics are failing: options to address this urgent threat to patients and healthcare systems, 2016](#)

How can medical technologies support EU and Member State action?

There are three key areas where medical technologies can support AMR/HAI prevention and management measures:

Figure 1: (Non-exhaustive) examples of medical technology solutions that can be used



1. DETECT / IDENTIFY bacteria and resistant strains

- **Diagnostic tests** can play a substantial role in the prevention of over-prescription of antibiotics, **by differentiating between bacterial and viral infections** and by identifying the microorganisms involved, leading to the identification of the precise therapy needed.
- Diagnostics can also provide a **fast and accurate diagnosis** ensuring a timely and appropriate therapy for better patient outcomes.
- Diagnostics can assess the **patient stratification** through the use of biomarkers distinguishing bacterial from non-bacterial infection, monitoring the response to the prescribed therapy and predicting the outcomes.
- Companion diagnostics can **improve patient participation in the clinical trials** of new antibiotic molecules, thus optimising the development of new antibiotics.

2. PREVENT resistance from developing and spreading

- Screening technologies before and during hospitalisation for multidrug-resistant organisms can help **mitigate the exposure** and limit the spread of the infections in the community and healthcare settings.
- The bundle strategy (Figure 1) can prevent Surgical Site Infections (SSI), as well as healthcare-acquired infections with higher morbidity, by **reducing the reliance on antibiotics and thus the development of resistance**.

- Innovative decontamination technologies and processes can restrain resistance by **avoiding cross-contamination**.
- Medical technologies can **address the risks associated with surgical smoke**, which can potentially transmit infectious pathogens.

3. MONITOR & TRACK resistance and increase patient compliance

- Diagnostic technologies can assist in the **surveillance of antimicrobial resistance patterns**. This data can be used in antimicrobial policies as well as prescribing guidelines at all levels (ward, hospital, local and national).
- Diagnostic technologies can inform regarding the **proper duration of antimicrobial treatment**, ensuring prudent and appropriate use by healthcare providers.
- Diagnostic technologies and **digital health solutions** can monitor the compliance of patients to treatments.
- Smart systems can **detect contact with infected patients**.

Medical technologies (as demonstrated above) can therefore help to fight the causes of AMR: the overuse- and misuse of antibiotics as well as the prevalence of infections in the first place. The solutions have been shown to provide increased medical value that translates to better patient outcomes and can generate cost-savings for hospitals, health systems and society at large.

What is needed to progress?

MedTech Europe would like to encourage policymakers to consider the medical technology industry as a solution-provider in the fight against AMR and HAIs. Therefore, MedTech Europe would like to recommend the following actions to be taken on at national and/or European levels:

- 1. The European Commission is encouraged to monitor the implementation of the current EU Action Plan on the fight against AMR and develop new EU guidance or joint action.** Since the European Union's Joint Action on Antimicrobial Resistance and Healthcare-Associated Infections (EU-JAMRAI's) mandate ends in 2020, it would be important to continue receiving updates regarding the successful implementation of the joint action. Given the political momentum, we would recommend the development of further EU guidance or joint action that aims to reinforce the link between AMR and infection prevention/control and global pandemics control.
- 2. The European Commission is encouraged to further support Member States in enhancing awareness, as well as implementing and monitoring national targets and surveillance systems aimed at the reduction of AMR through holistic action plans under the "One Health approach".**
- 3. The EU, as well as Member States, are encouraged to promote the development by ECDC of evidence-based guidance on infection control as well as best practice-sharing between Member States.** The implementation of such guidelines on a national level will reduce the infection levels in hospitals and healthcare facilities, lowering the risk of AMR. Existing legislative frameworks on health and safety in the workplace (both at EU as well as Member State level) can be better implemented in hospitals and serve as an additional basis to address sources of infection.
- 4. The European Commission, as well as Member States, should support the development of new funding and business models for improved access to innovative technological solutions that help to prevent and control AMR/HAIs.** The intrinsic value of available technologies is still not well understood or incentivised by healthcare systems, making them less accessible to patients and adopted by healthcare professionals. To fully utilise the potential of these technologies and ensure their access, structural changes will have to be implemented in a manner that acknowledges the value they provide.
- 5. The European Commission, as well as Member States, could foster the uptake of solutions to diagnose and prevent AMR/HAIs.** One key step would be to make sure that they are used to ensure that antibiotic prescription is appropriate and informed by evidence, as suggested by the UK AMR Review¹⁶. Nurturing the practical implementation of these technologies as a standard of care, monitored by verified quality indicators.
- 6. The Member States are encouraged to promote the implementation of antibiotic stewardship and infection control programmes in hospitals and healthcare facilities, as well as transparency of infection rates.** Where these programs already exist, they should be enhanced through technological support, such as electronic surveillance systems. The Netherlands is an excellent example of successful antibiotic stewardship teams in hospitals (see Case study). Publishing hospital and healthcare facility infection rates within the right context and setting annual targets can encourage healthy competition for the reduction of hospital-acquired infections, a high percentage of which are caused by highly resistant bacteria¹⁷.

16) [Review on Antimicrobial Resistance: Final report and recommendations \(May 2016\)](#)

17) [CDC: Making Health Care Safer, 2016](#)

Equally in the context of the COVID-19 pandemic, the increased exposure of patients to healthcare settings and invasive procedures, alongside the extensive use of antibiotics, has enhanced the emergence and spread of resistant pathogens. Therefore, it is critical to monitor and tackle the collateral and long-term consequences stemming from the increased use of broad-spectrum antibiotics. The implementation of antimicrobial stewardship principles to patients with COVID-19 could help mitigate the harm¹⁸.

7. The Member States could support educational programmes developed with and for healthcare professionals and patients. Behavioural change will be a crucial factor in improving awareness and understanding around resistance¹⁹.

8. The European Commission could further encourage EU Member States to promote a prevention culture at national level.

Medical technology-enabled solutions that support complementary actions at EU and Member State levels, can lead to significant prevention and reduction of AMR and HAIs. MedTech Europe is ready to engage and partner with stakeholders in further exploring the aforementioned recommendations.

Case study

Did you know... ?

...that the Dutch Government has made multidisciplinary antimicrobial stewardship teams mandatory for every hospital²⁰? Their job is to:

- Monitor antimicrobial use and resistance hospital-wide
- Provide tailored feedback on antimicrobial therapy
- Provide continuous education and training to healthcare professionals

Researchers found the impact of the so-called 'A-teams' to be significant in reducing the length of hospital stay and required nursing time. Cost savings per hospital totalled 70.000 euros compared to the historical cohort during a 12-month period after implementation.

Recently, the Netherlands has launched case audits for the reassessment of the antibiotic use after 48 hours reduced antibiotic consumption and length of stay in a hospital and also had a positive return on investment²¹.

18) Beovic B. et al: Antibiotic use in patients with COVID-19: a 'snapshot' Infectious Diseases International Research Initiative (ID-IRI) survey. J Antimicrob Chemother doi:10.1093/jac/dkaa326

19) [WHO Global Action Plan on Antimicrobial Resistance](#)

20) [The Netherlands EU Presidency: AMR Next Report, 2016](#)

21) ECDC, Infographics about antibiotic stewardship programmes: <https://antibiotic.ecdc.europa.eu/en/infographics-about-antibiotic-stewardship-programmes>

About MedTech Europe

MedTech Europe is the European trade association for the medical technology industry including diagnostics, medical devices and digital health. Our members are national, European and multinational companies as well as a network of national medical technology associations who research, develop, manufacture, distribute and supply health-related technologies, services and solutions.

www.medtecheurope.org

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