

ORIGINAL ARTICLE

Imaginaries of the data-driven hospital in a time of crisis

John Gardner 

School of Social Sciences, Monash University, Melbourne, Victoria, Australia

Correspondence

John Gardner, School of Social Sciences, Monash University, Clayton Campus, 20 Chancellors Walk, Melbourne, VIC 3800, Australia.

Email: John.gardner@monash.edu

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Abstract

This article uses the concept of sociotechnical imaginaries to explore how public hospitals are being reimaged and reconfigured by promissory digital health. Drawing on interviews with 42 senior leaders and staff from a large NHS hospital organisation, the article describes the imaginary of a data-driven hospital and the tensions of its operationalisation. These relate to data quality, data curation and data access, and reflect a discord between the organisation's commitment to immediate patient care and its research aspirations. These tensions, however, serve to invigorate, rather than undermine, the sociotechnical imaginary of a data-driven hospital, as they prompt the translation of a general data-driven imaginary into specific sociotechnical arrangements. The article argues that the potency of the data-driven hospital imaginary must be understood in terms of its enchanting qualities: it has the capacity to excite hospital staff and to align distinct and potentially diverging hopes and expectations regarding the societal role of public hospitals. The article concludes by suggesting that the entrenchment of the data-driven imaginary can be partly explained by its strategic utility for severely resource-constrained healthcare organisations: it provides a means for organisations to position

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themselves towards a viable future in an otherwise dire health-care context.

KEYWORDS

big data, computational medicine, eHealth, electronic health records, organisations, science and technology studies

INTRODUCTION

Public healthcare systems, we are told, have been on the brink of a crisis since well before the COVID-19 pandemic. Commentators in the UK, Australia, New Zealand and elsewhere have cited huge budget deficits, long wait times for elective surgeries, GP consults and emergency care, outdated facilities and equipment, and poor coordination between hospitals and community care as evidence of strained systems structurally ill-suited to meeting contemporary health-care needs (Anandaciva, 2019; Daalder, 2022; The Kings Fund, 2021; Visontay, 2022). The crisis has been attributed to an interplay of funding, workforce and demographic challenges. In England, for example, commentators state that fiscal conservatism means that health funding has consistently fallen well short of rising costs, resulting in huge successive deficits for National Health Service (NHS) providers and chronic underinvestment in infrastructure (Health Foundation 2016; Street, 2016). At the same time, the health-care workforce is severely understaffed: recent media coverage proclaims that the NHS England is short of 110,000 staff, with one in 10 nursing positions currently unoccupied (Campbell, 2022). Future projections are also dire. Ageing populations and rising levels of chronic illness, we are told, will place a crippling burden on healthcare systems in many countries (Goryakin et al., 2020; Wu et al., 2019).

Commentators are arguing that the scale and scope of the healthcare crisis necessitate a digital transformation (Topol, 2019). According to such arguments, telehealth, mobile technologies and smart devices will enable more healthcare to be delivered remotely; electronic health records (EHRs) will bring about greater integration between GPs, specialists and hospitals, pharmacists and other health-care professionals; EHRs and supporting digital data infrastructures will permit ongoing evaluation and optimisation of health services as well as the production of 'big data'; and big data, in combination with new computational approaches (particularly those that employ artificial intelligence (A.I.)), will facilitate the development of new, revolutionary diagnostic tools and precision medicine (Academy of Medical Sciences, 2018; Honeyman et al., 2016). Collectively, within such promissory discourse, digital tools and approaches are championed as the means for bringing about more efficient, integrated, accessible and patient-centred health-care systems. Policy makers in a number of countries are, therefore, proclaiming 'the future of health-care is digital' (ADHA, 2021).

In response, present-day public hospitals in the UK, Australia and elsewhere have committed to building their digital and computational capabilities. Many hospitals have implemented integrated EHR systems such as Epic, Praxis or Cerner. Hospital organisations are investing in data standardisation (particularly the adoption of SNOMED CT) to facilitate integration, and some larger research hospitals are working with academic and industry partners to create data research platforms intended to facilitate the curation and sharing of various forms of data (e.g. digital imaging). New specialist hospital roles that bring together clinical and informatics expertise, such as Clinical Research Informatics Officers (CRIO), are becoming more common

(Sanchez-Pinto et al., 2017). Hospitals are also seeking to build upon pandemic-necessitated advancements in eHealth, such as the use of telehealth (Dorn, 2021).

Public hospitals, however, are organisationally complex. Large metropolitan hospitals encompass multiple specialities with distinct infrastructures, workflows and expertise (Glouberman & Mintzberg, 2001). Infrastructures are often outdated and reflect a legacy of piecemeal improvements. Authority structures are generally divided between managerial and clinical expertise (Pinheiro et al., 2016). Collectively, such factors have been identified as impediments to the intra-organisational collaboration needed for major health service innovation, including the uptake of digital technologies (May, 2015; May & Finch, 2009). Many hospital organisations are also managing ongoing deficits while focussing available resources on meeting key performance indicators relating to, for example, waiting times for elective surgeries and emergency consults (The Kings Fund, 2021). Public hospitals are often, in other words, struggling to maintain 'business-as-usual-operations' and have limited resources and managerial attention for undertaking significant structural changes.

Public hospitals are thus points at which the promissory visions of digital health care meet the day-to-day realities of providing care in a challenging economic and societal context. This article explores this intersection between the aspirations surrounding digital health and the realities of functioning as a large public hospital within a health-care system in a state of 'near-crisis'. The case study site is an NHS Hospital organisation and its affiliated Biomedical Research Centre (BRC) in the UK. The organisation has made a commitment to becoming a data-driven hospital, and it is currently undertaking a number of initiatives to build its digital and computational capabilities. Using the concept of *sociotechnical imaginaries* as an analytical frame, this article explores the imaginary that underpins its commitment and some of the ways this imaginary is being translated into specific sociotechnical forms. In doing this, I illustrate that the building of digital and computational capabilities within the hospital organisation brings to the fore a discord between its commitment to patient care and its aspirations to facilitate research. This manifests as tensions relating to data quality, data organisation and data access. I illustrate, however, that such tensions can enhance the potency of the aspirational vision for data-driven health care. This, I argue, reflects what can be described as the *enchanted qualities* of digital tools and approaches.

