

“It’s Actually Part of Clinical Care”

Mediating Biobanking Assets in the Entrepreneurial Hospital

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Abstract: A core aspect of the entrepreneurial hospital is the mobilisation of the means of care beyond care itself. In previous work, we showed how the entrepreneurial hospital uses its unique access to patient populations, whose health needs make them available, in order to facilitate research into therapeutic, diagnostic, or service delivery innovation. Its ‘entrepreneurialises’ care, we argued, to meet research needs. What may be less obvious in this process, however, is that research, too, is entrepreneurialised to meet care needs. That is, the entrepreneurial hospital not only constitutes its patient populations and care infrastructure as distinctive assets that serve its entrepreneurial aims, but also positions its entrepreneurial aims as a decisive element in the service of care. This article develops the concept of the entrepreneurial hospital to help theorise biobanking. It foregrounds the views of biobankers – drawing from our ethnographic research and especially our interviews with key-informants (2008-2009) who work in some relation to biobanking in a Canadian province – thereby providing a window onto an important, yet under-examined, set of rationales motivating the entrepreneurial integration of care and research through biobanks.

Keywords: biobanks; public participation; biosociality; personalized health; genomic research; healthcare.

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I. Introduction

How should we think about biobanking in relation to the entrepreneurial hospital? In earlier work, we argued that – unlike the much-discussed “entrepreneurial university” (see, among many: Bok 2003; Etz-kowitz 1998; Owen-Smith 2005; Slaughter and Leslie 1997) – entrepre-

neurial hospitals have been largely unnoticed, in spite of their significant, distinguishing characteristics. For whatever reason, research theorizing the rise of the “commercial ethos” (e.g. Etzkowitz 1983) in bioscience has largely tended, until recently, to ignore the specificity of the hospital setting. What is missed, in overlooking this setting, are the particular ways that patient populations and care infrastructure are constituted as *distinctive assets* in pursuit of entrepreneurial aims (French and Miller 2012). From where we write, in Canada, our investigations into entrepreneurial hospitals have illuminated some of the tensions underlying their efforts to hybridize multiple logics of healthcare, with those of innovation, commercialisation, technology transfer and economic growth. Insofar as they are positioned to care not just for health, but also for wealth, entrepreneurial hospitals reflect a considered attempt on the part of the health research and care communities to “leverage a joint solution to parallel problems of constrained public finances, growing need, and the limited success of persistent, independent efforts at reform” (Miller and French 2016, 1541). Key focal points within this considered attempt, as we discovered in the course of our empirical work, are biobanks. Insofar as biobanks represent sites of accumulation (of tissue, data, expertise, and so on) within the entrepreneurial hospital, they act as crucibles for both the intensification and mitigation of the tensions mediated by this organization. The goal of this article is to examine the relationship of the biobank to the entrepreneurial hospital, with reference to sociology’s and science and technology studies’ (STS) engagements with biobanking.

A core aspect of the entrepreneurial hospital is the mobilisation of the means of care beyond care itself. For example, the entrepreneurial hospital uses its unique access to patient populations, whose health needs make them available, in order to facilitate tailored research into therapeutic, diagnostic, or service delivery innovation. In this respect, the hospital-based biobanks we examined are different from ‘national biobanks’ – analysed by Busby and Martin (2006), Mitchell and Waldby (2010), and Tutton (2002; 2007), among others – where there is a need ‘to drum up volunteers’ independently of their access to medical care (Mitchell 2012, 231), and where many of the volunteers would be healthy. The biobanks we studied typically receive tissue samples and patient histories from individuals who, as part of their care, have been asked to donate their materials and information. Patients, according to a website of one of the biobanks we examined, “are offered the opportunity to participate [in research] at the time of their first appointment”, when they are asked to provide a blood sample and also for permission to be contacted for future research projects. This biobank thus takes advantage of the entrepreneurial hospital’s patient population and care infrastructure to meet its research goals. We might therefore say that care is here ‘entrepreneurialised’ to meet research needs – this is an example of the mobilisation of the means of care beyond care itself.

What may be less obvious in this process, however, is the potential of research to be 'entrepreneurialised' to meet care needs. Indeed, this article will present data illustrating how biobankers working within the entrepreneurial hospital make sense of their efforts with respect to care. We will also highlight discourse arguing that biobanks, in this context, do not only aim to realise their research needs, but also position their research and entrepreneurial aims as decisive elements in the service of care.

Although it may be tempting to dismiss such positioning as a form of rhetoric designed to mollify public sentiment in contexts where the "core publicness" (Anderson 2012) of care is increasingly instrumentalised according to non-public (e.g. professional, organizational, commercial, etc.) interests, we identify in this article its potential to play an important mediating function. Indeed, it seems that the entrepreneurial hospital excels at mediating between incommensurate value systems. This mediation work, as we will show, is deftly performed in the biobanking context (Tupasela and Snell 2012), illustrating how biobanks can operate as intermediaries that help maintain the entrepreneurial hospital's social license and legitimacy (Dixon-Woods and Ashcroft 2008; Dixon-Woods and Tarrant 2009). It may also help to explain why patients willingly participate in research initiatives like biobanking when the direct benefits to their health may not be apparent¹.

Moreover, by empirically advancing the concept of the entrepreneurial hospital to help theorise biobanking, this article makes two contributions to the literature. First, it pulls the substantive-theoretic scholarly focus upon biobanks to a meso-organizational level, emphasising the layered, complex socio-technical networks in which biobanks are embedded. Second, it shifts the empirical focus (dominant in the sociology of biobanking) from the views of lay-participants to the views of biobanking and health professionals, thereby providing a window onto an important, yet under-examined set of rationales motivating the entrepreneurial integration of care and research through initiatives like biobanks.

