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Accepted Manuscript

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PII: S0277-9536(19)30087-5

DOI: https://doi.org/10.1016/j.socscimed.2019.02.020

Reference: SSM 12169

To appear in: *Social Science & Medicine*

Received Date: 20 August 2018

Revised Date: 12 January 2019

Accepted Date: 12 February 2019

Please cite this article as: Wright, S., Porteous, M., Stirling, D., Young, O., Gourley, C., Hallowell, N., Negotiating jurisdictional boundaries in response to new genetic possibilities in breast cancer care: The creation of an 'oncogenetic taskscape', *Social Science & Medicine* (2019), doi: https://doi.org/10.1016/j.socscimed.2019.02.020.

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ABSTRACT

Changes in the nature and structure of healthcare pathways have implications for healthcare professionals' jurisdictional boundaries. The introduction of treatment focused *BRCA1* and *2* genetic testing (TFGT) for newly diagnosed patients with breast cancer offers a contemporary example of pathway change brought about by technological advancements in gene testing and clinical evidence, and reflects the cultural shift towards genomics. Forming part of an ethnographically informed study of patient and practitioner experiences of TFGT at a UK teaching hospital, this paper focuses on the impact of a proposal to pilot a mainstreamed TFGT pathway on healthcare professionals' negotiations of professional jurisdiction. Based upon semi-structured interviews (n=19) with breast surgeons, medical oncologists and members of the genetics team, alongside observations of breast multidisciplinary team meetings, during the time leading up to the implementation of the pilot, we describe how clinicians responded to the anticipated changes associated with mainstreaming. Interviews suggest that mainstreaming the breast cancer pathway, and the associated jurisdictional reconfigurations, had advocates as well as detractors. Medical oncologists championed the plans, viewing this adaptation in care provision and their professional role as a logical next step. Breast surgeons, however, regarded mainstreaming as an unfeasible expansion of their workload and questioned the relevance of TFGT to their clinical practice. The genetics team, who introduced the pilot, appeared cautiously optimistic about the potential changes. Drawing on sociological understandings of the negotiation of professional jurisdictions our work contributes a timely, micro-level examination of the responses among clinicians as they worked to renegotiate professional boundaries in response to the innovative application of treatment-focused BRCA testing in cancer care – a local and dynamic process which we refer to as an 'oncogenetic taskscape in the making'.

Keywords: *UK; Professional jurisdictions; cancer care; taskscape; genomics; mainstreaming; personalised medicine*

INTRODUCTION

Care pathways are locally developed guidelines which outline the order and timing of healthcare that patients receive and the roles and responsibilities of practitioners involved in care provision. These infrastructural technologies came to prominence in the 1980s in North America (Allen 2009, 2014) and are now firmly established within modern healthcare (Martin et al. 2017). The potential cost-saving and standardising effects of the introduction of care pathways into healthcare have been widely acknowledged (Martin et al. 2017; Hunter and Segrott 2008; Berg et al. 2000). But while efforts to standardise and promote transparency of practice fit within the contemporary 'audit culture' (Strathern 2000), it is recognised that the introduction of care pathways might also create tensions. Casting a critical eye over the care pathway movement, Pinder et al. (2005) note that while the introduction of care pathways might be built upon good intentions and the ideal of rationalised planning, this organisational map making can have negative consequences, not least in relation to healthcare professionals' perceptions of professional autonomy, and inter-professional jurisdictional boundary negotiations.

Care pathways and the sociology of professions

Abbott's (1988) work on the social nature of workplace relationships and professional control offers a useful analytical foundation for examination of the fluidity of professional workplace jurisdictions in relation to care pathway development. Elucidating the concept of workplace jurisdiction, Abbott (1988) notes that far from being fixed, a profession's control, or ownership, of tasks is open to continuous, competitive negotiation. Abbott's work is, however, concerned with 'investigating how jurisdictions of entire professional groups vanish or expand over

time under internal or external pressure' (Timmermans 2002: 552) and has been criticised for over-simplifying the complexity of workplace jurisdictional negotiations (Macdonald 1995).

Sociologically-informed studies examining the impact of workforce change within the NHS in relation to jurisdictional defence and negotiation are numerous, and highlight the mobilisation of occupational legitimacy discourses used by different occupational groups to assert new or established professional jurisdiction in relation to others (Sanders and Harrison 2008; Hunter and Segrott 2008; Nancarrow and Borthwick 2005; Timmons and Tanner 2004; Allen 1997). As Timmons and Tanner (2004) note, examples of boundary disputes include those involving hierarchical jurisdictional negotiations, as well as those conducted among professions with a similar status.