By adopting this case study approach, the article illustrates some of the specific ways in which busy, resource-constrained healthcare organisations are being reimaged and reconfigured by promissory digital health. The article argues that that the entrenchment of the aspiration for data-driven health care can be partly explained by its strategic utility for severely resource-constrained healthcare organisations: visions of data-driven health-care have the capacity to energise hospital leaders and staff and to align what are otherwise distinct and potentially conflicting hopes and expectations regarding the societal role of public hospitals. This enables public hospitals to strategically present and orient themselves towards the realisation of what is perceived to be a viable future in an extremely challenging healthcare context. This, the article concludes, has implications for configurations of 'patienthood' as well as having significant political-economic implications.

Enchanting sociotechnical imaginaries of data-driven health care

The promissory dimensions of digital health tools and approaches have been the focus of critical attention in sociology (e.g. Petersen, 2018, Lupton, 2017, Henwood & Marent, 2019 (Special Issue)).

In general terms, as Petersen notes, the prevalent aspirations for a digital-enabled health care that is more 'predictive, personalised, timely, efficient and effective' have had a performative function in many countries (2018, pp. 1–2): governments, industry and professional bodies have committed to advancing digital technologies in health care, resulting in new 'innovation-facilitating' digital health policies and agencies, academic-industry networks and specialised areas of research. The present-day impact of these developments within health care and biomedical contexts, such as the impact on biomedical knowledge production, patient-practitioner interactions, patients' sense of self and professional roles, has been examined by sociological and similar scholarship (see Henwood & Marent, 2019 special issue). This article contributes to this area of scholarship by exploring how hospitals—key institutions within contemporary healthcare systems—are being reimagined and reconfigured by the expectations surrounding digital health tools and approaches.

Jasanoff and Kim's (2009) concept of sociotechnical imaginaries provides a useful analytical frame for exploring the intersection of promissory digital health and hospital organisations. The concept has its heritage in scholarship in the sociology of expectations, which has foregrounded the generative dimension of expectations and aspirations within technological innovation (e.g. Borup et al., 2006; Brown & Michael, 2003; Brown et al., 2000; Kitzinger & Williams, 2005). In general terms, scholars have noted that while expectations and aspirations are the products of innovation practices, they also function to drive the formation of the networks that constitute those innovation practices (Vezyridis & Timmons, 2021). Innovation, in other words, entails the alignment of diverse actors (both human and non-human) and their interests with a common optimistic vision of the future. Responsibilities and incentives are negotiated; investments and resources are deployed; hence, expectations have structuring effects in the present day and consequently on the future that unfolds (Brown & Michael, 2003). The notion of sociotechnical imaginaries foregrounds this interplay between aspirational visions of the future and the sociotechnical arrangements through which those visions are enacted. As Jasanoff and Kim describe them, sociotechnical imaginaries are:

...collectively imagined forms of social life and social order reflected in the design and fulfilment of... specific scientific and/or technological projects.

(Jasanoff & Kim, 2009, p. 120)

Imaginations refers to visions of a desired social order, and *sociotechnical* refers to the fact that such desires both prescribe particular arrangements of technological and social life, and are (therefore) operationalised through projects that reconfigure social and technological elements.

Jasanoff and Kim (2009) originally developed the concept to illustrate how national aspirations and associated visions of 'the good society' have informed and been enacted through the nuclear power infrastructures and policies of particular nation states. The concept has also been used, however, to explore the materialisation of imaginaries within specific biomedical organisations. Stephens et al. (2013), for example, illustrate how the institutional and governance arrangements of the United Kingdom's Stem Cell Bank reflect the widely shared aspirations for an ethical stem cell/tissue economy that is directed towards the public good. And similarly, Gardner and Webster (2017) have explored the ways in which national aspirations for 'health and wealth' have informed the development of biomedical innovation accelerator agencies, specifically the Cell and Gene Therapy Catapult. Collectively, such work illustrates how particular future-oriented visions become an enduring set of relations via their materialisation in the particular sociotechnical arrangements of organisations (see also edited volume Jasanoff & Kim, 2015). In a similar

vein, this article examines the interplay between the aspirations surrounding digital health and the organisational arrangements within a case study hospital organisation. It will describe the imaginary that underpins the organisation's strategic commitment to digital health and explore the sociotechnical configurations within the organisation through which the imaginary is being operationalised. As I illustrate, the drive for data-driven health care is widely supported and advocated among staff (particularly senior leadership) as a means for enabling the organisation to meet multiple priorities.

In the process of exploring this sociotechnical imaginary for a data-driven hospital, the article will foreground tensions relating to data quality, data curation and data access. Hospital organisations can be understood as comprising multiple sociotechnical arrangements (e.g. technological infrastructures and associated standards, workflows and professional roles) oriented towards a variety of clinical, administrative and research priorities (Glouberman & Mintzberg, 2001). As this article will illustrate in relation to data quality, data curation and data access, the attempted embedding of a digital health imaginary within the case study hospital exposes the frictions between organisational priorities and their associated sociotechnical arrangements, particularly in regard to the provision of immediate patient care and its research aspirations.

The article will argue, however, that such tensions can function to invigorate, rather than undermine, sociotechnical imaginaries: tensions evoke calculative and affective responses among organisational stakeholders, and this can result in the refinement of a relatively general organisational aspiration into more specific sociotechnical arrangements. I will suggest that this in part reflects what Harvey and Knox (2012) have referred to as the *enchanted qualities* of technological and infrastructural projects, and also the agential materiality of technologies themselves. As Harvey and Knox (2012) illustrate with their example of a large-scale roading project in Peru, the materiality of technological-infrastructural projects inevitably presents unanticipated (as well as anticipated) disruptions in local settings. These can manifest as constraints and affordances for human action, they prompt calculative responses, and as Harvey and Knox emphasise, they can also expose and stoke the affective appeal of new technologies and infrastructures. Enchantment refers to this disruptive quality and its affective allure: the sense of wonder, excitement and passion, for example, that infuse the more reasoned and calculative 'official' motivations for infrastructural projects. Referring to Bennett's work (2001) on the enchantment of modern life, Harvey and Knox describe enchantment as being 'more a mood' than 'a form of knowledge and belief', that may be evoked in 'a surprising encounter, a meeting that you did not expect and are not fully prepared to engage' (Bennett, cited Harvey & Knox, 2012, p. 522). The notion of enchantment, therefore, helps to shed light on the dynamic interplay between the material disruptions presented by digital technologies as they are implemented in specific settings, aspirational visions of digital health and the organisational responses that result in the institutionalisation of sociotechnical imaginaries.

