



THE FUTURE OF PERSONALISED MEDICINE

Short scenarios

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ABOUT HECOPERMED

PERSONALISED MEDICINE

With increasing and ongoing pressure on healthcare budgets in Europe, personalised medicine is the hope of many patients, healthcare professionals and policy makers. Personalised medicine aims to optimally match patient and treatment by assessing the characteristics of patients for whom treatments achieve the best results. In this way, personalised medicine reflects a paradigm shift in healthcare, as it no longer emphasises the effects on group averages, but on the individual differences between patients through in-depth phenotyping. Behind the call for personalised medicine is the implicit promise that healthcare will become more cost-effective through more targeted treatments.

HECOPERMED PROJECT

The Horizon 2020 funded HEcoPerMed project (Health care- and pharma economic models in support of the International Consortium for Personalised Medicine) responds to the demand for economic models that evaluate treatments enabled by innovations in personalised medicine and seeks to identify funding and reimbursement mechanisms that provide financial incentives for the rapid development and adoption of such innovations. HEcoPerMed goes beyond current assessment and payment models to serve the requirements of personalised medicine for more comprehensive cost-effectiveness estimates that incorporate patient and societal perspectives and improve the sustainable affordability of cutting-edge health innovations. HEcoPerMed aims to identify the best modelling and payment strategies for personalised medicine to distinguish between promise and reality.

HECOPERMED SCENARIOS

To demonstrate the value of state-of-the-art economic modelling and appropriate financial agreements, HEcoPerMed has created future scenarios that consider, on the one hand, the trends, and drivers, and, on the other hand, the challenges, and benefits of personalised medicine for the European social model of healthcare and its financial viability.

The aim of the HEcoPerMed scenarios is to tell parallel stories of what different futures of personalised medicine might look like from a wider societal perspective. The scenarios are by no means predictions. Rather, the scenarios developed represent plausible alternatives in which different aspects dominate. Scenarios create links between future assessments (i.e., trends, drivers) of a variety of stakeholders and participants in the scenario process and can thus create pictures of the future with greater density and diversity, going far beyond a stringing together of individual trends. Linking trends and drivers in scenarios makes framework conditions and critical issues visible where development could go in different directions. This perspective is especially important for policy makers.

STAKEHOLDER PARTICIPATION

Stakeholders were an integral part of the project through participation in workshops and interviews and had the opportunity to contribute to the scenario building process, to assess the scenarios and elaborate further options for strategy development and policy implications.

We would like to thank all experts participating in the scenario process, especially our HEcoPerMed consortium partners, the advisory board, interview partners and workshop participants for providing valuable information, feedback and context.



SCENARIO: PRIVATIZATION – BOUTIQUE MEDICINE VS. AUTOMATED MEDICINE

Healthcare is largely privatised. The public sector has retreated from supporting a tax-based health system due to ever rising costs. Personalised medicine is something for wealthy people who do “health shopping” on an international scale. Most of the investments for personalised medicine come from the private sector.

SOCIETY

The European social system is reaching its financial limit. Personalised medicine has made considerable progress in diagnostics and treatment of diseases, and a number of personalised medicine therapies are available. However, medical innovation is cost-increasing rather than cost-saving.

HEALTH CARE

The public sector has withdrawn from supporting a tax-based health system due to the ever-increasing costs. A growing proportion of medical care is now

based on genome screening and related therapies. Many of the expensive therapies of personalised medicine are only affordable for wealthy people. The emergence of “boutique medicine”, where the wealthy patients choose appropriate and tailored treatment, is leading to increasing inequalities in health outcomes between a small segment of wealthy people and the poorer majority who mainly access standard health services. As a result, the rich live longer and healthier lives than the poor because they have access to quality hospitals and therapies. The inequity between the small rich



segment and the large poor segment starts already at a young age because rich people can afford a full genomic sequencing right after birth, and their medical treatment is based on this analysis throughout their lives. From the patient's point of view, the free market allows international shopping for the best tests and treatments and offers a variety of solutions for all those who can afford it.

However, stratified medicine based on Big Data, referred to as "automatic medicine", makes diagnostics and treatment more efficient and cheaper than ever before, benefiting the larger part of the population that cannot afford boutique medicine.

INSURANCE

Private insurance, affordable only to a few, can hardly compensate the existing care deficit. Multinational, diversified companies, which incorporate insurance and pharmaceutical companies, offer a pan-European insurance plan and global health care.