While it is suggested that the changes that come with care pathway development can improve inter- professional collaboration and cooperation (Harvey and Currie 2000), they can also be counterproductive, as healthcare professionals react by 'protecting, expanding or closing ranks' around their jurisdictional territory (Huby et al 2014). An example of this is seen in the emergence of new professional roles and the enactment of a form of legitimising discourse, used by professionals – new and old – to try and assert their (new/established) professional jurisdiction in relation to others. For example, Timmons and Tanner investigated the highly charged occupational boundary dispute between theatre nurses and new 'Operating Department Practitioners'. They reported on the demarcation disputes that ensued following the introduction of new professionals (ODPs), and how both groups – the nurses and ODPs – deployed a range of rhetorical strategies in order to defend what they viewed as their jurisdictional territory (Timmons and Tanner 2004).

Jurisdictional conflict is not only the result of the introduction of new roles into the NHS, but can also emerge as a result of the implementation of new technologies, which may cause a realignment of jurisdictional boundaries. For example, in his cautionary account of the

occupational division of labour between gastroenterologists and surgeons in response to the development of gastrointestinal endoscopy, Zetka suggests that the introduction of endoscopy blurred the 'traditional lines of demarcation' (2001:1507) and triggered conflict between gastroenterologists and surgeons, as the groups vied for control over the technology. But, while much of the existing literature on the sociology of professions details inter- or intra-professional conflict occurring as a result of new possibilities of practice – either the emergence of new roles or the introduction of innovative technologies - there remains relatively little attention paid to the impact of innovative *genetic* technologies on professional jurisdictional negotiations, which seems surprising given the hype and hope that has surrounded this technology since the turn of the century.

Care pathways, professional jurisdictions and genetic technologies

In their qualitative study of the provision of cancer genetic services for hereditary cancer syndromes in Ontario, Canada, Miller et al. (2008) speak of the co-evolution of two parallel professional communities of practice that have emerged in the context of the growing influence of genetics in medicine. Members of these two communities, (genetic counsellors, family physicians, non-genetics physicians such as surgeons, and general practitioners), spoke of either a 'genetic vision' of cancer care or, an 'oncogenetic vision'. The genetic vision represented a future characterised by the devolution of day-to-day tasks to other specialists while simultaneously protecting the sovereignty of genetics expertise. Conversely, the oncogenetic vision saw genetic testing as cancer prevention, informing management and treatment and, as such, positioned genetic expertise as 'a supportive element in the core cancer service' (Miller et al. 2008: 158). Miller et al. (2008) note that, in contrast to much of the literature on negotiations of professional jurisdiction, their study is not so much an account of professions in conflict, but rather a demonstration of how heterogeneous communities of practice can emerge in response to the introduction of genetic technologies in clinical practice.

Two further studies (Martin et al. 2009; Robins and Metcalfe, 2004) focus on the impact of the integration of genetic technologies into primary care. Discussing the role of general practitioners with specialist interest (hereafter GPSI) in relation to specialist colleagues in tertiary care, Martin et al. (2009) examined how the division of labour between clinical genetics and GPSIs was negotiated at several pilot sites. The study highlighted that both cooperative and less constructive relationships were formed between GPSIs and clinical geneticists and that, while the former were keen to demonstrate their competence in genetic knowledge, the clinical geneticists claimed that only day-to-day immersion in the knowledge field would result in true expertise. In contrast, Robins and Metcalfe's (2004) Australian study focused on the integration of genetics into primary care practices, and found that GPs held ambivalent views, claiming a lack of understanding of genetics, coupled with uncertainty as to the relevance of genetic testing to patient management.

Each of these studies teased out central questions about the negotiation of control of genetic technologies among healthcare professionals and highlighted central themes in participant narratives linked to perceptions of expertise and clinical relevance. These themes also came up in our own work as we examined the professional jurisdictional negotiations that were triggered by the proposal to mainstream the pathway for the delivery of 'treatment-focused' *BRCA1* and *2* genetic testing (hereafter TFGT) for newly diagnosed breast cancer patients in oncology. Bringing together the views of surgeons, medical oncologists and genetics team members as they prepared for the mainstream pilot, our study contributes new insights into how innovative applications of existing BRCA testing technology influenced occupational divisions of labour as this group of professional contemplated incorporating genetic testing in their clinical practice.

