Dynamic consent in the digital age of biology: online initiatives and regulatory considerations

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'Dynamic consent' is discussed in this second article of a two-part series examining projects that have developed the concept in order to manage the use of information and samples in the health context. The first article was published in the September 2013 issue of the *Journal of Primary Health Care*.[1]

Here, online initiatives by two private companies, 23andMe and PatientsLikeMe, that utilise a system of dynamic consent for the collection and use of a large volume of health and medical data, are discussed. Based on the overseas projects discussed in these two online initiatives and the projects discussed in the first article, a description of the essential characteristics for the new and evolving concept of dynamic consent will be offered. In addition, new possibilities as well as limitations will be noted. Of particular interest for the New Zealand context is the question of how dynamic consent will fit in with the local regulatory framework for informed consent. There is potential for dynamic consent to be adopted in New Zealand to build on key elements of informed consent and help foster respect for the rights and interests of patients and research participants.

Online initiatives utilising the dynamic consent approach

23andMe

23andMe is a web-based private company that sells direct-to-consumer DNA testing services online.[2] The company's research platform incorporates web-based recruitment, and involves collection of phenotype data and other personal information through web-based surveys, in order to perform genome-wide association studies (GWAS).[3] In March 2012, 23andMe reported having DNA data for approximately 200 000 customers (with nearly 90% having opted in to participate in research), and more than 90 million individual survey responses or 'phenotypic data points'.[4] An earlier announcement by 23andMe stated that from a total of about 100 000 customers, around 76% agreed to participate in research.[5] Fifty-nine percent of research participants provided responses to 23andMe's online questionnaires, with those taking surveys filling out at least 10 surveys on average.

23andMe's research is conducted through its research arm, 23andWe, as well as its recently launched 23andMe Research Portal. 23andWe is described as a customer-driven, web-based collaborative research study undertaken by 23andMe's internal investigators.[6–8] On the other hand, the 23andMe Research Portal is offered as a research platform to external investigators or third-party researchers who wish to access 23andMe's database of genotype information and other data. Individuals who wish to have their DNA genotyped pay a fee of US$99 and,

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The **ETHICS** column explores issues around practising ethically in primary health care and aims to encourage thoughtfulness about ethical dilemmas that we may face.

THIS ISSUE: This article is the second in a two-part series looking at international projects involved in the development of dynamic consent processes for accessing patient health information and samples.

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based on the genotyping carried out, they receive personalised reports relating to their health, ancestry and traits.[9] At the same time, they are asked to participate in genetic research that would involve completing online surveys relating to their health and lifestyle. Besides recruiting customers into research, the company has attracted eligible individuals to participate in research by waiving the fee that would normally be charged for personal genotyping services, in exchange for their participation in any of its four research initiatives. The research initiatives relate to Parkinson's disease, sarcoma, myeloproliferative neoplasms, and 'Roots into the Future', which is a research project aimed at recruiting 10 000 American adult participants of African descent for the investigation of the connection between DNA and disease.

Enrolment, participation and ongoing engagement in 23andMe's research take place in an interactive web-based environment and includes the following steps.[10,11,12] An individual who signs up to 23andMe via the web is sent a collection kit so that a sample can be provided. The individual needs to visit the company's website to set up or finalise a personal online account, and then register the unique barcode number of the collection kit. While logged in, the individual is presented with the company's Terms of Service (ToS) which set out the legal basis for the genotyping services offered that will involve the extraction and processing of DNA, the uploading of a digital version of the individual's genetic information on 23andMe's website, as well as the creation and sharing of content on the company's website. After the ToS has been accepted, the online system asks the individual to consent to 23andMe's research activities. Besides that, the system offers an option for biobanking the sample supplied by the customer or research participant. (The terms 'customer' and 'research participant' are used very specifically here to indicate the differing circumstances and nature of relationship between the individual and the company where, as part of a contractual transaction, the individual has paid a fee in return for genotyping through the company's Personal Genome Service®, or where the individual has responded to any online invitation by the company to participate in research.)