FINANCING & BUSINESS

Medical and technological breakthroughs are provided by public research institutes and universities. Research and development is usually funded with public money. There is no government regulation of prices for specific and personalised treatments or tests.

The small percentage of boutique medicine followers are willing to pay a high price for comprehensive analysis of their health data, which creates incentives for start-ups to develop rapid tests and reliable interpretations. The role of private players in the production and delivery of health services is increasing. They might be willing to lower the prices for treatments in exchange for personal data from (potential) clients.

To provide more incentives to invest in personalised medicine, patent protection has been limited and the costs of research and development have been distributed.



SCENARIO: TECHNOLOGY-DRIVEN – PERSONALISED MEDICINE BY SUBSCRIPTION

Public and private funds are available for technological progress including personalised medicine. Sharing one's own data is the entry point to the healthcare system. Technology-driven medicine that uses e.g., Internet of Things with sensors everywhere allows more flexible healthcare. Rapid decline in genome sequencing costs has made it affordable for everyone and genome screening is expected by everyone.

SOCIETY

The European social system strives for cure for all and at all costs. The top priority of the health care system is to do whatever it takes to prolong life, even if this means that the number of chronically ill people and those in need of intensive care is increasing sharply.

Patients have great trust in technology-driven medicine and the achievements of personalised medicine because of unprecedented advances in biotechnolo-

gy and medical technology, such as artificial intelligence, quantum computing, Internet of Things, and new methods for analysing and visualising biological functional levels (genomics, proteomics, metabolomics, etc.).

HEALTH CARE

Healthcare professionals are more concerned with genetic deficiencies than with treating people or preventing other illnesses. Processing costs for genome screening are low, and it has become easy to



obtain enormous amounts of biological data. Health data is owned by the collecting institution, and these data companies have become the major players in the health system. Patients willingly provide these companies and pharmaceutical companies with their health data, be it genetic or physiological and behavioural determinants from wearable and (implanted) body sensors. They are convinced that in this way the healthcare system can cure every affliction in the long run. For fear of a predisposition to a genetic disease, citizens are willing to participate in many of the numerous screening programs. A trigger for the extensive sharing of personal health data is also the fact that it is a prerequisite for patients' access to medical treatment. Everyone is under great social pressure to take personal responsibility for their own health, e.g. by proactively undergoing screening programmes.

INSURANCE

Despite tax-funded health insurance schemes, private insurance is becoming common practice because possible genetic diseases or unfavourable epigenetic patterns can never be ruled out, even in healthy people. The focus of healthcare on the

genetic causes of health problems has led to the creation of "genetic insurances" that cover all problems arising from a person's genetic pattern. The "Geneflix model" (in reference to the media service Netflix) is the new business model of insurance companies. People take out subscriptions that make them direct payers for research and development on the one hand, and owners of the results, i.e. the free research and development services for treatment, on the other hand.

FINANCING & BUSINESS

Public and private funds are available for technological progress including personalised medicine. The government is committed to maximise the quality of healthcare and takes a "whatever it costs" approach. It also places great trust in personalised medicine to combat any disease and financially supports screening programmes and research in data-intensive healthcare.

Private companies offering screenings at low cost are flourishing. As technologies are often privately owned, care is becoming increasingly commercialised.



SCENARIO: COOPERATION - PERSONALISED AND HOLISTIC MEDICINE

Personalised medicine advances through open and intense cooperation between all actors within the health sector: science, policy, insurance, pharma industry, SMEs, patient organisations. There is a worldwide exchange of health data. The population is quite healthy due to the excellent healthcare system. People are working longer and extending their working lives to finance the high public spending for healthcare.

SOCIETY

The European social system benefits from the overall economic growth. Technological and social innovations have contributed to economic growth with far-reaching positive socio-economic effects on society. The society has a strong sense of community. Every citizen should benefit from the wealth of the country. The population is quite healthy thanks to the excellent healthcare system. However, to finance the high public spending for healthcare, people are working longer and extending their working lives.

HEALTH CARE

Previous crises, such as the COVID-19 pandemic, have underlined the importance of the services provided by health professionals and raised their social prestige. Not only the sick, but also the elderly people and those in need of care who live at home benefit from the high number of people working in the health sector now.

