Experts explain how economics can shape precision medicines

March 16 2017

Credit: Petr Kratochvil/public domain

Many public and private efforts focus on research in precision medicine, the process by which genomic information and other characteristics of a patient's disease are used to predict which treatments will be most effective. Scientific initiatives alone, however, will not deliver such medicines without strong incentives to bring them to market. An article

to be published in *Science* on Friday, March 17, 2017, examines the unique economics of precision medicines in the United States and the factors that impact their development, pricing, and access.

The authors—Assistant Professor Ariel D. Stern of Harvard Business School; Associate Professor Brian M. Alexander, MD, of Harvard Medical School and Dana-Farber/Brigham and Women's Cancer Center (DF/BWCC); and Professor Amitabh Chandra of Harvard Kennedy School—also outline the principal reasons why prices for precision medicines are likely to be higher than prices for conventional therapies and discuss the types of policies that are likely to increase patient access to these medicines.

In their discussion of the incentives needed for precision medicine innovation, Stern, Alexander, and Chandra cite the passage of the U.S. Orphan Drug Act of 1983 (ODA), which created incentives—tax credits of 50 percent of clinical trials expenses and marketing exclusivity for seven years rather than the usual five—to encourage manufacturers to develop new drugs for so-called orphan diseases, those affecting fewer than 200,000 people.

"The incentives provided by the ODA," the authors write, "mean that manufacturers of precision medicines should be particularly eager to find biomarkers that allow them to bring their medicines to market as orphan drugs, including salvaging some projects by showing effectiveness in narrower populations."

In addition, taking note of several existing FDA regulatory designations that encourage the development of innovative medicines, including Priority Review, Fast Track, and Breakthrough Therapy, the authors assert that "A better understanding of how precision medicines will be considered for such programs will be important for understanding which precision medicines are developed."

Stern, Alexander, and Chandra next consider the factors that will drive up prices for new precision medicines as opposed to conventional therapies: First, after the launch of a new product, competition in small markets from other new entrants will be limited, which means that there is less brand-to-brand competition early in a product's life cycle. Further, competition from a generic equivalent or follow-on biologic drug is delayed by statute.

Second, since precision medicines are more likely to be biologic drugs derived from living organisms (for example, isolated from tissues from humans, animals, or microorganisms), prices will reflect their more costly and technologically-intensive manufacturing, with limited relief in sight from "biosimilars," which are unlikely to be treated as direct substitutes by US physicians and pharmacists in the near future, as a result of current FDA and state-level policies.

Third, since biomarkers identify the subtype of patients for whom a treatment will be most effective, more efficient targeting enables manufacturers to charge higher prices to reflect higher effectiveness.

Fourth, if R&D costs are higher for precision medicines than for traditional therapies, then the medicines launched will be only those with potential prices high enough to justify those R&D expenses.

According to Stern, Alexander, and Chandra, since the promise of precision medicine relies on identifying patient or disease factors that predict the effectiveness of a given therapy, it is important to understand the incentives to develop biomarkers and diagnostic capabilities.

"One motivation," they explain, "is trial 'enrichment,' in which a patient characteristic such as a biomarker is used to define a study subpopulation so as to maximize the likelihood of finding a drug's effect." Another motivation stems from the ability to segment the patient

population and charge higher prices to patients who will benefit most from a precision medicine. A third reason, say the authors, is motivated by payers and capitated providers who have financial incentives not to overuse high-cost drugs. "These entities have potential to generate additional demand for biomarkers for high-cost drugs," they write.

In light of all these issues, what kind of access will patients have to the medical breakthroughs that precision medicine can make possible? After all, the inability of insurers and patients to pay for such drugs will reduce firms' incentives to develop them.

One proposed solution is the creation of new financial instruments that would function like mortgages to spread the costs of high-value, high-price treatments over time, thus decreasing the upfront financial burden for patients and payers alike. Others include publicly financed "high-risk pools" that may help cover high-cost therapies, policies that would help spread risk by decoupling insurance from specific companies by encouraging employers to purchase insurance on exchanges where multiple employers pool patients, and creating price competition to provide financial relief for both patients and payers.

"Clear characterization of the precision medicine development pipeline—including its sensitivity to economic incentives such as exclusivity periods, effective patent length, public funding, and the roles of early stage companies and more mature players—will allow policy makers to more accurately anticipate the likely profiles of medicines that will reach the market in years to come," the authors conclude. At the same time, "Reduction in both the cost and length of trials means that more drugs can clear the hurdle of commercial viability."

"My colleagues and I hope that this article will help to build further understanding of incentives to develop and use precision medicines," said Professor Stern. "This is a topic that resonates deeply at the

institutions where we work. For example the DF/BWCC has one of the most comprehensive precision medicine initiatives through the Profile project, a systematic way to match patients to precision trials through the Dana-Farber Cancer Institute's Match Miner, and it is developing novel clinical trial designs to support precision medicine.

"In addition, Harvard Business School is deeply committed to the Kraft Precision Medicine Accelerator, a partnership between HBS, The Robert and Myra Kraft Family Foundation, and the Broad Institute—all made possible by a $20 million endowment from the Kraft Foundation under the leadership of Robert Kraft (MBA 1965) and Jonathan Kraft (MBA 1990)."

More information: "How economics can shape precision medicines" *Science*, science.sciencemag.org/cgi/doi … 1126/science.aai8707

Provided by Harvard Business School