A note on 'treatment-focused genetic testing' for *BRCA1* and *BRCA2* gene mutations

Dominantly inherited *BRCA1* and *BRCA2* gene mutations are known to be associated with heightened risk of developing breast cancer and ovarian cancer (Kuchenbaecker et al. 2017). Due

to technological advances in, and decreasing costs of, gene sequencing in recent years (Trainer et al. 2010), and new evidence from clinical trials of targeted treatments in *BRCA* mutation positive women (George et al. 2017), *BRCA* testing has expanded from its predictive and diagnostic functions to inform personalised cancer treatment plans (NICE 2013). TFGT has the goal of stratifying patients according to their *BRCA* mutation status and targeting their treatment as a result. This recent application of *BRCA* testing offers patients streamlined treatment pathways, particularly where TFGT is offered by cancer specialists (surgeons or medical oncologists) within mainstream cancer care.

METHODS

Data collection

Findings presented herein originate from a larger, ethnographically-informed study of patient and practitioner experiences of TFGT at one UK teaching hospital, which sought to examine individuals' experiences of the shift towards the mainstreaming of genetics into routine cancer care. In their introduction to a special collection on hospital ethnography van der Geest and Finkler note that 'possibilities for anthropological research in hospitals vary', (2004: 1999) due to differing cultural norms of privacy and patient well-being – concerns which are managed through ethical review boards. We use the term 'ethnographically-informed' to describe our research in order to indicate the adaptation of traditional ethnographic methods, specifically, participant observation that we undertook in this study. Our observations were structured and limited to certain spaces and, as such, offer an example of Wind's reworking of participant observations as 'negotiated interactive observations': 'what happens when you are doing fieldwork without at the same time assuming that you become one of "them"' (2008: 87). In this paper, we focus exclusively on data from the breast cancer care pathway, at a time when it was preparing to pilot a mainstreamed model (see Figure 1 for current and proposed pathways). Captured during the

period of negotiation and early implementation of the new pathway, our findings report the anticipatory views of those working in breast cancer care.

Fieldwork was conducted by SW in 2017 and involved twice-weekly attendance at the breast multidisciplinary meetings (MDM) over a six-month period, with most meetings lasting between 2-3 hours. Despite being structured and limited to the MDM, observations allowed SW to examine the processes of patient triage and inter-professional communication pertaining to the proposed mainstream pathway. Furthermore, observations allowed SW to become known to the clinicians enabling the successful recruitment of practitioners to the study. Nineteen semi-structured interviews were conducted with clinicians involved in breast cancer care. Participants were identified through contact with key clinical gatekeepers (in surgery and the genetics team). SW emailed potential participants an invitation, information sheet, and expression of interest form. Interview participants included six Breast Surgeons and a breast care nurse specialist (BS1-7) who were responsible for triaging patients for onward referral to the genetics team, six Medical Oncologists (MO1-6) who were about to undergo training and start offering TFGT to breast cancer patients, and six members of the Clinical Genetics team (CG1-6) who currently offer TFGT to all breast patients fitting referral criteria. All interviews were digitally recorded. The University of Edinburgh Research Ethics Committee granted ethical approval.

Data Analysis

We conducted a thematic analysis of fieldwork materials (transcripts and field-notes). We first familiarised ourselves with the data, listening to audio files and reviewing our transcripts and field-notes (Pope, Ziebland and Mays 2000). SW and NH discussed emerging ideas and themes at regular meetings before independently coding the transcripts using NVivo11 software (QSR International Pty Ltd., 2015). Codes, and subsequent categories, were inductively and deductively determined (Maxwell 2012), that is, we were influenced both by *a priori* research questions (for example, seeking to understand clinicians' experiences of providing TFGT), as well as

recognition of new insights (for example, learning of the plans to mainstream the breast care pathway). While consideration of occupational boundaries was not the initial focus of our study, it nevertheless became a strong thread in our participant narratives, as they spoke of the plan to mainstream the breast care pathway.