In what follows we first provide a brief discussion of the entrepreneurial hospital, focusing on its emergence and contemporary context. We next discuss literature on biobanks with a focus on two strands of work, 1) related to hybridization of public- and private-sector logics, and 2) related to the incommensurate (bio)values mediated by biobanks. Then, following a discussion of method, we present data from our ethnographic research, drawing primarily from twenty-six semi-structured interviews with key-informants (2008-2009), who work in separate but networked organizations at a number of physical sites, with responsibility for the provision of care for a geographically defined population. Taken together, the network possesses a substantial research infrastructure, well developed affiliations to the local, university-based medical school, as well as connections to other universities. We discuss biobanking in the context of this network, and the entrepreneurial hospital more generally. We present two discursive orientations that emerged in our data, which,

while complimentary, may also evince some tensions. We conclude with a reflection on the implications of these tensions for the future of biobanks – and the entrepreneurial hospital more generally – focusing in particular on tensions between the imperative to grow the biobank's network and the imperative to maintain its social license.

2. Entrepreneurial Hospitals: The Emergence of a Novel Organizational Form

In Canada – the site of our empirical work – entrepreneurial hospitals have emerged against the backdrop of a pervasive effort to re-imagine the meaning and hidden potentialities of publicly-funded healthcare. At issue is how to transform a long-standing commitment to public-funding for care into a national competitive advantage in biomedical innovation. The visualization of this transformation has become a matter of policy for governments and other organizations involved in the funding and conduct of health research (e.g. ACAHO 2007; CIHR 2006 and 2009; Government of Canada 2007; Naylor et al. 2015; see also Atkinson-Grosjean 2006; Miller and French 2016).

By no means unique to the Canadian context (e.g. BIGT, 2004; CFST, 2011), the aspirational policy discourse aimed at producing national wealth by leveraging healthcare infrastructures and patient populations reflects organization-level developments designed to mobilise care in commercial ways. For example, a characteristic feature of entrepreneurial hospitals in Canada is the articulation of mission-statements, policy, and funding priorities meant to accelerate innovation, technology transfer and commercialization. Consequently, a number of entrepreneurial hospitals have developed in-house expertise in technology transfer and commercialisation, offering their health researchers a range of services related, for example, to intellectual property (IP) protection, material transfer, and non-disclosure-agreements, patent searches and applications, business development planning, and so on.

Given this policy focus, it is apparent that the *entrepreneurial* hospital is designed to do far more than merely provide care. At the same time, because it is a *hospital*, care provision remains core to its mission, providing a basis for hybridizing multiple logics, including logics for health research, health care, innovation, technology development and commercialization. For its proponents, the entrepreneurial hospital's cutting-edge biomedical expertise, supported by data-sets on treatment regimes and outcomes, growing tissue repositories, and large populations of patients, make the organization into a catalyst of biotechnological innovation.

To the extent that it embeds entrepreneurial aims into the traditional organization of care, the entrepreneurial hospital must maintain the capacity to address a diversity of problems, and not just those directly related to care. For this reason, it would seem that at least two types of re-

search are privileged by the entrepreneurial hospital: 1) research that is seen to have direct clinical applicability; and 2) research that is seen to have clinical applicability in future (French and Miller 2012; Miller and French 2016). Biobanks – characterized by accumulative practices that harvest patient tissue and information on a routine basis in the course of care – derive utility in the context of the entrepreneurial hospital by straddling and enabling both types of research. They may be used as platforms that address well-defined research questions articulated in present circumstances. Yet their value stems also from their potential to collect a population's past, lived experience with disease (registered in tissue and information) in case it may serve future and as yet undefined research needs.

We turn now to a discussion of sociological and STS engagements with biobanking. Then, following a brief discussion of method, we present data that illustrate how the entrepreneurial hospital seeks to leverage its biobanking potentiality.

3. Sociological and STS Engagements with Biobanking

Sociological and STS accounts of biobanking have grown substantially in the past decade (see, for example, Lipworth et al. 2011) and we cannot be exhaustive in our review of the literature. Instead, we concentrate on two strands of work related to 1) the hybridization and entanglement of public and private-sector logics in biobanking, and 2) the incommensurate (bio)values mediated by biobanks.

3.1 Hybridization and Entanglement

Against the backdrop of earlier research that had discussed biobank development according to two different and mutually exclusive logics (those of the public sector and those of the private sector), a number of sociological and STS accounts of biobanking have taken up the 'hybrid' nature of biobanks – more specifically, they have focused on the hybridization of public and private interests, on how they intersect, reinforce each other, and work within complex social, political, ethical and economic spheres. For example, Hauskeller and Beltrame, in their study of umbilical cord blood banking, argue that there is no clear-cut division between public- and private-sector biobanks; rather, viewed as biotechnological platforms (Keating and Cambrosio 2000), cord blood biobanks exhibit “a growing hybridization between the public and the private model” (Hauskeller and Beltrame 2016a, 416). As they note, the “network of actors, objects and practices involved in biobanking creates shared organizational interdependencies that foster the coexistence and hybridization of both redistributive public and private market bioeconomies” (Hauskeller and Beltrame 2016a, 416).