In this article, I illustrate that the hospital organisation's aspiration for a data-driven health care is similarly invigorated as staff respond to the disruptions and tensions that characterise their attempts to build organisational digital and computational capabilities. I argue that as staff and senior leaders become aware of and attempt to manage emerging tensions relating to data quality, data curation and data access, the vision of health care that is predictive, personalised and efficient becomes more potent. This is reflected in organisational responses within which the general aspiration for data-driven health care is reenvisioned as specific idealised sociotechnical arrangements relating to research and patient care, the hospital clinician, and participatory governance. Consequently, we see how hospitals are actually being reimagined and reconfigured by promissory digital health discourse, and more specifically, by aspirations for data-driven health care.

METHODS

The argument presented here derives from a study of an NHS hospital organisation and its affiliated Biomedical Research Centre (BRC) within the UK. The hospital organisation employs approximately 5000 health-care professionals and encompasses a large general hospital and several specialist hospitals, all located in a large metropolitan centre. It presents itself as research-intensive with a history of pioneering new medical interventions, and via the BRC, it is closely affiliated with a nearby university. The organisation has implemented an integrated EHR system, it has a strategic vision to become a data-driven research hospital, and it has undertaken initiatives to improve its capacity to collect, manage, curate and analyse various forms of health data. This strategic vision and the accompanying initiatives are the focus of this study.

Interviews were undertaken with 42 participants from the organisation and affiliated BRC between July 2021 and February 2022. With the guidance of two site contacts, a purposive sampling approach was used to identify suitable participants (Creswell & Clark, 2011), such as participants involved in the formulation and implementation of organisational strategy, participants familiar with the challenges of running a large public hospital and participants with an awareness of the difficulty of generating, curating and accessing digital data for operational enhancement and research. Participants (see Table 1) thus included members of the board of directors, including the CEO and medical directors with oversight of research and digital health care, workforce and nursing; senior managers with oversight of relevant directorates and administrative units, including digital health care and operational performance; staff involved in research support and governance; clinical staff in 'digital-health enabling' roles; and clinical and affiliated academic staff undertaking research in health informatics, computational medicine, digital imaging and A.I.

During interviews, participants were encouraged to express their aspirations and concerns for data-driven health care, and their hopes and concerns regarding their organisation and public hospitals more generally, to describe and reflect upon their experiences of undertaking initiatives to build the organisation's digital capabilities and their experiences of undertaking (or attempting to undertake) digital health-related research. Interviews were undertaken via video conferencing software and were between 30 and 62 min in length.

Interview recordings were transcribed by a transcription service and subject to NVivo software assisted thematic analysis by the author following the general method recommended by Braun and Clarke (2014). A close reading of all transcripts was undertaken while also listening

TABLE 1 General role and number of participants

General role	N (42)	Anonymised description
CEO & Medical Directors	9	Director 1-9
Senior managers	4	Senior managers 1-4
Governance & Research Support	4	Governance & research support specialist 1-4
Performance analytics specialist	1	Analytics specialist
EHR oversight	1	EHR expert
Clinical staff with roles in health informatics	8	Clinician I.T specialist 1-8
Clinician Researchers	9	Clinician Researcher 1-9
Researchers (non-clinician)	4	Academic researcher 1-4
Academic leadership & advocacy	2	Academic leader 1-2

to recordings. Coding was undertaken during the second and subsequent readings. Preliminary topic codes were devised to capture main areas of discussion, particularly regarding the strategic priorities of the organisation and organisational initiatives to facilitate data-driven health care. Analytical codes were then devised to capture participants' aspirations, expectations and concerns, and as a result, the underlying imaginary surrounding the data-driven hospital and the tensions associated with characterising its translation into specific sociotechnical forms. Participant's emotion-laden utterances were also noted.

Ethics approval was obtained for the UK's Health Research Authority and from Monash University Research Ethics Committee. All data have been anonymised.

RESULTS

Participants' aspirations, expectations and concerns focussed on four general areas: the strategic vision of their organisation, and tensions relating to data quality, data curation and data access. Following the sociotechnical imaginary informed analytical approach, this section will begin by exploring the general aspirations and expectations underpinning the organisation's strategic vision, and in doing so, describe the underlying 'enchanted' imaginary that is animating its engagement with digital health. The section will then explore the associated tensions, describing how each have invigorated the imaginary and prompted its articulation as specific sociotechnical arrangements.

The strategic vision: The data-driven hospital sociotechnical imaginary

The organisation has formulated a strategic vision to become a data-driven research hospital. It has therefore aligned its long-term purpose with what can be described as a *sociotechnical imaginary* that embraces promissory digital health discourse.

Senior leaders' descriptions of the strategic vision illustrate general details of this data-driven hospital imaginary. In its simplest sense, the vision is to become a hospital 'that uses data to inform how the hospital runs' (Senior manager 1). In more specific terms, it was articulated as a hospital in which the integration of digital tools and approaches means that: 'every opportunity and every interaction with the patient [is] an opportunity for innovation and transformation' (Director 3). One senior leader described this as a hospital oriented around 'real-world embedded research', where research encompasses both 'research with a small "r" as well as the capital "R" research', the former being service evaluation and optimisation ('how a particular pathway is working, how the clinic is working') and the latter being hypothesis-driven research such as that enabled by big data (Senior manager 1). One senior leader articulated the vision as embedding 'a culture of evaluation and reflection' in which hospital staff:

...are continually reflecting and appraising what [they] do and considering effectively running experiments every time [they] innovate... you collect data and use it as a means of evaluation and improvement.

(Director 1)

We see here from these descriptions that the strategic vision is underpinned by an aspirational imaginary of a general sociotechnical system characterised by a highly calculative form

of decision-making. Within this imagined system, sociotechnical systems will mean that the data generated by numerous patient interactions will provide a real-time objective and transparent picture of clinical services, and are thus rendered amenable to rational adjustment and control. This imagined sociotechnical system is, no doubt, appealing to senior leaders overseeing what are diverse and complex and, to some extent, operationally opaque clinical workflows and processes, particularly in a context where hospitals are under pressure to find cost efficiencies.

Indeed, participants' accounts link this imaginary to the unsustainable state of existing health-care systems. The necessity for a transformational change towards greater rationalisation and control was presented as a motivation for the formulation of the vision and its embrace by the board of directors. As one senior leader put it '[we] have a hospital board that recognises that innovation and transformation is essential' (Director 1). Another participant described the rationale for the strategic vision in more explicit terms:

Health systems are falling over and we can't deliver better care at lower price unless we radically change the way we do things... we've got more and more older people with more and more co-morbidities... that's not sustainable in any healthcare system, so things have to change.

