Patient Stake Principle: definition of a new ethical standard ensuring patient control and ownership over health data used for biomedical research and development and commercialisation

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Imagine that Henrietta Lacks (1) and her heirs would have received a cent for each HeLa cell used in biomedical research, development and commercialisation of results achieved through the cloning of her cells for innumerable tests in countless labs around the world. At the time, the early 50´s, society did not have an understanding of how important her cells and genetic information would become in only 30 years. We also did not have the tools to ensure a personal stake in real world outcomes without slowing down continued research. We now have both: The understanding of the importance of Real World Evidence (RWE) created by Real World Data (RWD) in biomedical Research and Development (R&D). And we have tools to trace and execute each patient's stake in commercialisation of products using RWE/RWD. The Patient Stake Principle (PSP) defines a new ethical standard to include fair and inheritable compensation for licensed RWE/RWD used in the commercialisation of medical products to the owner and creator of the data - the patient.

Randomized Clinical Trials complemented with Real World Data

Randomized controlled trials (RCTs), long regarded as the "gold standard" of evidence of safety and efficacy of a given drug or therapy, are increasingly coming under valid scrutiny. Their appearance at the top of "hierarchies" of evidence is inappropriate; and hierarchies, themselves, are illusory tools for assessing evidence. They should be replaced by a diversity of approaches that involve analyzing the totality of the evidence base (2). The perception that RCTs are needed before any conclusions on effectiveness of treatment can be proved is a common misunderstanding of the nature of medical evidence (3).

Healing occurs through a chain of connected steps bringing the body from disease back to the best possible state of health. Healing is a personal process requiring different lengths of time and a chain of events for each individual. Different chains of events work for different patients to help their body recover and maintain homeostasis back from disbalance caused by diseases. Patient health data is irreplaceable RWE of this process and the healing steps made on the pathway back from disease to health.

RWE encompasses all forms of clinical data collected on patients outside of the traditional RCT setting. Far from being the "poorer cousin" to RCTs, RWE may be particularly valuable for researching novel applications for existing approved medications, or for creating a foundation for research on products, such as medical cannabis, which do not naturally lend themselves to the traditional pharma research model.(4)

Real World Evidence evolution enables real world personalisation

The landscape and boundaries around what constitutes RWE are evolving. The creation of disease registries with the incorporation of wearable tech, biosensors, and other real time data collection methods are beginning to benefit from the inclusion of even newer technologies, such as Artificial Intelligence (AI) and Natural Language Processing (NLP), Optical Character Recognition (OCR), and predictive and active modelling.(4) From this, we can understand the "bigger picture" surrounding a condition, shaping clinical care and allowing for the trial of novel interventions at lower costs and in ways which approximate how medicines are actually used, as opposed to the heavily supervised and standardized use of experimental medicines that is typical of RCTs. Such data can be integrated with that collated from other sources, such as Electronic Health Records (EHR), PRO data, biological assays, or even genomics (5–9).

Preliminary RWE-based studies which combine RWD and analytical modules, including via Machine Learning algorithms, can help to identify those patient subgroups that have the worst outcomes, or are otherwise outliers in their disease burden. The specific study of real-world effectiveness in subgroups opens the possibility of research into effect modifiers (e.g., treatment by group interactions) and precision medicine (10). This in turn may improve our understanding of the variability in response, and address concentrations of unmet needs. Limitations of the non-randomised nature of treatment selection can be addressed by including comparison groups, or through the triangulation of multiple analytical approaches to improve confidence in inferred causal relationships.(4)

Another feature of RWE is its capability to reach beyond the “perfect” patients who typically inhabit RCTs; those who are stringently screened, recruited from within tight parameters, and almost always without comorbidities (11). RCTs are undertaken in tightly selected patient groups that are not usually representative of the average patient who often has multiple medical comorbidities and possibly takes other medicines. Exclusion of these individuals means that safety data derived from RCTs often lacks ecological validity because this data is considered to be low in relevance in normal medical settings where comorbidities and drug-drug interactions have been actively excluded from the study by design. Therefore, even when such trials are positive, they are only suggestive of effectiveness in wider patient groups. RCTs measure the efficacy of a treatment but this does not equal “effectiveness”. Efficacy is based on the change in clinical endpoints at defined time-points and these are pre-registered within the construct of a controlled clinical trial. Effectiveness assesses the utility of the medicine in the real world, and assesses changes in patient health outcomes that extend beyond predefined clinical scales or time points. Approaches such as effectiveness trials or clinical audits are often required to best estimate the real-world value of an intervention to individual patients.(4)

Real World Data reflecting treatment reality in Patient Reported Outcome

Patient Reported Outcome (PRO) is one of the most significant developments emerging from RWE. PROs have received immense investment from the US National Institutes of Health (NIH) and several new standards have been developed for this purpose. PROs are now required as elements of outcome measures for clinical trials funded by the NIH in the USA, which addresses a previously unmet need in the clinical research community (12). PROs put more emphasis on the patient’s quality of life. Furthermore, the EMA recently launched their Data Analysis and Real World Interrogation Network (DARWIN) (13) to deliver real world evidence on diseases, populations and the uses and performance of medicines, confirming the increasing understanding of the value of RWD.

Clearly, the RWE model is increasingly gaining traction within medical research. It draws upon and encourages widespread stakeholder engagement and is less subjected to the financial constraints and incentives which historically shape pharmaceutical research (4). These rapid developments in data resources and analytical techniques have been vital to assess and address the global COVID-19 crisis, and many guidelines are now beginning to include evidence from robust observational pharmacoepidemiological studies alongside RCTs (14).