Central to understanding how all kinds of hybridization flow from, and contribute to, the network of public-private bioeconomies made up by the global system of biobanks is the concept of “entanglement”. Callon (1998, 19) uses the concept of entanglement as a way of theorizing “the process of ‘marketization’ and the relations that are either hidden or surfaced in the performance of market transactions”. Hauskeller and Beltrame (2016a, 425) build on this by pointing, in the context of cord blood biobanking, to the way that entanglement is formed through “cooperation across the public and private sector”, as well as to how this cooperation “produces configurations within the regimes of [cord blood] biovalue exploitation that account and serve both institutional forms and maintain them in their differences and hybridity”. In other words, the concept of entanglement highlights for analysts the fact that there are relations that – to use Callon’s term – “overflow” the boundary between public and private. For Hauskeller and Beltrame (2016a, 429) the concept of entanglement helps illustrate how even apparently public biobanks operating on a redistributive model have developed in “symbiosis” with the market economy. Ostensibly public biobanks are, thus, also governed by economic principles. However, “the search for profit is not the central engine of this market”; instead, the “economic principle that is dominant in public banking is one of self-preservation and sustainability” (Hauskeller and Beltrame 2016a, 429).

Given this situation of entanglement, it is important to locate and study what Hauskeller and Beltrame (2016b) elsewhere describe as “hybrid practices” in biobanking. Hybrid practices play across, and reshape, the boundary between public and private biobanking practices. They blur the borderlines between research, clinical care, commercialization, volunteerism and citizenship within the biobank. They may, for example, invoke ideals of nationhood and supposed genetic homogeneity that reach back to time immemorial while also mobilizing a “diverse and multicultural national identity” to ensure the participation of “ethnic minority groups” (Busby and Martin 2006, 245-246; see also Busby 2004). They may encourage patients to see their participation as combining “their personal health project with a sense of contributing to efforts undertaken by the welfare state” (Hoeyer 2003, 235). They may seek to manage – through rhetorics of standardisation and governance, as well as through public engagement exercises – the uncertainties of public opinions about the “substantial commercial interests” (Tutton 2004, 20; see also Tupasela et al. 2015) that direct public funding of biomedical research and the development of biobanking platforms. They may blend narratives of health with those of wealth, emphasizing how biobanking can benefit wider national economies (Lewis 2004; Cooper and Waldby 2014). Hybrid practices, in other words, emerge in relation to the structural realities of biobanks that straddle public- and private-sector boundaries; they work not just to navigate these boundaries, but also to actively constitute them.

In this sense, we might think of the hybrid practices developed by biobanks expressions of the “tension between ethical, scientific and commercial values” (Timmons and Vezyridis 2017, 1). For example, Timmons and Vezyridis (2017, 11), in their study of what we would characterize as an entrepreneurial hospital in the UK, observe how the biobank “broker[s] the commodification of its own assets between academia and the market”, acting as “both a producer and seller of biospecimens”. Similarly, Turner and colleagues (2013, 70) find that biobanks are “caught directly between the values and rights of the participants and the potential commercial and scientific value of the samples and data”, while at the same time “construct[ing] a business model that will ensure the long-term sustainability of the biobank”. These tensions give rise to, but are also managed by, hybrid practices. Indeed, it is worth stressing here that tensions are not necessarily impediments to development. Bunton and Jones (2010) demonstrate, for instance, how biobank stakeholders envision commercial as well as global scientific and public health value in biobanking efforts. Biobanks may thus deploy hybrid practices to negotiate with – and even leverage – the tensions that accompany public- and private-sector boundary “overflow”.

Taking these observations together, it is clear that contemporary scholarship on biobanks must examine efforts to mediate between commercial and healthcare logics (Miller and French 2016), as well as the entanglement of (hybrid) practices that these efforts entail. Moreover, in our view, it is important to turn scholarly attention to the precise ways that the intermediary role of biobanks is configured and enacted. As we shall suggest, in the biobanks that we studied – with their specific relation to the mission of the entrepreneurial hospital – the configuration of mediating hybrid practices seemed to be optimized to walk the razor’s edge between achieving economic growth and maintaining social license. A key question, therefore, is whether and how particular types of organisations and expertise are called into being by the effort to successfully balance amongst all of the various biobank’s entangled commitments.

3.2 The Incommensurate (bio)Values Mediated by Biobanks

A number of concepts are available to help theorize these mediation efforts and their entangled hybrid practices in biobanking and in the contemporary biosciences more generally. Some have turned to the concept of commodification (e.g. Sharp 2000; Rose 2001); others have advanced the idea of biocapital (Sunder Rajan 2006); and others have been critical of these developments (e.g. Helmreich 2008; Birch and Tyfield 2012). As we developed our work on the entrepreneurial hospital, we found Waldby’s (2000; 2002) conceptualization of biovalue to be particularly useful, especially as elaborated with Mitchell in their book, *Tissue Economies* (Waldby and Mitchell 2006), and in subsequent work (e.g. Mitchell and Waldby 2010).

Waldby, drawing from a range of theorists (and not just Marx, as some critics have seemed to suggest), provides the foundational articulation of biovalue in her book on *The Visible Human Project*, where she defines it as “a surplus value of vitality and instrumental knowledge” (Waldby 2000, 19) derived from nature’s participation in technology, and the configuration of this participation so as to solicit compliance from the productive capacities of living matter. Biovalue, in other words, is the “the yield of vitality produced by the biotechnical reformulation of living processes” (Waldby 2002, 310).

Waldby and Mitchell (2006, 108) elaborate on this idea in the context of their work on biobanks, arguing that biovalue “refers not to the stable and known properties of tissues but to the capacity of tissues [under the conditions of the types of socio-technical configurations made possible by biobanks] to lead to new and unexpected forms of value”.

In the context of their work on national biobanks, Mitchell and Waldby (2010) further specify their conceptualization, noting two different modalities of biovalue, one that depends on the separation of individuals from their biological materials, and one that requires the maintenance of linkages between them. These modalities, while different, operate together and we certainly see both modalities in the biobanks we studied, expressed, as we shall argue, in the way that tissue is both separated from and reconnected to patients and patient groups. Indeed, as we shall indicate, we can understand the mediation work done by biobanks, and by the entrepreneurial hospital more generally, as mediating between these modalities of biovalue.