During the time that the sample is analysed by 23andMe, the individual is presented with invitations to participate in research surveys. When the personal genetic data (comprising both raw genotypes and customised reports) are available, the individual is notified by email to log on to the service website; as well, additional invitations are extended to the individual to participate in further surveys. After this point, the individual continues to receive new genetic reports and new surveys. The continuous two-way interaction between the individual and company is maintained online with the individual choosing whether to further participate, and if so, what other surveys to complete. This kind of interactive consenting process has been observed as having:

> the obvious benefit that it reduces the bureaucratic burden of re-contact and re-consent while at the same time, enabling the participants to exercise their autonomy by giving informed consent for new research.[13]

The ability to withdraw from 23andMe's research can be exercised at any time, whenever the individual chooses to do so.[6] Withdrawal from research does not affect the individual's access to genetic information or ongoing use of services provided by the company, which continues to generate and make available new reports about latest discoveries.

An important point must be noted. 23andMe states that even if individuals do not give consent for their information to be used in research relating to 23andWe or the 23andMe Research Portal, their 'genetic and/or self-reported information', which may include identifiable information, may still be used by the company for 'R&D' purposes.[14] R&D is defined by 23andMe as 'research and development activities performed by 23andMe on user data'.[14] 23andMe states that such activities 'may include, among other things, improving [23andMe's] services and/or offering new products or services to [customers or participants]; performing quality control activities; conducting data analysis that may lead to and/or include commercialisation with a third party'.[14] The breadth of such R&D activities should be carefully noted by potential customers or research participants.

PatientsLikeMe

PatientsLikeMe (PLM) is a health data-sharing platform that incorporates social networking functions. PLM enables an online peer support community of patients to connect and share information about their medical conditions, health status and general wellbeing.[15] PLM has been described as 'extend[ing] the functionality of traditional qualitative online patient communities to encompass quantitative patient-reported data'.[16] Using crowdsourcing methods since it was launched in March 2006,[17] PLM has been developing its repository of health information that, to date, includes over 177 000 individuals and more than 1000 conditions.[18] With the large database of information, PLM has developed a pioneering model of conducting online health research.[15] PLM is not, strictly speaking, a research biobank and does not have responsibilities nor provide facilities for storing samples. However, where individuals have test results from having their DNA analysed, they can opt to have their genetic information uploaded, entered into their online profile and made 'findable' by others who share the same genetic characteristics.[19]

The individuals who sign up as members of PLM's online community usually have chronic, life-changing diseases. They find others like them, matched on demographic and clinical characteristics, and share information about their diagnoses. Members provide self-reported data on treatments, symptoms and health outcomes. PLM enables them to enter their data for retrieval by others, track their own health condition and interact with other members, whether one-on-one through private messages, or as a group in an online forum, regardless of location or time of day. Members can gain information from the aggregated data reports of others with a view to improve their own outcomes.[16] While similar sites offer patients the online ability to communicate and support each other, PLM is unique in the way it prompts members to enter data and employs a range of web-enabled tools to display that data, to provide actionable information.[20] PLM states that it aims to improve quality of life by facilitating information sharing and helping patients answer the question: 'Given my status, what is the best outcome I can hope to achieve, and how do I get there?'[16]

Significantly, PLM is a key international social-networking site, with a real-time research platform. PLM and its collaborators conduct their own non-traditional research by collecting and analysing data on the site. PLM has its own research and development team that conducts studies that may be pursued in partnership with clinical, academic, industry or commercial researchers.[21] Furthermore, members can research their own medical questions and they are given options to share structured, detailed and longitudinal medical information with one another, and to discuss that information online.[22] They can input a range of data, such as their condition, treatment history, side effects, hospitalisations, symptoms, disease-specific functional scores, weight, mood and quality of life on an ongoing basis. In effect, longitudinal patient-maintained records of health data can be constructed online. With PLM's software, the data can be reported back as individual-level graphical health profiles, and aggregated into reports to help patients gain insight and identify patterns.