FINDINGS

Figure 1 about here

TFGT and the renegotiation of professional jurisdictional boundaries in the context of breast cancer care

When we commenced this research, patients with breast cancer were offered TFGT in a standard care pathway. This meant that patients were triaged by their surgeons during their first appointment in order to determine whether they TFGT was appropriate. Triaging criteria included: age, family history (if known) and tumour type. Eligible patients were referred to clinical genetics where they received (expedited) pre-test counselling and *BRCA* testing, which commonly would comprise of a 45 minute counselling session, followed by a blood test, performed by the genetic counsellor. The genetic counsellor would then be responsible for sending the blood sample to the hospital laboratory, from where it would be sent on to the national laboratory for processing. Results of the test would then be returned to the genetics team. Only those identified as carrying a pathogenic mutation or Variant of Uncertain Significance (VUS) – a result which necessitates the interpretation of complex results - would be invited back to the genetics clinic to discuss their result and initiate a familial cascade. The timing of TFGT in relation to treatment varied between patients, depending on whether they had neo-adjuvant chemotherapy or conservative surgery (see fig 1).

197 This standard pathway, based upon triage and, where appropriate, onward referral to clinical
198 genetics for testing, established and reified 'occupational jurisdictions' (Hunter and Segrott 2014)
199 - the roles and responsibilities of surgeons, medical oncologists and the genetics team in their
200 daily practice. As one of the genetics team members said:

201 *'Our role really is to go through the testing so that they can understand the implications of being tested*
202 *and the possible outcomes… We have to very much take into consideration that this test result can*
203 *impact the family and this is one of the things that I feel is really important so that they know that*
204 *having a genetic test result can mean that their condition, their diagnosis can maybe effect other family*
205 *members and other family members will be able to be tested and other family members might be at risk'*
206 *(*CG1*).*

207 While the genetics team were concerned with, both, the individual patient and their family
208 members, the medical oncologists and surgeons, in contrast, described themselves as primarily
209 focused on treating individual patients:

210 *[The oncologists'] area of work is personalised medicine and, hence, their focus is on individualised care.*
211 *It should not be about treating of a disease but, rather, it is about treating a patient (*notes from
212 interview with MO2*).*

213 *'We don't say too much about the, you know, the implications for the other family because, you know,*
214 *we're here to treat cancer' (*BS6*).*

215 During our research the clinical genetics team actioned a plan to pilot a mainstreamed pathway at
216 the hospital; this entailed shifting the responsibility for consenting and *BRCA* testing from the
217 genetics team to the surgeons and medical oncologists at the breast unit. This stage of 'process-
218 mapping', that is, deciding what should happen and when in the new pathway (Harvey and
219 Currie 2000), demanded renegotiation of professional jurisdictions, as the genetics team sought
220 to devolve the responsibility for consenting patients for TFGT to other practitioners. The design

and implementation of the pathway was achieved through adaptation of the Royal Marsden's 'mainstreaming cancer genetics project' to the local context, a job which was taken on by members of the genetics team. While this was an innovation, it was not the first time that the genetics team had introduced a mainstreamed approach to TFGT at the study site, as the ovarian cancer care pathway had been mainstreamed several years prior to our fieldwork. However, unlike the ovarian pathway, which delegated consenting and testing, and the interpretation and sharing of results with patients, the proposed breast pathway would see the genetics team maintaining jurisdiction over results interpretation and informing patients of their BRCA status.

Contracting work boundaries: the clinical genetics team's views on mainstreaming

The introduction of TFGT had had profound implications for the genetics team, as the incorporation of this technology into their practice had meant that their workload had increased in recent years to a point where the service was struggling to cope. As a consequence, the genetics team were actively encouraging other professionals to share some of the workload associated with TFGT – an example of what Nancarrow and Borthwick (2005) refer to as 'horizontal substitution', which is advantageous when services are at capacity. The proposal to relinquish taking consent for genetic testing in this instance was justified by some genetics team members as related to the indistinctness of professional responsibilities when it came to TFGT, as CG3 said '[just] because a patient has a genetic cancer doesn't mean that they only belong to genetics: they have cancer, they need their treatment'. As Miller et al. (2008) found in their study of those involved in genetic cancer care in Ontario, there was a sense among some practitioners that the mainstreaming of cancer care was the future, and that the genetics clinic was not necessarily the right place for this care provision. Indeed, as CG3's comment highlights, there was unresolved tension raised by TFGT, primarily because there was uncertainty about where these patients would belong, and who should be responsible for them.