In making this observation, we are also sensitive to Birch’s critique of the concept of biovalue (and the other ‘bio’ concepts), which, he argues, tend to allow analysts to over-emphasize the bio aspects of the bioeconomy at the expense of understanding its political economic aspects. While we do not entirely follow Birch (2017) in his critique of the bio-concepts because, in our view, it is perhaps too dismissive of their analytic utility, we have nonetheless found his account of *assetization* useful for thinking about the nature of the incommensurate (bio)values mediated by the entrepreneurial hospital.

Birch’s conceptualisation of assetization is grounded in a broader discussion of financialization and capitalization, which, owing to space constraints, we cannot fully cover here. For our purposes the key points of Birch’s analysis can be summarised as follows:

1. For firms in the life sciences sector, profits are just as – if not more – likely to come from “licensing, partnerships, royalties, and so on (i.e., asset-based income)” as they are to come from “product sales (i.e., commodity-based income)” (Birch 2017, 465).
2. Asset-based income for firms in the life sciences sector is rooted in a range of valuation practices that can, when taken together, be thought of as the discounted present value of a future stream of earnings (Birch 2017, 466).

3. “the configuration of value through these diverse valuation practices involves the transformation of something into a recurring source of revenue – that is, turning something into an ‘asset’ – rather than its transformation into a commodity” (Birch 2017, 468).

Birch conceptualises assetization “as a process in which value is constituted by the management of value and valuation, especially as they relate to organizational entities and their capacities” (Birch 2017, 470). It reflects “a dual process” involving the transformation of knowledge into IP, “and the monetization of that knowledge asset as a source of value (e.g., out-licensing IP)” (Birch 2017, 474).

For our analysis of the way that the entrepreneurial hospital mediates amongst incommensurate biovalues, it will be important to think about what it means for biobanks to produce economic value not from *commodities per se* – not from bringing scientific knowledge from bench to bedside – but from *assets*. This may have, as we shall suggest, important implications for the maintenance of the social licence of the biobank and the entrepreneurial hospital more generally, especially if it comes to be perceived in terms of “non-reciprocation” (Carter et al. 2015). Beyond this, and riffing on Birch’s argument for the analytic decomposition of the concept of bioeconomy into its constituent ‘bio’ and ‘economic’ parts in order to better specify its bio-technological and political-economic components, we want to suggest that the concept of biobank might admit a similar analytic decomposition into its biological (bio) and institutional (bank) components; however, it is precisely because of the mediation work done by the entrepreneurial hospital that the biobanks we studied avoid such decomposition.

4. Method

The data presented below are part of a larger study designed to examine biotechnological innovation in entrepreneurial hospitals in Canada (French and Miller 2012; Miller and French 2016). Following ethics review and clearance from the University of Toronto, we undertook (between 2008-2009), ethnographic fieldwork including extensive review of organizational documents, field-site visits, and twenty-six semi-structured, key-informant interviews with participants working in networked organizations within a single Canadian province, in a health system that provides publicly-funded, universal access to physician and hospital care. In this article, our analysis concentrates primarily on our interview data.

Initially our purposive sampling strategy targeted potential study participants working at the “bench-bedside interface” (Wainwright et al. 2009, 960). We interviewed senior hospital administrators, clinicians and researchers, as well as professionals working in the hospital’s technology transfer office (n=15). Then, to better understand issues specific to the

commercialisation of innovations derived from research with patient bi-material and information, we focused on finding informants involved in biobanking. We interviewed administrators, researchers, clinical staff and information technology specialists working with biobanks housed in, or affiliated with, the entrepreneurial hospitals we studied (n=11). Averaging about 1 hour in length, interviews were conducted in person (n=13) and by telephone (n=13) and were audio recorded and transcribed verbatim.

Our analytic approach was informed by constructivist grounded theory and methods (e.g. Bryant and Charmaz 2007), and especially situational analysis (Clarke 2005). Working collaboratively, we analysed our interview data for emergent themes.

5. Results

Our participants are involved, to varying degrees, with different dimensions of biobanking – they may get tissue from biobanks to facilitate their research (researchers), procure patient material and data (clinicians – nurses and doctors), secure patient consent for participation (research assistants), negotiate partnerships with external parties (technology transfer professionals), directly oversee the day-to-day operations of a biobank (administrators), or create strategies that align biobanking activities with broader organizational missions (senior administrators). All position biobanking as an integral research undertaking within their healthcare organization. Accordingly, while having diverse views on what biobanking is, and what it ought to accomplish, all see biobanking as an enterprise with the potential to contribute to the overall healthcare mission of their hospitals.

Below we have broadly categorized our data according to two overarching discursive orientations. On the one hand, we see a discourse that emphasizes the fundamental materiality – *tissue* – at the heart of biobanks. It describes biobanks as tissue repositories, access brokers, and as holding the currency of translational research. This orientation may be said to reflect the “bio”-ness of biobanks, (problematically) evoking notions of tangible goods that possess an inherent value, which, under the right conditions, may be extracted and leveraged. On the other hand, we see a discourse that emphasizes *patients*, which locates the biobank within the broader context of the entrepreneurial hospital. It describes biobanks as entangled with universally accessible healthcare systems, as well as with the work of clinical care. This orientation may be said to reflect the “bank”-ness of biobanks, (problematically) evoking notions of the institutionally-housed intangible dimensions of tissue collections that see them as deriving value through their relation to data about patients, treatment outcomes, and the broader, institution-level logics of care that characterize hospitals². These orientations are not mutually exclusive. Indeed, we argue that they are made to work together by the entrepreneurial-

al hospital, and therefore, when read in conjunction with all of their tensions, they exemplify the crucial mediation work performed by the entrepreneurial hospital.