Patient health data ownership and data flow transparency

The continued growth of big data markets that sell patient’s information on treatments and diagnoses to insurance and pharma industries with neither specific regulation nor patient consent is unacceptable. The European Public Service Union has called for an effective EU-wide regulation governing the sharing of data in the health sector which would complement the General Data Protection Regulation, which would also assist health workers in providing proper treatment without infringing on a patient’s health data rights. (15)

There is a dire need for major change in the drug industry to help with discovery, development and implementation of new drugs and therapies faster in order to defeat complex diseases such as cancer (16). Artificial Intelligence (AI) is increasingly being used to target drug discovery, but alone it’s not enough and requires RWD of patients to realize its full potential (17). Classic Drug discovery and research for such complex diseases moves at a slow pace and is plagued by inefficiencies. Advancements are being made through detailed understanding of disease pathophysiologies through academic and clinical research. For example, the genome projects (18), immunotherapy (19) and molecular circuits (20). However, data is difficult to collect, whether directly from patients, through academic and clinical research or from secondary data analysis (21).

As patients' clinical information is critical for pharmaceutical research, patient data is often sold for large amounts without benefiting the patient or research, or even respecting transparency of the data flow. Not only are patients not paid for their contribution to new therapies, but they often don’t even own their own data. They may have a right to access it at any time, but they often are not the only ones having this right. This creates an unfair structure, where the most vulnerable are exploited; with patients stripped of their vital information without any reward. To ensure a fair system, patients should be given control over their data and the option to decide where their data goes, who sees it and for what purpose. Patients should have peace of mind that their data is collected in a secure and transparent manner, and that it is not shared with anyone without their consent.(22)

Patient Stake Principle unlocking the value of Real World Data

The Patient-stake principle is based on the decoupling of science, health organizations and financing to enable the tracking and tracing of RWE/RWD, while at the same time compensating the patient for use of their data in drug research and development. Human suffering drives innovation through research and development as society seeks to alleviate those conditions which diminish the quality of life. All humans are entitled to access and control any information collected about their health according to the Convention on Human Rights and Biomedicine, chapter III, article 10 paragraph 2 (23). New technologies enable each and every individual to have control over their health data. Moreover they can financially benefit from the use of their data and any new therapies and drugs that evolve from that use. Moreover, the data can be passed to their heirs and thus benefit future generations.

Patients' healing experiences can help their relatives or other patients to find a fast and more efficient path of healing from the same conditions. The more that health data is shared on PSP platforms, the more passive income will be generated on a patient's account. Clients of PSP platforms will have full control over usage of their health data for different research projects. Moreover, the data will be provided in an anonymized form without disclosing the identity of the patient, unless the patient chooses otherwise for a specific project. All data commercialisation will be approved by the data owner and PSP compatible platforms will provide transparent parameters for use of the patient's anonymized data for each project. The PSP platform will calculate and secure any compensation that the users are entitled to by sharing their data. With PSP platforms, "sharing is caring" will become "sharing is caring and earning." In addition, sharing personal health data through a PSP platform will enable the patient to care about their own health with the assistance of an AI trained in biomedical research. The PSP platform will be able, with the patient's consent, to match the patients data with existing and planned projects and inform them about other treatments and therapies.

Patient Stake Principle benefits for society

Through the PSP ecosystem, patients will license their data to individual projects over secure encrypted channels and data warehouses compliant with the jurisdiction of its location. The data will only be used for the chosen project for which it is licensed. The PSP application will not own the patient's data, ever. Furthermore, the PSP ecosystem can help build an international community of patients, creating a more diverse data pool for researchers and removing barriers to international data sharing and information requests (including second opinions.)(22)

The PSP ecosystem will use AI-based target identification that will increase the likelihood of approval of treatment candidates by up to 4 times. As the pool of PSP data expands so will the likelihood of therapy candidate success which may be increased by more than double that. For oncology, where the likelihood of approval lies at around 5.1%, this increase in candidate approval could be groundbreaking. This means that potentially life-saving therapies could be researched and trialed with a much higher potential of success, saving huge amounts of time, resources and money. Not only is RWD vital to improving the predictive power of AI algorithms, but it can also significantly support organizations throughout the clinical development process. Furthermore, there are calls from patient organizations to include a "patient voice" in the clinical development and go-to-market processes. But too often, regulatory barriers and frictions between the pharmaceutical industry and patients make this difficult to bring to reality.(22)

The current model of healthcare spending, where the majority of revenue is accumulated by a few pharmaceutical companies that create more expensive therapies, which are to be paid for by the public, is unsustainable. PSP will generate much needed passive income for the increasing number of seniors in aging societies to supplement retirement pensions, which continue to shrink. Data on PSP platforms will be inheritable and ownership of valuable health data can benefit future generations, both financially and by having health data readily available. Patients contributing to medical R&D with their health data will receive better personal care, will improve treatment personalisation for their relatives and will significantly help to better individualize care for others suffering same or similar conditions. Healthcare and public health protection are, together with education and social care, the most important public services enabling a peaceful development of society. Revenues generated by the development of new care models utilizing health data of individuals should be shared with health data owners.

List of abbreviations:

AI - Artificial Intelligence
DARWIN - Data Analysis and Real World Interrogation Network
EHR - Electronic Health Record
EMA - European Medicine Agency
EU - European Union
NIH - National Institute of Health
NLP - Natural Language Processing
OCR - Optical Character Recognition
PRO - Patient Reported Outcome
PSP - Patient Stake Principle
RCT - Randomized Clinical Trial
R&D - Research and Development
RWD - Real World Data
RWE - Real World Evidence

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