(Clinician researcher 1).

Part of the appeal of the data-driven hospital imaginary for participants, then, is that it provides the organisation with a means of orientating itself towards what is perceived to be a more viable future of healthcare provision. It has, as I will argue further on, strategic utility for the organisation.

Participants' articulation of the imaginary of a data-driven hospital also delineates multiple benefits and beneficiaries. Hospitals and the wider health-care system will benefit from 'a more efficient, financially sustainable' (Director 4) means of providing care; patients will benefit from 'taking information back to directly improve care' (Clinician researcher 1) and from 'utilising data... from many different sources, whether its genomic data... [and] developing interventions' (Clinician researcher 1). Academics and universities will also benefit, as the:

opportunities that you can see at as a [university] researcher will be tremendous just due to the richness of the dataset.

[Clinician I.T. specialist 1].

Participants thus envisage a future hospital that can meet multiple priorities relating to care, cost control and research. The data-driven hospital imaginary, in other words, is characterised by an alignment of the interests of multiple stakeholders: clinicians and hospital managers, patients and researchers.

The affective dimensions of this imaginary of a data-driven hospital are apparent in senior leaders' accounts. The word 'amazing' was often used to describe what could be done: 'we would do amazing things' (Senior manager 1), and 'amazing for us to empower everybody' (Director 5). One senior leader remarked 'I think it's a beautiful vision' (Director 4). I suggest that such comments and the passionate tone in which they were uttered are evidence of *enchanted qualities* of a data-driven hospital imaginary. They reflect, in other words, its affective allure: the general mood of aspiration and excitement that animates the organisation's formulation and pursuit of its strategic vision for data-driven health care.

Data quality

The embrace of the data-driven hospital imaginary within the organisation's strategic vision coincided with the implementation of an integrated Electronic Health Records (EHRs) system. The EHR system can be seen as a particular sociotechnical manifestation of this imaginary: it is sociotechnical infrastructure of hardware, software and human actors aimed at creating, storing and circulating clinical and operational data (Cresswell, Worth, and Sheikh, 2010). The introduction of this sociotechnical infrastructure within the organisation has, however, brought to the fore tensions relating to the organisation's multiple priorities. These include tensions relating to data quality.

Specifically, the nature of the data collected by the EHR system meant that it could not be easily used for research purposes. EHR data, as participants stated, was generated in clinical settings where the immediate priority of staff was providing care and doing so promptly given that clinical services were stretched. This meant staff had little time to enter data in the EHR system in a manner that was not of direct use to them. Many clinicians, for example, would input clinical notes including diagnoses within a 'free text' box, rather than making use of 'drop down' and other EHR functions that create structured data. The former input mode was perceived by clinicians to be quicker and approximated their previous practices of record keeping. One participant stated: 'No clinician is ever going to enter a bit of data because it helps the research engine. They're only going to enter it if it's useful to them' (Clinician I.T. specialist 2). The consequence of this is that the data is not readily useable for research purposes: 'the data that's generated isn't generated for research. It's an artefact of delivering care' (Clinician I.T. specialist 2).

The introduction of the EHR system has, therefore, foregrounded a tension between the priorities of frontline staff and patients, and the organisation's aspirations to embed a data-driven approach. Current sociotechnical arrangements directed towards immediate patient care (e.g. the technologies and workflows of wards and clinics) do not generate data that can serve research purposes, despite the introduction of the EHR system. As a participant put it:

Anything that involves more data entry, or more time spent in front of a computer doing something with data, [clinicians] feel that that's not a good use of their time because it's taking them away from patients.

(Clinical researcher 1)

This tension is recognised among senior leaders and staff, and consequently several organisational responses are being undertaken. These can be seen as attempts to reconfigure existing sociotechnical arrangements—or more specifically, EHR-clinician interactions—in accordance with the data-driven hospital imaginary.

This includes initiatives focussed on aspects of the EHR system itself (as the flexibility of the EHR system enables it to be tailored to specific clinical settings by EHR support staff) and also several initiatives focussing more specifically on users (e.g. health professionals and support staff). The latter includes general 'digital literacy' training for all staff (approximately 4000 require training every year) that entails introductory EHR training and also more specialised and targeted training for health professionals. A group of EHR-expert clinicians, for example, has been convened to induce a culture change, department by department, focussing on 'trying to get clinicians to input structured data and to not "free text"' and thus 'optimising the input of data through [the EHR system]' (Clinician I.T. specialist 3).

Participants' justification for these organisational responses to the tension of data indicated that they have been animated by specific, idealised visions of the hospital-based clinician. As one

senior leader put it, the training initiatives aim to ‘demonstrate to clinicians, if you get your data in accurately and comprehensively, this is the kind of analysis we can get back to you’ (Senior manager 1). This participant went on to describe the envisaged benefits for clinicians:

we can then make available...an analysis of all of your patients and so you are analysing your patients by age, sex, diagnosis, a wide range of things....If you have to do returns to regulatory bodies, we can complete those for you. We could design a data warehouse that would produce those systems. We can help you with your cert studies... All of those things. So you can actually start demonstrating to your clinicians, ‘get the data in accurately and then we can help you achieve those kinds of objectives’. So that’s the real hook... to tackle data quality.

We see in this statement the enthusiastic evocation of the ideal health professional that underpins the vision of data-driven hospital imaginary. This is a health professional that, enabled and prompted by a carefully configured EHR interface and workflow design, is engaging in particular kind of data-enabled reflective and calculative clinical practice that addresses multiple priorities in addition to the immediate care of the patient. Within this ideal, the EHR-clinician configuration means that there is no fundamental discord between the work required to provide prompt care in everyday settings and the work required to produce ‘high quality’ data (i.e. data with research utility). This is an enchanting ideal; it has been evoked among participants as they encounter the tensions arising from the introduction of the EHR system, and it has informed and invigorated organisational responses to these tensions.

Data curation

Another tension that has been brought to the fore by the implementation of the EHR socio-technical system relates to data curation. The core EHR system has been primarily designed to facilitate care. One consequence of this, as participants stated, is that the data is stored and organised in such a way that make it unusable for many research purposes: ‘the data’s quite compartmentalised. The data structure is quite unusual’ (Director 1); ‘data in [EHR system] is not in a format that can be used for research’ (Clinician I.T. specialist 3). Participants also report that it is unsafe to access the EHR data directly for the purposes of research, such as the testing and developing of a computational tool, as this could corrupt patient records and thus put patients at risk: ‘you can’t start testing algorithms within operational systems because it may crash the whole bloody system’ (Director 1).