5.1 Tissue

There are differing accounts in the literature over what, exactly, are the important, defining characteristics of a biobank (e.g. OECD 2006). On the surface, the necessary (if not sufficient) condition for constituting a biobank would seem to be the possession and/or accumulation of (human) biological tissue. However, as we shall suggest, this focus on tissue presents a rather minimalist representation of what makes up a biobank, and of what biobanks can do.

Biobanks as tissue repository

To be certain, human tissue is regarded as fundamental to biobanking in the context of the entrepreneurial hospital, which emphasizes the importance of translational research. Indeed, so central has been the possession of human tissue to the development of biobanking in this context, that one veteran of the field – a biobank director we interviewed – expressed the following axiom in his concluding remarks to us: “he who has the tissue rules” (BIA-39).

Conveying a sense of exasperation with the slow development of biobanking research in Canada, especially with respect to biomarker discovery and validation, our study participant prefaced his axiomatic statement about the centrality of human tissue by asking:

How are you going to find frickn’ solutions for things? In vapour ware? [...] the reality is in the final analysis, you have to try it out in humans [...], with human urine, blood, joint fluid, biopsy tissue... (BIA-39)

Biobanks, in this sense, are fundamentally repositories of *human* tissue that enable the discovery of healthcare solutions. As a biobank administrator notes:

Being able to make that jump from a cell line or an animal model into a human tissue model really advances the science, but you need those specimens to be able to do that research. (BIA-42)

These observations underscore the importance of the human bio-material resource at the heart of biobanking. This resource is rooted in access to patients and patient populations, well-developed, computerised medical records systems, and a range of other affordances that attend hospital care, thus making the apparatus that brokers ethical access to patients essential.

Biobanks as access brokers

Describing a situation in which access is brokered, one of our participants notes that “a lot of the work I do” is with:

commercial entities, often with very good ideas [...] for some sort of novelty test [...]; in theory it works well, but what they do not have access to is our, let's say, large pool of anonymized patient specimens. (BIA-36)

In the absence of trying their theories out using the hospital's “specimens”, the commercial entities in this example “cannot actually go ahead and develop their tests” (BIA-36). Our participant, who was a laboratory researcher, was – following a process of ethics review and “ethics paperwork” (BIA-36) – able to access anonymized human tissue samples stored in a hospital biobank. For diverse users, including those working in the private sector, access to tissue is both made possible, *and legitimated*, via an oversight and governance process, brokered by the entrepreneurial hospital.

The biobanks we studied were described as resources that could support translational research at the local, national and international level. This orientation towards translational research sometimes means forming partnerships with private sector organizations because, in the words of one participant, “we [the entrepreneurial hospital] don't have the resources here to actually take something to market” (BIA-28). From this perspective, the biobank plays an important brokering role, adjudicating proposals for research with the interests of its patient population in mind, while also perhaps bringing a solidaristic sense of legitimacy to research undertaken by its private sector partners. We see, here, not only the hybrid practices associated with adjudicating proposals, but also the institutionalized capacity to govern adjudication according to standardized, international norms. Indeed, as one biobank manager noted, “we are able to facilitate the access to bio-specimens, which are needed for translational research”: “the way our infrastructure is set up, it opens up channels for researchers to have access to it [patient tissue]” (BIA-42).

This point was underscored in our interviews with researchers who do not themselves maintain biobanks, but who rely on their biobanking colleagues to broker their access to (human) biological tissue. As one researcher noted, “we have technologies, genomic technologies, that can interrogate genetic material but only if we can obtain samples” (BIA-28). Access to patient samples is, in this case, seen to be a necessary condition of advancing the research and collaboration that takes place within the entrepreneurial hospital. Another researcher we interviewed also emphasized the importance of tissue access for the kind of research privileged by the entrepreneurial hospital. Engaged in a technology development project aiming to construct and validate a diagnostic device, this study

participant stressed the importance of developing “the referral pathway”, and of being able to access archived tissue, as well as a prospective stream of samples (BIA-49). Without this access to patient tissue, it would not have been possible to identify the molecular biomarkers used by this technology.

These observations link up with descriptions of biobanks as institutions that broker and legitimate access to patient tissue. As Waldby and Mitchell argue, biobanks play a central regulatory function in “tissue economies”: they accumulate tissue from donor populations and medical intermediaries; they process this tissue according to established technical and ethical guidelines, as well as legislation; and they redistribute it in legitimate ways that aim to maximize its utility (Waldby and Mitchell 2006, 35). Accordingly, while tissue accumulation is an essential feature of biobanking, so too is the brokering of legitimate access to tissue. This involves doing ‘public engagement’ and working on “public perception of what it means to be a biobank” (BIA-42). In doing this work, in brokering and legitimating access, the biobank becomes much more than a mere tissue repository. By governing social relations amongst researchers and publics, the biobank enacts a key, regulatory function of the entrepreneurial hospital, namely, the mediation of (new) uses of the patient population.

Biobanks as the currency of translational research

Several of our participants underscored how fundamental biobanks were to health research, especially translational research. One of the biobank directors we interviewed stated:

Biobanks are crucial. Dry data and wet data are the currency – I don’t like using the word currency – but they are the currency of innovation with respect to translational research and understanding human biology [...] translational research, for whatever purpose, for whatever question, requires exquisite, exquisitely phenotyped patients and exquisitely phenotyped and quality assured biobanks. (BIA-39)

As this study participant explained, the translational research conducted by his organization would not be possible, would “not be even imaginable, without quality assured, quality controlled, agile biobanks” (BIA-39).