Of primary interest here is the way in which individuals participate and choose to supply their information to PLM. Participation in PLM's community involves information sharing and interactive communication that can be regarded as taking place in a dynamic manner. The health history profiles of individuals are shared within the site with other members, and data are also automatically aggregated from all members in the community, to create summaries of treatments and symptoms.[22] PLM's search and browsing tools help individual members to locate others with shared medical experiences and in similar circumstances. Members have the ability to track the use of their data. In addition, because PLM incorporates real-time listings directly from ClinicalTrials.gov, members can learn about research findings that are being publicised, as well as search for trials for which they may be eligible to participate based on their age, sex, condition and location.[23] (ClinicalTrials.gov is open access and free of charge. It is the largest database in the world for publicly and privately supported clinical trials, with current registrations from more than 139 000 studies in 182 countries). At any time, members can cancel or permanently deactivate their account.[24,25]

Dynamic consent: general discussion

The meaning of dynamic consent has evolved in step with changing technological developments over the past decade. It can be described as encompassing a range of characteristics that enable interactive ways for individuals to express and change their consent virtually immediately, at any time, and on a continuous or ongoing basis. In other words, individuals are not restricted to static, one-off, unchanging or time-consuming ways that permit only single or very limited abilities to indicate or modify their preferences. With dynamic consent, individuals can exercise greater control over their information or samples in real time. They can make choices that can be modified at another time. They are able to specify their privacy preferences, for example, by indicating that they agree for their information or samples to be used, transferred to third parties, or that they wish to receive notifications in relation to any uses or disclosures of their information or samples. They may change their initial settings, as well as continue to express or change their choices over time, or even revoke their consent or previously expressed preferences. They can also track and audit any changes made, and indicate when and how they are to be contacted.[26,27]

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Health care professionals need to foster a relationship of confidence, trust and understanding so that there is real insight into whether or not the patient or participant fully grasps what is at stake.[28] At the heart of dynamic consent are mechanisms that enable communication to and from patients or participants over time, hence offering them the opportunity to remain informed and in control of their information or samples on a continuous basis. They can protect and manage their privacy through the dynamic consent interface, by using online tools that allow them to choose privacy settings in line with their privacy preferences. The ability to have the technological means to maintain ongoing engagement with patients or participants provides a significant advantage where it is necessary or desirable to re-contact them; for example, to obtain new consent, collect additional information, communicate research results or disclose incidental findings. Thus, there is considerable potential for dynamic consent mechanisms to strengthen long-term therapeutic relationships with patients, as well as to develop ongoing research partnerships with participants.

Dynamic consent exercised through the electronic or online system marks a paradigmatic change from the paper-based system of obtaining consent. Paper-based consent has been predominantly focused on the one-off, unidirectional format of communicating and providing information, and is static in the sense that the interaction is confined to a defined single study or situation.[29] Additionally, it has been said that traditional paper-based consent:

> is given and is only revoked by determined individuals who are able to make their way through the (rarely used) mechanisms for withdrawal.[30]

However, while technological developments and innovations create new ways to do things differently, there are implications and limitations that should be identified or recognised. Disparities in accessing information and communication technologies exist among different demographic, socioeconomic and geographic groups, such as

the elderly, people with disabilities, low-income families, and isolated or rural communities. The practical implementation of dynamic consent mechanisms, being dependent on both computers and the internet, introduces issues that are not just technical or technological but raises concerns that are essentially ethical in nature, relating to the 'digital divide'.

Regulatory considerations in New Zealand

How do the various models of dynamic consent described in this article fit in with the regulatory framework for informed consent in New Zealand? This is a question relevant to those in New Zealand who are considering designing or trialling dynamic consent. This may include, for instance, those looking to support the development of personalised medicine, or to strengthen engagement with participants in human tissue research, as well as those considering innovative initiatives in primary health care. The feasibility of a dynamic consent model for long-term, ongoing, multiple uses of human tissue, for different types of genomics research, is currently being explored by the principal author with collaborators associated with the international and multidisciplinary University of Otago's Centre for Society, Governance & Science (SoGoS) that is led by the Faculty of Law, University of Otago.