Here again, we see a tension between current sociotechnical arrangements directed towards immediate patient care, and the organisation’s aspiration to embed a data-driven approach. The EHR system itself is viewed by participants as a ‘goldmine’ of research-facilitating data, but its current structural configuration within the organisation as an everyday clinical tool presents significant challenges to accessing the data for research purposes.

The organisational response has been to build a bespoke research-enabling data platform. The research data platform functions as a mirror to the EHR system, collecting real-time EHR data and curating it in such a way that it has general research utility. The platform thus represents a major organisational attempt to enact a sociotechnical imaginary of a data-driven hospital. As one participant described it, ‘It’s a big piece of work, tens of people, millions of pounds, several years of work’ (Clinician I.T. specialist 1).

At the time of data collection, there was ‘still a lot of work... [to] be done’ (Health informatics manager) before the platform would be fully operational, but its potential was described in highly enthusiastic terms. It was described, for example, as ‘designed for operational safety [with a] really good integrated dataset so you can answer quite a broad range of questions. ...That’s incredibly cool’ (Clinician I.T. specialist 1), and as ‘an amazing platform... should put us in an amazing place, really, to be able to use all that data for research purposes’ (Director 4). This again reflects the enchanting appeal of digital tools and approaches: the implementation of the EHR system and the development of the research platform have presented constraints and affordances within the organisation, inciting affective and calculative responses from participants within specific organisation settings. In this way, the general imaginary is translated into, and invigorated through, specific sociotechnical arrangements.

These enchanting affects also include a sense of frustration. This is illustrated by participants’ criticisms of the research data platform. For several participants, the platform’s potential to leverage EHR data for research purposes had, by comparison, foregrounded its inability to support access to some other types of data, particularly imaging data. For example:

[the research platform] is great but [it] does not go far enough. We need all data types, not just physiology and clinical and so on. We need imaging in there... what’s lacking...is sufficient provision for the additional tools that we need in order to make the data properly interrogable and modellable.

(Clinician researcher 2)

In articulating this frustration, we see here the evocation of an ideal sociotechnical arrangement that curates and integrates multiple data types within a repository that has much greater research utility. Such frustrations are well known within the organisation and have prompted more action. A senior leader stated that the organisation had made it a priority to apply the research data platform principle ‘to imaging... to develop a repository of imaging for research access’ (Director 5).

Data access

The organisation’s operationalisation of the data-driven hospital imaginary has also exacerbated another major frustration for senior leaders, clinician-researchers and affiliated academics. This is the difficulty in accessing the organisation’s existing repository of digital data for research purposes. Clinicians stated that accessing ‘their own’ data was inexplicably slow. For example, ‘it takes you three to six months to access data that you already have, your own routine health-care data, which doesn’t make sense’ (Clinician researcher 3). Affiliated academics described the process of accessing data as opaque and complicated: ‘the whole thing is a nightmare... it’s very hard to navigate if you’re not in a hospital and no one really knows what to do with you’ (Academic researcher 1). Several senior leaders were particularly concerned at the levels of frustration expressed by some hospital staff and academics, and indeed were exasperated to hear that academics were turning to other organisations to support their research. For example:

We’re still unable to unlock the data that we have access to for the purposes of research and therefore our closest cousins at [the affiliated university] or others, are increasingly frustrated and will be going to [other organisations] to access the data which I find extraordinary.

(Director 3).

Prompted by such frustration and exasperation, the organisation had made it a priority to identify and address the reasons for data access delays.

A number of reasons were discussed by participants during interviews. Several participants stated that the poor quality and curation of existing data—as described above—were significant factors, and that academics and some senior leaders had failed to appreciate that this, in effect, meant that requested data was simply not available. Participants also referred to the necessity for all academics to obtain an onerous form of NHS research clearance that is largely irrelevant for accessing digital data. Participants involved in research support described the delays in undertaking governance approvals of proposed projects due to regulatory uncertainties: given the relative novelty of digital and computational tools and approaches, it was not clear how relevant regulation should be interpreted. One participant, for example, described the uncertainty as to whether new algorithms being developed within proposed projects met the Medicines and Healthcare Products Regulatory Authority's (MHRA) definition of 'medical devices'.

Collectively, these factors and the resulting sense of frustration and exasperation felt by participants illustrate the discord between many of the existing sociotechnical system that constitute the hospital (e.g. relating to the provision of care, research governance) and the data-driven hospital imaginary. These existing systems have emerged to address other priorities (patient safety, regulatory compliance) and are not, in their current form, capable of supporting the collection, curation and flow of health data needed for research purposes.

Several participants were quick to point out, however, that such discord was manageable. What made the situation challenging—and indeed what resulted in long delays of approving data access requests—was, they stated, a lack of capacity among research support teams. As one participant stated:

The main issue about [the strategic vision] is that we haven't got the resource to do it properly. It has increased the amount of work that we've got to do... it's always kind of been the issue with the NHS is that support services - It's never really taken into account what resource that we need when things like this are taken on, It's the same with I.T., same with finance, same with workforce. Whenever anything additional was taken on, we're just told to do it. Very rarely do our resources ever increase to take on that extra work. That's always been the issue.

(Governance & research support specialist 1)

What we see expressed here is a sense among some participants that the research-enabling work of coordinating diverging sociotechnical systems is often neglected, due to the severe resource constraints of the healthcare system, and the need for organisations within that system to generally prioritise the immediate delivery of patient care.

Participants' descriptions of data access difficulties also revealed significant tensions between the organisation's therapeutic relationship with patients and the interests of researchers. As part of the approvals process, it is necessary for research applications to make a clear justification for accessing specific data that includes a description of potential benefit to patients. Participants involved in research support and governance felt very strongly that it was necessary to uphold this requirement, as it reflected the organisation's therapeutic commitment to patients. They stated that this necessity was not always understood by academics or indeed the affiliated academic institution pursuing research goals. As one participant stated:

I fully understand the benefit of research, but I also put my patient advocate hat on. At times it feels like there's a squabble and not just at [the organisation] but [elsewhere] about data, about patients... This is the patient versus this is the academic research arm. I'm not sure there's a balance been found yet.

[Clinician I.T. specialist 4]

And, they stated, they felt some general pressure to be more flexible in their approach to governance in order to support innovation. As another participant put it:

The problem is, if I have an innovator, well call them, [saying] 'let's be nimble and do wonderful things. Innovation is for the good'. My first question is, well good for whom? Who's this going to help?... you've got to understand the context you are working in, and from the healthcare provision perspective it's a therapeutic relationship between health service provider and patient.