Another participant, a clinician-researcher, draws a similar connection between biobanking and translational research. In response to our opening question designed to elicit information about our informants’ relationship to, and interest in, biobanking, this participant described “a desire to create a significant research program”. He stated: “we realized that, to have a research program that we envisioned, which was translational, it had to be biobanking” (BIA-46).

5.2 Patients

To this point, the characterization of biobanking is highly tangible, in its sources, practices and impacts. Below we present a more expansive conceptualization of biobanking, characterized by a care-focused orientation that is not well recognized in the literature. It is given a particular valence by the embedding of biobanks *within* the entrepreneurial hospital. It explicitly entangles biobanking with care, thereby emphasizing the networked nature of the biobank and—in tension with the emphasis described in the previous section—de-centering the idea that biobanks are all about tissue.

Biobanks as entangled with population-level, patient group treatment outcomes

Although possession and accumulation of tissue may be a defining characteristic of biobanks, many of our informants were careful to specify that, without the capacity to understand tissue *in relation* to patient records, personal health histories, collective geo-demographic information, risk exposures, treatment regimes, future patients, and the like, the biobanking enterprise would add limited value to health research.

To see how biobanks transcend their attachment to purely corporeal artifacts by producing ‘bioinformation’ (Parry and Greenhough 2018), consider how our study participants situate tissue in relation to information gleaned during the course of clinical care. With reference to making genomic discoveries, for example about the ways that complex therapeutic interventions interact with the genetic pre-dispositions of individuals and groups, one study participant succinctly stated: “omic [genomic, proteomic, etc.] knowledge is based on care of patients” (BIA-31). To contextualize this statement, our participant described his research in the following terms:

I work [...] to discover new omic information. And, the nature of [this] work is based on, the study of patient material. [...] So, we will look at populations of patients, not just one, but a whole population of patients with a similar type of [disease]. We will take an omic discovery and we will correlate that with the clinical features of the patient group when they first present with their disease and then follow information on how they respond to therapies over time. And, so we very closely correlate an omic piece of information with a diagnostic or outcome result, and that outcome result is really what makes the omic piece important. (BIA31)

In this description, research using patient materials is made valuable through its linkage to, its correlation with, clinical information.

This correlative capacity of biobanks to connect up with information gleaned during the course of care was similarly underscored by another

participant we interviewed, a clinician researcher who linked tissue samples with patient outcomes data:

I set up a lab [...], which uses tissue samples from [the hospital] and links them to outcome data [...]. And, the [tissue] archives wouldn't have been valuable without the [outcome] data. But, by putting them together we're able to make something really good happen. (BIA-29)

By situating biobanking initiatives within a broader organizational setting characterized by relations of care – a unique feature, we believe, of the biobanks we studied – our participants' discourse illustrates that the materiality of tissue is profoundly entangled within the broader networks of the entrepreneurial hospital. We suggest, moreover, that the entanglement of biobanking materials and practices with materials and practices mobilised for care is a key function of the entrepreneurial hospital.

Biobanks as part of clinical care

Biobanks have been described as serving therapeutic, forensic, diagnostic, and research-related ends. In spite of their potentiality to serve these diverse ends, a great deal of focus in social scientific literature has been concentrated upon future-oriented, research-related ends (Hoeyer 2008, 430). Somewhat missed in this focus is the potentiality of biobanks to serve clinical ends in the present.

As our participants describe, this clinical utility of biobanking stems not solely from its promise of future improvements in care, of better, more tailored treatments, but also from the symbolic capital it provides to health professionals in the here and now of bedside interactions. Tapping into the embodied, emotional and affective dimensions of patienthood (cf. Kerr and Cunningham-Burley 2015), this way of thinking about and articulating the role that biobanks can play in care typifies how the entrepreneurial hospital not only constitutes its patient populations and care infrastructure as distinctive assets in service of entrepreneurial aims, but also positions its entrepreneurial aims as a decisive element in the service of care. It presents a benefit that off-sets risks associated with biobanking (e.g. risks related to discrimination, or breach of privacy). Although this way of articulating the value of biobanks could be understood as a form of self-justifying rhetoric, it also depicts an attempted virtuous cycle in which care feeds into research and research feeds into care, all the while functioning in a way that aims to be respectful of patient interests. This notion of a virtuous cycle, resulting from pursuing both care and research, seems to be fundamental to the *raison-d'être* of the entrepreneurial hospital.

One of our participants, a biobank director, made a sustained argument that biobanking is “actually part of clinical care” (BIA-43). His analysis is nuanced and bears quoting at length:

[...] the other facet of biobanking, which is not just satisfying, but I think it's very important, is that donors want us to ask them to provide their tissues and data. They say it loudly and resoundingly [...]. When you ask somebody when they're sick with a disease, do you want to donate to a biobank, it's actually part of clinical care. When people come into a centre and they're facing a problem, they want... Forty-nine percent of what they want is advice, management, treatment, to be cured or to resolve the pain, or whatever it is that is their problem. And, fifty-one percent of what they want, I believe, is they want us to provide them an opportunity to do something about it so that they don't get a recurrence or their daughter doesn't get the same disease or their neighbours and their friends. So, in that sense, when you treat a patient or provide advice, I think it's incumbent on us in healthcare to offer that opportunity at the same time as giving our advice and our drugs and our treatment. And, so, in that sense, that fifty-one percent of the reason is, of why we should offer biobanking, is offering opportunity for patients to *do something* – they make a decision. Their decision might be no, I don't want to, but that's therapeutic. A patient's been given a chance to make a decision about their condition and their disease and their interaction with their healthcare. (BIA-43)

In this passage of the transcript our study participant mobilizes a line of argument that could be emblematic of the entrepreneurial hospital. As with the entrepreneurial hospital's investments in technology transfer, innovation, and commercialization initiatives (French and Miller 2012; Miller and French 2016), biobanking is here also constituted as part of a broader, moral obligation owed to citizens, which stems from their support of publicly-funded healthcare.