Role diversification, or the adoption of a new role by a professional group (Nancarrow and Borthwick 2005), - in this case the surgeons/medical oncologists adopting the role of consent taker - was regarded by the genetics team as a means to divest themselves of a task so that they could refocus their attention on the familial implications of testing:

> *'I think the genetic counselling role obviously is of high importance when we're looking at family and I don't feel that's going to go I think that's always going to be the most important thing dealing with the management of the family' (*CG2*).*

As noted above, the importance of looking beyond the individual and considering *the family* distinguishes the role of clinical genetics from that of other professionals in the breast cancer pathway. Indeed, the expertise of clinical genetics extends beyond the patient and the pathology, linking patient and kin through a relationship of risk (Hallowell 1999). Crucially, this sense of professional jurisdiction extending beyond the individual patient to their family offered a justification for why the genetics team appeared to be advocating for mainstreaming TFGT.

> '*We weren't set up for it, they're [genetic counsellors] on their knees, it will return us to actually being able to do our own job properly. I don't think it takes away the role or anything, I think there's all the pre-symptomatic testing, which is what we're really supposed to be about' (CG4).*

As CG4 observed, mainstreaming this service would allow the clinical genetics team to return to their primary role of counselling and supporting those patients, specifically, those identified as mutation positive or as carrying VUS. In addition, the genetics team would be able to focus on not only the patients, but also the tasks of identifying and supporting family members undergoing pre-symptomatic testing.

In summary, the proposal to mainstream TFGT potentially narrows the jurisdiction of the genetics team, allowing them to re-establish the boundaries around their specialist jurisdiction, while simultaneously necessitating the expansion of surgeons and/or medical oncologists'

jurisdictions, as they assume responsibility for offering TFGT and consenting patients. In the following section we consider how these non-genetic specialists responded to the possibility of a mainstreamed pathway, in relation to their workload, realms of expertise and perceptions of relevance of TFGT to clinical practice.

Expanding work boundaries: Breast oncologists' and surgeons' reactions to jurisdictional renegotiations

Our findings indicate that breast surgeons and medical oncologists had differing opinions about the implementation of a mainstream pathway. The medical oncologists who participated in our study appeared keen to complete the online training provided to them by the genetics team, so that they could start integrating the consenting of patients into their clinical practice. The reasons that medical oncologists gave for their enthusiasm for participating in the mainstream pathway included: their belief in their ability to take on this work, both in terms of expertise and workload, their understandings of the clinical relevance of TFGT and, finally, their sense that they were better suited to the task than their surgical colleagues. Primarily, the medical oncologists recognised that they had a number of skills - namely, discussing risks and benefits in oncology- that would suit the task of consenting patients for TFGT:

> *'I don't feel uncomfortable in discussing it in broad terms, so in terms of consenting the patient…I don't feel uncomfortable about that. I mean we have a lot of similar type of discussions, around other aspects of oncological care that are also… a question of balancing unquantified risks and unquantified benefits, or risks and benefits that haven't got precise measures. So I think I can consent people meaningfully for the genetics test, which is probably the key question as to whether it's right to mainstream or not'* (MO3).

The experience of communicating uncertainty about treatment and prognosis to patients meant the medical oncologists viewed consenting patients for TFGT as falling well within their professional jurisdiction. This finding echoes Miller et al. who found that those healthcare professionals who espoused an oncologic vision of care saw undertaking some roles previously

under the purview of genetic professionals as a 'natural extension of their work' (2008: 158). Furthermore, we found that some medical oncologists felt that offering TFGT was a more appropriate task for them than their surgical colleagues:

> *'You need this operation, these are the risks". When it comes to discussing chemotherapy, and say adjuvant chemotherapy, it's really common that we have a kind of discussion, "well, here's the pros and here's the cons and it's somewhere in between" and it's a grey, grey area discussion we can't perfectly quantify. So our familiarity with that type of conversation might be greater [than the surgeons']'* (MO3).

Thus, the medical oncologists deployed legitimacy discourses to position themselves as competent and better suited for this work than their surgical colleagues (see Sanders and Harrison, 2008). Finally, the medical oncologists were clear about the clinical utility of the TFGT result for the treatment of their patients:

> *To know the BRCA status of a patient … 'determines the treatment'. The oncologists request an urgent result and, usually, they will get the result within 4 weeks. This is by mid-chemo, and the outcome is important because they can change the chemo regime, if necessary. If a patient comes back BRCA + then 'Carboplatin' will be added into the chemotherapy. Therefore, knowing the BRCA status of the patient before neoadjuvant therapy is completed is absolutely vital for the care they are providing patients (*interview notes MO2*).*