A brief, general overview of the health regulatory framework for informed consent to be obtained from individuals in New Zealand can be stated as follows. The New Zealand Bill of Rights 1990 upholds the right to refuse to undergo any medical treatment and the right not to be subjected to medical or scientific experimentation without the person's consent.[31] The law in New Zealand enshrines the principle that informed consent is required prior to any 'health care procedure' being performed on an individual.[32,33] Informed consent is required, except where any enactment or any provision of the Code of Health and Disability Services Consumers' Rights[33] provides otherwise. The definition of 'health care procedure' is wide and encompasses health treatment, examination, teaching or research, and extends to any provision of health services.[32] For the collection, storage, use and disclosure of health information, appropriate authorisation needs to be obtained in accordance with the rules of the Health Information Privacy Code 1994.[34] For human samples removed or obtained in the course of a health care procedure, the general rule (subject to exceptions) is that they must be stored, preserved or used with the consent of that individual, or a person entitled to consent on behalf of that individual.[33] In the context of health research, an exception is provided for the samples to be used without consent, if the proposed research has been approved by an ethics committee or, in other words, if the committee grants a waiver to the researcher from the requirement to seek informed consent.[33] Approval needs to be given by an appropriately constituted ethics committee that, in the main, has been accredited or approved by the Health Research Council Ethics Committee.

However, even though ethics committees have been vested with power to grant such a waiver, the law is silent on the circumstances as to when ethics committees may exercise the discretion to do so, or as to the conditions, criteria or factors that have to be taken into account. The Health Research Council's *Guidelines on Ethics in Health Research* indicate that requests for waivers can be sought from ethics committees if researchers consider it is:

> impossible, impractical or excessively costly to obtain consent, or that doing so would adversely affect the outcome of the [proposed] research.[35]

While those four grounds may seem clear enough, it will be a matter for ethics committees to determine, depending on the factual circumstances and details of the specific research proposal, whether any of those grounds have been met, as well as what additional safeguards should be in place. Documented instances of waivers being granted are rare, but not unknown.[36] In addition, the use of human tissue for future unspecified research purposes in New Zealand is regulated by Ministry of Health guidelines that specify the circumstances and conditions under which researchers have to obtain consent from individuals for such research to be undertaken.[37]

The dynamic consent system can be viewed as introducing significantly new and different

technology-enabled mechanisms that have the ability to improve the informed consent process. The key elements of informed consent comprise:

1. communication between the health professional or researcher and the individual;
2. provision of adequate information to the individual; and
3. meaningful opportunity for the individual to exercise informed choice and consent.

These three elements are encapsulated in rights 5, 6 and 7 of the Code of Health and Disability Services Consumers' Rights, respectively.[33] Dynamic consent builds on each of these elements and, in its entirety, may have the potential to transcend the conventional bounds of the process of obtaining informed consent and may help foster deep respect for the rights and interests of patients and participants.

As discussed, the dynamic consent approach is specifically characterised by continuity and high interactivity, thus marking a significant change from the one-off, unidirectional format of communicating and providing information. With dynamic consent, individuals can have a greater degree of control over the uses of their information or samples. The dynamic consent system makes it possible, practical and affordable to re-contact individuals. Interestingly, adoption of the dynamic consent approach might mean that it would be less relevant or necessary to seek waiver of consent in many instances. Additionally, it may well be less essential to seek consent for future unspecified research because contact can be made with individuals to convey information to them as, and when, details of any research become known, and they can then exercise their informed choice and decision whether to be involved.

Conclusion

The internet is inherently interactive, and it is from such an environment that dynamic consent initiatives have emerged. Dynamic consent mechanisms give individuals the ability to consent and exercise greater control over their information or sample, as well as the choice to indicate or modify their future preferences with regards to consent. The use of such mechanisms can contribute to robust, transparent and effective processes, crucial for building the confidence and trust of patients or research participants. In the past decade, projects involving individuals from academia and private companies overseas, particularly in the US and the UK, have been initiated, and a diverse range of dynamic consent approaches and models have been adopted.

Looking ahead, there is considerable potential for dynamic consent systems to advance further and to be used more widely for online health services and research. While the current legal framework allows and does not hinder the continuing development of dynamic consent, underlying challenges surrounding the digital divide and accessibility to information and communication technologies remain. These issues are not just technical or technological but raise concerns that, ultimately, are ethical in nature and need to be addressed.

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COMPETING INTERESTS
None declared.