Although its mission involves constituting its patients and patient populations as distinctive assets in the service of entrepreneurial aims, these entrepreneurial aims are themselves enrolled, in a broad sense, in the service of universal care. Our informant continues:

[...] one additional point is that many patients are offered the opportunity to be involved in research and knowledge development that deals with their disease [...], but most of what is offered comes with entrance criteria and guidelines, which relate to the specific research question being asked. So, this is one of the benefits and the advantages of biobanking – you ask a patient a much more generic and fundamental question around involvement in research. You know, would you like your tissue and your blood sample and your health data to be collected, organized and then made available for research in the future and we're not sure what that research project is, but we'll set up the appropriate mechanisms to make sure that, if it's used, it's used appropriately, ethically, and for good science. And, that's essentially the biobanking transaction. But, when we offer that to patients, we can offer it to all patients. [...] And, so, essentially, it's a very equitable and open opportunity to be involved in research that biobanking offers, which is distinct from most other kinds of research like a clinical trial which is very specific. You've got to have this disease. You've got to

be going to a centre where the clinical trial is open and you have to meet all these criteria. And, if you don't meet those criteria, we can't offer this to you; whereas we can offer biobanking to everybody. (BIA-43)

As noted, our research was conducted in a health system that provides publicly-funded, universal access to care. In the above passage, participation in research biobanks is also framed as a matter of access (as opposed to, or perhaps in addition to, a matter of obligation). As our participant asserts:

...I think it's incumbent on us to offer biobanking for free, and biobanking in the broad sense, meaning that we offer a patient an opportunity for their tissue and their data to be used for health research that generates new knowledge. (BIA-43)

These points, of course, bear some critical reflection. As scholars studying national biobanks have argued, patients may not experience the offer to "do something" by participating in biobanking research as empowering (e.g. Tutton 2002; Busby and Martin 2006). Nevertheless, what we wish to underscore by highlighting the above passages is that biobankers actively work to make sense of their efforts with respect to care, and this is indicative of the entrepreneurial hospital's reconfiguration not only of care so that it is addressed to research aims, but also of research so that it is addressed to care aims.

6. Discussion

In some senses, the discursive orientations that we have identified are complementary discourses: they each speak to overarching aims of the entrepreneurial hospital. Yet, in other ways, they exist in tension, one emphasizing tissue as the key locus of biobank activity, the other foregrounding the patients, populations, information systems, and so on that entangle biobanking practices with clinical care. To theorize these orientations, let us circle back to the two strands of work we highlighted in our literature review: 1) hybridization of public- and private-sector logics, and 2) mediation of incommensurate (bio)values by biobanks.

Hybridization of public and private-sector logics

Dixon-Woods and colleagues (2008) argue that conceptualizing biobanks and their publics as interdependent, mutually constitutive multiplicities is useful for understanding the existence of competing views of tissue use. Drawing from Star and Griesemer (1989), they describe tissue as a boundary object, an object that lets people cooperate without necessarily having to agree upon how the object is defined, classified or valued.

By emphasizing multiplicity in conceptualizations of biobanking – in understandings of public views and professional motivations – the authors trouble analyses that characterize biobanks as drivers of body commodification. They are critical of analyses that depict biobanks as:

a particular, though pervasive and especially disturbing, case of a more general inclination on the part of biomedicine, bioscience and bioindustry to defile the sanctity of the body and the dignity of individuals. (Dixon-Woods et al. 2008, 58)

For Dixon-Woods and colleagues, the problem with such accounts of biobanking is that they assume 1) that participants can be easily duped into colluding with their own objectification, and 2) that “tissue samples, once they have crossed the boundary into the social world of the ‘researcher’ inevitably become part of a commodified tissue economy” (Dixon-Woods et al. 2008, 75). Having made this critique, the authors argue that there is nonetheless a need to understand how biobanks operate in institutional contexts that might encourage individual researchers to pursue commercial objectives. Regulating such pressures, they contend, are powerful incentives, which can be regarded as a form of social or reputational capital. In order to maintain this capital, biobanks must operate, they argue, in ways that “sustain their social licence”, that are seen “to act in the interests of donors”, and that do not risk the cooperation of donors nor that of “the hospital staff who spend time and effort to seek [patient] consent” (Dixon-Woods et al. 2008, 76).

Drawing from Dixon-Woods (2008) and colleagues, one way to interpret the statements of our study participants is as an effort to manage, in an entrepreneurial way, the social capital of their initiatives. This involves acting in ways that protect, but also *grow*, the investment made by biobanking participants. We see elements of the effort to grow, while sustaining social license, in both of the discursive orientations we described. Yet, the harmonious hybridization that this entanglement seems to have accomplished might be undone if disagreements over fundamental characteristics (definitions, valuations, etc.) are surfaced. And, in an almost counter-intuitive sense, this is precisely what the patient-emphasizing discourse might do if the entrepreneurial hospital’s biovalue yields are expressed in assets (Birch, 2017) rather than, say, commodities.