(Governance and research support specialist 1)

Here again, we see that the organisation's embrace of the data-driven hospital imaginary of integrating care and research has brought particular frictions to the fore for some hospital staff: frictions between the therapeutic relationship and research, and more generally between the immediate priorities of the hospital organisation and the affiliated university.

The organisation has responded by creating a new research support service specifically for researchers wishing to access digital data. The service includes a new application form specific for health data access requests which is 'richer and more expedient' (Governance and research support specialist 2) than the general forms that had been used. The specialised service will also bring together research support staff and staff with a detailed knowledge of the organisation's existing data capabilities, ideally resulting in a much quicker overall review process. It means, as one participant enthusiastically envisages it, that staff can work with researchers prior to ethics review to quickly determine:

Is the research feasible? Is the research resourced enough to deliver what you want to deliver? Do you have the right computers to do it? ...by taking this process in-house we make sure people deal with these things beforehand.

(Clinician I.T. specialist 5)

The organisation had also received approval from the relevant regulator to provide 'in-house' ethics review for research projects requesting anonymised health data. Reviews will be undertaken by a committee that includes seven patient representatives, one of whom will act as chairperson. These patient representatives, one participant explained, will 'basically have veto over what gets done or not' (Clinician I.T. specialist 5). The rationale for this composition, the participant stated, was to ensure that the interests of patients are kept at the forefront when granting access to data and, potentially, to have some direction over data research:

We have the data subjects [i.e. patients] approving [requests] and maybe accepting a higher level of re-identification risk... The closer people whose data it is are to understanding why we're doing it, the better. ...They'll [also] have full view of all the data research that is happening, they're in a position to tell the organisation if their interests are not being met... I'm quite excited by it.

Overall, the intention of the soon-to-be launched research data support service is to streamline the process of accessing health data for research purposes. Here again, we see the translation of the general data-driven hospital imaginary into specific sociotechnical arrangements (including forms and protocols, new groups bringing together relevant expertise and new committees). We also see here that this particular response is underpinned by an idealised vision of streamlined, participatory governance: patient representatives, as articulated in the quote above, will have greater say in granting access to data, thus (ideally) permitting greater flexibility, greater alignment between patient and research interests and, ultimately, a more proficient research governance process.

DISCUSSION

Contemporary public hospitals are subject to multiple expectations: to provide immediate and equitable patient care; to provide education and professional development; to serve as loci of research and innovation; to serve as hubs of economic activity and employment for local communities, and in some cases, function as lucrative loci for investment (Jones, 2018). Public hospitals, in other words, are expected to fulfil multiple societal roles, each entailing specific sets of stakeholders (patients, communities, academics, governments, health professionals and investors) with their own aspirations, values and worldviews (Gardner, *in press*). As previous studies have illustrated, these roles and the aspirations and interests of stakeholder groups diverge, and the pursuit of a specific set of aspirations and interests can impede organisations' ability to pursue others (see Barlow & Köberle-Gaiser, 2008; Jones, 2018; Kisacky, 2017). The tension between providing care to patients while also serving research and innovation priorities is especially well known. Authors such as Greenhough (2012) have noted, for example, that physical spaces designed for delivering therapies do not easily lend themselves to research activities. Contemporary public hospitals are therefore having to balance multiple, potentially conflicting expectations, and they are required to do so in a healthcare context that is in a worsening state of crisis.

Promissory digital health discourse provides a means for some public hospitals to strategically position themselves in the midst of these potentially diverging expectations and grim future projections. We see this in the case study organisation's embrace of a particular sociotechnical imaginary: an imagined sociotechnical system where every patient engagement will generate data that can be used to optimise clinical services and facilitate research. Senior leaders within the organisation enthusiastically explain their embrace of the imaginary as a necessary response to socioeconomic pressures, and as a way of enabling the hospital to deliver benefits to several groups: better care and new interventions for patients; greater efficiencies and thus cost-savings for communities and taxpayers; more research and innovation opportunities for academics and clinician researchers. This illustrates that the data-driven hospital imaginary can enable organisations to strategically orient themselves towards an envisaged future in which they can address the expectations and interests of several stakeholder groups. In this regard, the imaginary of a data-driven hospital has *strategic utility* for the organisation.

We see in this enthusiastic reimagining of the public hospital the uncritical perpetuation of prevalent, promissory expectations regarding the incorporation of digital tools and approaches into health care. As Wyatt et al. (2020) have noted in regard to NHS policy more generally, digitalisation is equated with greater patient benefit by enabling greater clinical access to records and big data analytics, and it is equated with a more efficient healthcare system. I suggest that the embrace of such promissory expectations is an attempt by struggling hospital organisations to demonstrate their legitimacy with multiple stakeholder groups. As Stephens et al. (2013) have

illustrated, organisations obtain their legitimacy by embedding and performing sociotechnical imaginaries that reflect the values and aspirational world views or relevant stakeholders. The sociotechnical imaginary of the data-driven hospital reflects the aspirations of policy makers (as reflected in NHS policy), hospital managers and presumably many clinicians and researchers. Using Harvey and Knox's (2012) notion of enchantment, I have also illustrated that the imaginary has 'affective pull' for hospital leaders and staff. It evokes a sense of amazement and wonder, and indeed frustration, when the shortcomings of existing systems become apparent by contrast. I argue that the strategic utility of the data-driven hospital imaginary as a way of demonstrating legitimacy, and indeed the promissory potency of digital health more generally, must be understood in terms of this enchanting capacity to operate in affective registers of wonder, excitement and frustration, particularly in an otherwise pessimistic health context.

This article has also shed light on how hospitals are being reconfigured by promissory digital health. In the case study organisation, the pursuit of the sociotechnical imaginary of a data-driven hospital has brought to the fore tensions relating to data quality, data curation and data access. These, I have illustrated, reflect a degree of discord between the multiple sociotechnical arrangements that constitute the hospital, particularly between those orientated towards immediate care, and the facilitation of research. Just as Vezyridis and Timmons (2021) noted in regard to primary practice, we see that the existing EHR data-input habits of health professionals within the hospital tends to result in data that is useful for patient care, but which has little research utility. We also see that the EHR system itself has limited research utility due to the way it arranges and stores patients' health data to support care. And, we see that the organisation's capacity to provide access to data for research purposes has been complicated by resourcing constraints and its therapeutic commitment to patients.

