Highlights from an IRGC workshop on the economics of precision medicine

On 12-13 April 2018, IRGC gathered over 20 stakeholders representing insurance and pharmaceutical companies, academic research, regulators and patients to discuss issues of cost-effectiveness, affordability, value and innovative payment schemes in precision medicine. Workshop participants were mostly familiar with healthcare systems in countries such as the UK, Switzerland and the US.

Precision medicine is fundamentally patient-centric, facilitating better targeted and personalised medical care, but it must also make economic sense for society. At a time when healthcare systems around the world are pressed to make better use of scarce resources and maximise health benefits, precision medicine’s salience augments in view of its potential to bring about improved health outcomes in ways that are affordable, economically viable and reflect social preferences.

It is worth highlighting that different types of precision medicine may involve different economic considerations and social judgments. More summarily stated, one can distinguish between ‘precision targeting’ and ‘breakthrough precision medicine’.

> ‘Precision targeting’ is about refining conventional medicines thanks to information about a patient’s ‘omics’ data\(^1\), medical records and other lifestyle information. Pharmacogenomics is particularly relevant in this approach, because understanding the role of the genome in drug response helps target treatments better (e.g. distinguishing responders/non-responders, grouping patients according to characteristics, etc.). While there have been significant scientific developments to enable this type of precision medicine, also called ‘stratified medicine’ in some countries, it is not yet for granted. It is dependent on (a) the availability and analysis of large sets of data collected from patients and the population at large, (b) the development of effective and cheap genetic testing to help diagnose health conditions or predisposition, and (c) companion diagnostics or biomarkers that provide better prospective indications on the safety and efficacy of a certain therapeutic product. Targeted genetic testing may become increasingly routine in some countries for a broad range of conditions, and key obstacles to making this type of precision medicine cost-effective may well be overcome in the years to come. Pharmacogenomics is increasingly used for cancer therapies, but perhaps also for neurodegenerative diseases, cardiovascular diseases, diabetes and other conditions, depending on scientific and medical advances.

The economics for precision targeting looks feasible if one takes a more long-term and dynamic view, that is considering important economies of scale (especially for large patient populations) and competitive dynamics that make the cost and price of treatments more affordable over time. Cost-effectiveness, as the measure of outcome on cost, should evolve and existing practices of measuring it should adapt to better account for efficiency\(^2\) and other economic gains (including fiscal ones), as well as the amelioration of quality of life (perhaps as outcome reported by patients). Further, it will be important to generalise performance-based payments, calculated on the basis of effective outcome in use. While cost-effectiveness is often a key concept to evaluate the cost and quality of care in certain healthcare systems, it can only inform and support decisions and may not be the most appropriate decision-making criterion to account for value and sustainability.

Overall, concerns about affordability and access to ‘omics-based’ therapies remain important, but is not the only constraining factor. Improved transparency concerning payment systems and IP rights, and better

\(^1\) E.g. genomics, proteomics, etc.
\(^2\) E.g. cost-savings in overall health care due to better targeting, fewer unnecessary consultations, tests, or ineffective treatments, etc.
explication to patients and medical professionals of key benefits in practise targeted precision medicine will help address resistance or reservations. Precision medicine has the potential to become more cost-effective than conventional medicine, and its affordability is not only a matter of accurate modelling but of appropriate dialogue between different stakeholders.

> The second type of precision medicine, ‘breakthrough precision medicine’, derives from the development of fully personalised curative drugs, especially regenerative cell and gene therapies that are tailored to each patient. Here, key economic considerations worth highlighting are: (a) the very large upfront costs\(^3\) and (b) the value that accrues with the curation of a patient for the rest of his/her life. These economic considerations must further be mediated with ethically and socially sensitive concerns around distributing pooled resources for expensive treatments of rare diseases as well as the patients’ age. Thus the paradigm change needed to answer the question of affordability necessitates focusing on the broader economic and societal value of a cure, that is around framing health as an investment rather than a cost\(^4\) and at the same time finding new ways to sustain solidarity with the more vulnerable ones.

On a more pragmatic level, the challenge is how to pay for value. In addition to social and ethical considerations, there is a temporal misalignment that may dis-incentivise doing so. Not only must payers be able to align cash flow, annual budgets and amortize the price of a therapy over the life of the patient, but in multi-payer systems, payers may not see the benefits in the long term if patients change insurers and/or insurers do not agree on splitting the cost of treating such patients.

Thus developing the economic rationale to justify this type of precision medicine requires the development of new business models for pharmaceutical companies, payers (insurers, governments) and patients, and with appropriate incentives. Depending on the severability – the extent to which the cost of a drug is separable from the cost of overall treatment and management of the disease – and the value generation horizon – the time it takes to amortise the expense and realise the value –, various types of business models could and should be developed to overcome short-term budget constraints and strategic payer behaviour. These include (a) loans or debt financing (for insurers, not indebted patients), (b) inter-payer transfer payments, special ‘cure funds’ (pool solutions) or re-insurance, and (c) patent buyouts by government or tax coverage. Payment schemes for new curative drugs should be negotiated early in the development of the drug in a way that makes economic and social sense.

Generating evidence remains important to convince developers and payers that breakthrough precision medicines can be affordable and viable. A way forward could be to develop and share evaluations of possible payment schemes, for specific therapies, under varied national regulatory contexts\(^5\). This could serve to determine guidelines for (a) amortisation over time, (b) distribution across actors, (c) performance-based incentives and (d) indicators.

Differences in healthcare systems notwithstanding, an important consideration revolves not only around changes to business models and/or better analytics of where, how and to whom value accrues, but also around understanding and explaining why and when precision medicine enables better healthcare provision than what is currently practised.

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\(^3\) E.g. treatments like Kymriah CAR-T for leukaemia in children was priced 475’000 USD in the US. Note though that the cost of subsequent CAR-T treatments may be lower.

\(^4\) Or, re-orienting from transactions-driven to value-based health care provision

\(^5\) Candidates for such case studies could include Gilead’s Sofosbuvir (Sovaldi) for chronic Hepatitis C patients, Nusinersen (Spinraza) for spinal muscular atrophy, Novartis’s Car-T (Kymriah) for leukaemia, of RT-100 gene therapies for congestive heart failures.

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A more complete workshop report will be developed and follow-up will be discussed with workshop participants.