Mediation of incommensurate (bio)values by biobanks

We can see this unsettling potential if we look at the apparently harmonious hybridization of the growth- and social license-imperatives through the prism of biovalue. As noted, the concept of biovalue describes “the yield of vitality” that is gained “by the biotechnical reformulation of living processes” (Waldby 2002, 310). It foregrounds the trade-offs and (unintended) consequences that stem from different modalities

of biovalue, for example those that depend on the separation of individuals from their biological materials, and those that require their linkage. The entrepreneurial hospital, as we have argued, is well positioned to mediate amongst these incommensurate values.

Yet let us hypothetically push this mediation work beyond a threshold and ask what would happen if the biobanking initiatives we have studied do not lead to the hoped-for production of new diagnostic and treatment technologies for future patients? Assume here that, when patients are offered the opportunity to “do something” by participating in biobanking, this *something* means contributing their tissue and information for translational research, which aims to help future patients through the creation of new, life-saving diagnostic and therapeutic technologies. This *something*, in other words, is the creation of value ultimately through the production of *commodities* (i.e. diagnostic and therapeutic interventions that can ultimately be bought by the entrepreneurial hospital and deployed in the clinic). However, the concept of assetization highlights the fact that value in the life sciences sector frequently comes less from commodity production than from financialized transactions involving the exchange of assets (Birch 2017). For example, Lazonick and Tulum (2011), drawing on the work of Gary Pisano (2006), argue that in the US biopharmaceutical sector, which is heavily subsidized by public funds, there is something like a perverse incentive to try to monetize assets instead of pushing scientific discoveries to market as commodities:

...the highly financialized US business model in the BP [biopharmaceutical] industry tends to undermine innovation by placing strategic control in hands of those who, primarily through stock-based compensation, have an incentive to make allocative decisions that, through speculation and manipulation, increase their firm's stock price even when such decisions impede the organizational learning processes that can result in a commercial drug. (Lazonick and Tulum 2011, 1185)

In other words, those who stand to make millions from stock options have an interest in raising stock prices, even if the tactics used to achieve this end ultimately impede drug development. If we see this as a more general trend that will frustrate the efforts of biobanks and translational research to produce new, life-saving technologies, how long will the entrepreneurial hospital be able to maintain its social license? Birch provocatively suggests that innovation strategies in the life sciences could be conceptualized as a kind of reverse Ponzi scheme (cf. Mirowski 2012):

it is the final private financier (e.g. late stage venture capitalist) who either accrues the highest returns *or nothing at all from their investment*, while the first financiers (e.g., friends, family, government, etc.) accrue the least. (Birch 2017, 465 – our emphasis)

From this perspective, the key question is, when will the bubble burst?

7. Conclusion

Our aim in this article was to examine the relationship of the biobank to the entrepreneurial hospital. Drawing from sociological and STS accounts of 1) the hybridization of public- and private-sector logics in biobanking, and 2) the ways that biobanks mediate incommensurate (bio)values, we suggested that biobanks act as crucibles for both the intensification and mitigation of the tensions mediated by the entrepreneurial hospital. We emphasized a meso-level analytic approach, using our study participants' discourses to reflect on organizational and network dynamics. This approach underscored how the entrepreneurial hospital works as an intermediary to confer legitimacy on its research *and* care aims. Indeed, our analysis suggests that the entrepreneurial hospital is not only entrepreneurialising care to meet research needs, but also trying to entrepreneurialise research so that it meets care needs.

In rendering this mediation work visible, we have also raised questions about its viability over the long-term, particularly as it relates to the wider set of valuation and value-creation practices evident in the life sciences sector, which have tended to favour the creation of assets rather than commodities per se. Here, the key questions are: will the public and biobank participants ever realize the promised returns of biobanking research, and if not, (how) will the entrepreneurial hospital continue?

In raising these questions we are suggesting the need for further research. We are here mindful of the limitations of our study, namely that we did not focus on the views of biobanking participants, that we did not attend in extended depth to everyday biobanking practices as a longer ethnographic study might, and that we focused on biobanking and the entrepreneurial hospital in one province in Canada. These limitations mean that we have been unable to explore participants' views of the opportunity to "do something" via biobanking. We have not been able to explore how variation in everyday practice might complicate the discursive orientations we identified. And we have not been able to explore how "generalizable" these phenomena are beyond our empirical setting. These points, we suggest, represent fruitful avenues for future research.

Acknowledgements

We are indebted to the many busy people who agreed to speak with us about their work, and thank the Canadian Institutes of Health Research (CIHR) for funding for this project (81195). While conducting this research, Fiona A. Miller was supported by a New Investigator Award from the Institute of Health Services

and Policy Research of CIHR (80495), and Martin French was supported by a Fellowship from the CIHR-funded 'Health Care, Technology and Place' Strategic Training Program and a postdoctoral fellowship from the Social Sciences and Humanities Research Council (SSHRC) (756-2010-0741). While writing this manuscript, Martin French had support via a SSHRC Insight Development Grant (430-2016-00996) and an Action-Concertée grant from Quebec's Fonds de Recherche—Société et Culture (2017-BJ-202106). Sponsors' support of this work should not imply endorsement of the conclusions, for which the authors retain sole responsibility. Martin and Fiona would like to thank Renata Axler, whose amazing authorial help was crucial for pushing this manuscript across the finish line. Martin, Fiona and Renata would like to thank the three reviewers of this manuscript for their very thorough and extremely helpful comments, as well as the editors of this special issue, Lorenzo Beltrame and Christine Hauskeller, for their excellent and insightful guidance.

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¹ According to one of the biobanks we studied, for example, 92% of referred patients agreed to participate.

² The strong distinction between tangible and intangible goods here could be likened to the equally problematic distinction sometimes drawn between materiality and immateriality, tissue and data, and so on.