However, rather than undermining the sociotechnical imaginary of a data-driven hospital, I argue that such tensions can serve to evoke and invigorate it. This too can be understood as a reflection of the enchanting qualities of infrastructural and technological projects: as people implement strategic infrastructural projects, they are inevitably presented with disturbances that incite calculative and affective responses, including responses that consolidate the performative power of aspirational visions (Harvey & Knox, 2012). In this case, this has entailed significant organisational responses that translate the general imaginary of a data-driven hospital into specific sociotechnical arrangements, such as the research data platform, training and 'culture change' initiatives aimed at reconfiguring staff members' engagement with the EHR system, and the research support service.

Each of these responses involves the evocation of specific idealised sociotechnical arrangements. The organisation's ongoing attempts to improve data quality and staff members' engagements with the EHR system, for example, are accompanied by the evocation of an ideal health professional, engaged in data-enabled, calculative and reflective clinical practice that optimises patient care and supports research. The organisation's nascent bespoke research data platform reflects an idealised sociotechnical system that collects, integrates, stores and circulates multiple health and operational data, and its soon-to-be-launched research data support services has been motivated by an idealised notion of participatory governance, where increased patient engagement in research approval processes will improve flexibility and permit greater alignment between patient and researcher interests. Collectively, these specific new sociotechnical arrangements attempt to align hospital sociotechnical systems oriented towards patient care with those facilitating research.

The reimagining and reconfiguring of the hospital has important implications. This attempt to align patient care with research reflects the long-term fading of the boundary between research and care in healthcare settings, as identified by Cambrosio et al. (2018). In effect, every patient

is envisaged as a research participant. Wyatt et al. (2020) note that as research participation becomes part of routine care, the notion of patienthood and indeed the qualities of citizenship are transformed. Public hospitals are widely celebrated for providing equitable access to care for citizens. Here, we see that in their reimagined form, the data-driven hospital becomes one means by which citizens' rights to equitable access are hitched to the expectation of research participation. We also see, however, that the reconfiguring of sociotechnical systems will bring to the fore tensions. These, I suggest, could provide points for hospital leaders and staff to critically reflect on if, and to what extent, the valued societal roles of the organisational can be aligned in specific systems. This will, however, require eschewing the uncritical valorisation of data-driven health care that is animating much of the current policy and public discourse.

The reimagining and reconfiguring of the public hospital also has political-economic implications. Drawing on the work of Birch and others (Birch, 2017; Birch & Muniesa, 2020), authors have argued that the digitalisation of healthcare services including the NHS reflects the ongoing assetization characteristic of contemporary OECD economies (Vezyridis & Timmons, 2021; Wyatt, Lampon, and McKevitt, 2020). In effect, digital systems generate data as an asset for realising value in health care, research and finance. Here, we see the potential role of public hospitals in this process. As hospitals embrace promissory digital health to gain legitimacy and orient themselves towards a viable future, they are, in effect, establishing themselves as major assetization instruments. The extent to which this can be balanced with responsibilities to equity and confidentiality in a challenging funding context will likely vary from hospital to hospital, given that some are struggling more than others. Major research hospital organisations with access to greater resources (e.g. via Biomedical Research Centres within the NHS) could play an important role in guiding other public hospitals.

AUTHOR CONTRIBUTIONS

John Gardner undertook the study that forms the basis of this article, and all authorship duties.

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CONFLICT OF INTEREST

The author of this article declares no competing interests such as financial interest or any benefits arising from the direct applications of the research.

DATA AVAILABILITY STATEMENT

In order to protect the anonymity of participants and the case study organisation, the data that informs this article will not be made available on a public repository. The data is interview transcripts, which in their entirety would enable participants to be identified due to uniqueness of the participating organisation.

ORCID

John Gardner  <https://orcid.org/0000-0001-7417-348X>

REFERENCES

- Academy of Medical Sciences. (2018). *Our data-driven future in healthcare: People and partnerships at the heart of health related technologies*. Academy of Medical Sciences.
- ADHA. (2021). *The future of healthcare is digital - have your say, think about tomorrow*. The Australian Digital Health Agency.
- Anandaciva, S. (2019). *The deteriorating state of the NHS estate*. The Kings Fund.
- Barlow, J., & Köberle-Gaiser, M. (2008). The private finance initiative, project form and design innovation: The UK's hospitals programme. *Research Policy*, 37(8), 1392–1402. <https://doi.org/10.1016/j.respol.2008.04.027>
- Bennett, J. (2001). The enchantment of modern life.
- Birch, K. (2017). Rethinking value in the bio-economy: Finance, assetization, and the management of value. *Science, Technology & Human Values*, 42(3), 460–490. <https://doi.org/10.1177/0162243916661633>
- Birch, K., & Muniesa, F. (2020). *Assetization: Turning things into assets in technoscientific capitalism*. MIT Press.
- Borup, M., Brown, N., Konrad, K., & Van Lente, H. (2006). The sociology of expectations in science and technology. *Technology Analysis & Strategic Management*, 18(3–4), 285–298. <https://doi.org/10.1080/09537320600777002>
- Braun, V., & Clarke, V. (2014). What can “thematic analysis” offer health and wellbeing researchers? *International Journal of Qualitative Studies on Health and Well-being*, 9(1), 26152. <https://doi.org/10.3402/qhw.v9.26152>
- Brown, N., & Michael, M. (2003). A sociology of expectations: Retrospecting prospects and prospecting retrospects. *Technology Analysis & Strategic Management*, 15(1), 3–18. <https://doi.org/10.1080/0953732032000046024>
- Brown, N., Rappert, B., & Webster, A. (2000). *Contested futures: A sociology of prospective techno-science*. Ashgate.
- Cambrosio, A., Keating, P., Vignola-Gagné, E., Besle, S., & Bourret, P. (2018). Extending experimentation: Oncology's fading boundary between research and care. *New Genetics & Society*, 37(3), 207–226. <https://doi.org/10.1080/14636778.2018.1487281>
- Campbell, D. (2022). *Staffing crisis deepens in NHS England with 110,000 posts unfilled*. The Guardian. 4th March 2022 <https://www.theguardian.com/society/2022/mar/03/staffing-crisis-deepens-in-nhs-england-with-110000-posts-unfilled>
- Cresswell, K. M., Worth, A., & Aziz, S. (2010). Actor-Network Theory and its role in understanding the implementation of information technology developments in healthcare. *BMC Medical Informatics and Decision Making*, 10(1), 67. <https://doi.org/10.1186/1472-6947-10-67>
- Creswell, J. W., & Clark, V. L. P. (2011). *Designing and conducting mixed methods research*. SAGE Publications.
- Daalder, M. (2022). *Omicron to slam a health system at 'breaking point'*. Newsroom.
- Dorn, S. D. (2021). Backslide or forward progress? Virtual care at U.S. healthcare systems beyond the COVID-19 pandemic. *npj Digital Medicine*, 4(1), 6. <https://doi.org/10.1038/s41746-020-00379-z>
- Gardner, J. (in press). *Hospitals of the future*. In A. Petersen (Ed.), *The handbook on the sociology of health and medicine*. Edward Elgar Publishing.
- Gardner, J., & Webster, A. (2017). Accelerating innovation in the creation of biovalue. *Science, Technology & Human Values*, 0 (0):0162243917702720. <https://doi.org/10.1177/0162243917702720>
- Glouberman, S., & Mintzberg, H. (2001). Managing the care of health and the cure of disease--Part I: Differentiation. *Health Care Management Review*, 26(1), 56–69. discussion 87-9. <https://doi.org/10.1097/00004010-200101000-00006>
- Goryakin, Y., Thiébaud, S. P., Cortaredona, S., Lerouge, M. A., Cecchini, M., Feigl, A. B., & Bruno, V. (2020). Assessing the future medical cost burden for the European health systems under alternative exposure-to-risks scenarios. *PLoS One*, 15(9), e0238565. <https://doi.org/10.1371/journal.pone.0238565>
- Greenhough, B. (2012). Room with a rhinovirus? Blurring the boundaries between research and therapeutic space. *Transactions of the Institute of British Geographers*, 37(3), 402–417. <https://doi.org/10.1111/j.1475-5661.2011.00475.x>
- Harvey, P., & Knox, H. (2012). The enchantments of infrastructure. *Mobilities*, 7(4), 521–536. <https://doi.org/10.1080/17450101.2012.718935>
- Health Foundation. (2016). *System-wide problems driving NHS deficit: Financial woes cannot be attributed solely to poor performance by local trusts*. The Health Foundation.
- Henwood, F., & Marent, B. (2019). Understanding digital health: Productive tensions at the intersection of sociology of health and science and technology studies. *Sociology of Health & Illness*, 41(S1), 1–15. <https://doi.org/10.1111/1467-9566.12898>