The cooperation and collaboration of all health-care actors, e.g. patients and patient organizations, doctors, researchers, insurers, medical technology



companies, innovators/start-ups, public funding organisations for health research, health policy makers and related policies, bring together a diversity of knowledge and perspectives and thus increase the benefits of personalised medicine for patients. Transnational alliances for personalised medicine have been fostered to pool knowledge and available resources in specialised transnational centres and reduce the costs for diagnostics in large-scale settings. These centres benefit from the fact that countries worldwide, and to some extent, pharmaceutical companies, support open data policies and make health data openly available worldwide.

Databases for health data are interconnected worldwide and regular data sharing between most countries is now common practice. In general, there is trust in the government and other data owners regarding the security of medical data, as there are strict national and international regulations governing the handling and use of sensitive medical data. All citizens are required to provide their health data to public health centres if they wish to access the state health insurance system scheme.

INSURANCE

The majority of the population uses the tax-based public health insurance system. The entire health care system is based on the “Singapore model”,

which provides every patient with every type of medical treatment, including personalised medicine. It comprises public and private health insurance schemes, both of which cover the costs of high-quality medical care. Health insurance and benefits depend on a citizen’s national status. While Europeans are entitled to subsidised public health services through a compulsory national savings scheme, employed non-Europeans can only use private insurance to cover themselves and their dependents.

FINANCING & BUSINESS

The population is taxed heavily to provide the resources for the healthcare system. In the long run, health insurers expect to save money by restricting certain treatments to patients who are most likely to benefit from the therapy. The people expect the government to reallocate budgetary resources from other sectors of the economy to the health sector. Health policy makers are still working to develop new business models and incentives for pharmaceutical companies to collaborate more closely with public centres in a public-private partnership and to balance the research and development costs of personalised medicine developments and the development risks between the public funders and the business entity who commercializes the medical product or treatment.



SCENARIO: SCEPTICISM - PERSONALISED MEDICINE IN A NICHE

The society is increasingly questioning evidence-based healthcare and has little trust in data-driven health-care systems due to expected data breaches. The health insurance system is solidarity-based but does not provide much funding for advanced medical research, treatment, or personalised medicine.

SOCIETY

The European social system and the society in general is sceptic about innovations, including personalised medicine.

Some private initiatives try to counter the scepticism by strengthening health literacy in relation to personalised medicine, e.g. by involving international celebrities who show how personalised medicine has helped them. These initiatives also argue that good regulations on data ownership and privacy issues could counterbalance the concerns of citizens who

do not want to share their health data and fear data breaches. In general, the notion prevails that “the data belongs to me” and should not be shared at a level where individuals can no longer control data use anymore.

At international level, countries are experiencing their isolation from other EU countries and beyond since politicians tend to pursue protectionist strategies. For the health sector, this means less access to treatments developed abroad.



HEALTH CARE

The emphasis is on prevention and healthy lifestyles, which are supported by government agencies and employers.

Blockbuster drugs are more widely used than any personalised medicine because they are more lucrative for pharma companies and more trusted by patients. Personalised medicine, on the other hand, brings with it a new form of threat, namely that of being one of the non-responders and therefore being denied treatment.

This impression is reinforced by the international trend that healthcare treatment is becoming a very expensive undertaking worldwide. Through mergers and acquisitions, the pharmaceutical market has become more and more consolidated, and eventually some pharmaceutical companies have become part of “Google Health” and “Amazon Care”.

INSURANCE

The health insurance system is solidarity based but does not provide much funding for advanced medical research, treatment, or personalised medicine. Instead, social networks are very tight, which means that family and community provide support structure for those in need. Most elderly people are cared for by their relatives rather than in nursing homes.

FINANCING & BUSINESS

In this sceptical society, there is less private investment in personalised medicine, but more public investment in long-term care and “warm care”, in line with the idea that loss of length of life is compensated by a better quality of life.

There are some private companies producing blockbuster drugs. And, since the COVID-19 pandemic in 2020, there are also public-private enterprises in which the state holds a significant number of shares. This approach has helped set the research and development direction and funding to produce the medication needed to contain epidemics and to copycat therapies of already approved drugs and therapies.

A lag in personalised medicine research is not considered to be a bad thing; in contrary, with a certain time lag there is an opportunity to adopt evidence-based personalised medicine from other countries and benefit from these experiences. Only when personalised medicine therapies are proven to be safe and affordable, health policy makers tend to include them in national health plans.

Among the new proposals to counter scepticism is that patents be owned by universities, public institutions, and governments, not industry.



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