- Honeymann, M., Dunn, P., & McKenna, H. (2016). *A digital NHS? An introduction to the digital agenda and plans for implementation*. The Kings Fund.
- Jasanoff, S., & Kim, S.-H. (2009). Containing the atom: Sociotechnical imaginaries and nuclear power in the United States and South Korea. *Minerva*, 47(2), 119–146. <https://doi.org/10.1007/s11024-009-9124-4>
- Jasanoff, S., & Kim, S. H. (2015). *Dreamscapes of modernity: Sociotechnical imaginaries and the fabrication of power*. University of Chicago Press.
- Jones, P. (2018). Private finance initiative hospital architecture: Towards a political economy of the Royal Liverpool University Hospital. *Sociology of Health & Illness*, 40(2), 327–339. <https://doi.org/10.1111/1467-9566.12616>
- Kisacky, J. (2017). *Rise of the modern hospital: An architectural history of health and healing, 1870-1940*. University of Pittsburgh Press.
- Kitzinger, J., & Williams, C. (2005). Forecasting science futures: Legitimising hope and calming fears in the embryo stem cell debate. *Social Science & Medicine*, 61(3), 731–740. <https://doi.org/10.1016/j.socscimed.2005.03.018>
- Lupton, D. (2017). *Digital health: Critical and cross-disciplinary perspectives*. Taylor & Francis.
- May, C., & Finch, T. (2009). Implementation, embedding, and integration: An outline of Normalization Process Theory. *Sociology*, 43(3), 535–554. <https://doi.org/10.1177/0038038509103208>
- May, C. R. (2015). Making sense of technology adoption in healthcare: Meso-level considerations. *BMC Medicine*, 13(1), 92. <https://doi.org/10.1186/s12916-015-0305-8>
- Petersen, A. (2018). *Digital health and technological promise: A sociological inquiry*. Taylor & Francis.
- Pinheiro, R., Geschwind, L., Ramirez, F., & Vrangbæk, K. (2016). The value in comparing organizational fields and forms. In R. Pinheiro, L. Geschwind, F. Ramirez, & K. Vrangbæk (Eds.), *Towards a comparative institutionalism: Forms, dynamics and logics across the organizational fields of health care and higher education* (pp. 9–32). Emerald Group Publishing Limited.
- Sanchez-Pinto, L. N., Mosa, A. S. M., Fultz-Hollis, K., Tachinardi, U., Barnett, W. K., & Embi, P. J. (2017). The emerging role of the chief research informatics officer in Academic Health Centers. *Applied Clinical Informatics*, 8(3), 845–853. <https://doi.org/10.4338/aci-2017-04-ra-0062>
- Stephens, N., Atkinson, P., & Glasner, P. (2013). Institutional imaginaries of publics in stem cell banking: The cases of the UK and Spain. *Science as Culture*, 22(4), 497–515. <https://doi.org/10.1080/14636778.2013.764071>
- Street, A. (2016). Hospital deficits are skewing NHS priorities. *The Conversation*, March 1.
- The Kings Fund. (2021). *NHS trusts in deficit*. The Kings Fund.
- Topol, E. (2019). *The Topol Review: Preparing the healthcare workforce to deliver the digital future*. Health Education England.
- Vezyridis, P., & Timmons, S. (2021). E-Infrastructures and the divergent assetization of public health data: Expectations, uncertainties, and asymmetries. *Social Studies of Science*, 51(4), 606–627. <https://doi.org/10.1177/03063127211989818>
- Visontay, E. (2022). *Australians in hospital emergency departments waiting days for ward beds as health system overwhelmed*. The Guardian.
- Wu, X., Law, C. K., & Yip, P. S. F. (2019). A Projection of future hospitalisation needs in a rapidly ageing society: A Hong Kong experience. *International Journal of Environmental Research and Public Health*, 16(3), 473. <https://doi.org/10.3390/ijerph16030473>
- Wyatt, D., Scott, L., & McKeivitt, C. (2020). Delivering healthcare's 'triple aim': Electronic health records and the health research participant in the UK National Health Service. *Sociology of Health & Illness*, 42(6), 1312–1327. <https://doi.org/10.1111/1467-9566.13101>

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