Knowing the BRCA status of a patient is, therefore, crucial for providing appropriate oncological care and, consequently, there was strong interest among the medical oncologists to learn this information as soon as possible. Despite this logic, it was the case that medical oncologists may not, in fact, know their patient's BRCA status at the time of commencing chemotherapeutic treatment. Consequently, mainstreaming the pathway presented the opportunity for the medical oncologists to gain control over the timing of testing for patients which would support them in their clinical practice. However, it should be noted here that although the shift to a mainstreamed model for TFGT in breast cancer care had seen medical

oncologists expanding their jurisdiction, mainstreaming the pathway would still require the genetic team to interpret the results of TFGT because in this locally designed mainstreamed model, genetic results would come from the laboratory to the genetics team who would then report back to the clinician and patient. So, while the genetics team were instrumental in getting medical oncologists to take on the role of consenting and testing patients, it remained the case that they would maintain intellectual sovereignty over the task of interpreting lab results. This echoes with the findings of both Martin et al. (2009) and Miller et al. (2008), who similarly found that while roles and responsibilities shifted in response to the new technological possibilities of the genomics era, this devolution was not all encompassing, as competing visions of the future of genetics in medicine and medical practice were negotiated. Arguably, the negotiations about the mainstreamed care pathway at our field-site can be seen as a momentary opening up of inter-professional boundaries, which was intended to facilitate the ensuing reinforcement (as opposed to de-territorialisation) of the genetics team's realm of expertise.

Contrary to the oncologists, all of the surgeons expressed reticence to expand their professional jurisdiction to include the consenting of patients for TFGT. Surgeons' ambivalence appeared to be explicitly linked to their concerns about workload management, lack of certainty around clinical relevance, and the need to maintain a distinct professional jurisdiction. Indeed, while one of the surgeons noted that mainstreaming demanded '*identifying who needs testing and getting it done as quickly and as efficiently as possible and sharing the pain of who does it'* (BS6), none of the surgeons suggested that they would be able, or willing, to participate in delivering the new pathway. As BS1 said, '*we're really in a clinic dealing with people with lumps and we're looking to diagnose their lumps rather than do all the genetic screen'*.

It appeared that the surgeons' ambivalence about mainstreaming might also have been influenced by a misunderstanding as to what this new care pathway would involve. Observations at one of the MDMs indicated surgeons were unclear about the proposal:

> *One of the surgeons interrupted the other and said that they would have to counsel the patient, rather than triaging and sending them on to genetics. This caused another to say 'I thought clinical genetics were meant to counsel', to which an oncologist said, no, they were moving towards a 'mainstreamed' service, 'like ovarian'. There was clearly some confusion regarding the proposed changes (*Field-notes from breast MDM 14/03/2017*).*

Unsure about what they were being asked to do, the surgeons seemed to resist the idea of mainstreaming, regarding it as too onerous - adding an unmanageable workload to their already over-stretched service:

> *'So, you know … if you look at what we are doing as clinicians you're doing more and more on more and more patients. And if we've then got to prepare the patients for genetic testing, and the view of the … genetic counsellors is if you have set criteria of which you can test people then to speed it up we can actually take the blood and counsel the patients, and then send it off for testing. I'm not sure we can take on much more realistically. I've got like five things open. I've got my clinic open. I've got my you know, my emails, my calendar open, I'm booking operation dates. I'm-, some days I'm seeing 20 in a morning….' (*BS2).

Like the orthopaedic surgeons in Norris' (2001) study of occupational boundary maintenance in musculo-skeletal treatment, the legitimacy claims made by the breast surgeons about their position and jurisdictional boundaries were framed around concerns about capacity. There was, however, a further explanation for the surgeons' lack of enthusiasm about the mainstreamed pilot, namely, they did not regard TFGT as integral to their practice of treating cancer. Instead, it appeared that the surgeons regarded genetic testing as primarily a means to *prevent future cancers* from occurring. In other words they did not see this new application of genetic testing as *useful* (Hedgecoe, 2008) in their day-to-day care of patients. In his study of the implementation and uptake of pharmacogenetic testing, Hedgecoe suggests that it is important to interrogate 'how "useful" specific tests are in specific contexts, [in] a way that places the onus squarely back on the proponents of these technologies to justify their adoption by clinicians' (2008:184). This

emphasis on the usefulness of genetic testing and pharmacogenetics resonates somewhat with the responses from the surgeons in this study insofar as they were sceptical about the test's clinical utility for their practice. Where our findings diverge from Hedgecoe, however, is our consideration of how the new technology of TFGT, in the context of wider policy and cultural shifts towards the mainstreaming of genomics, worked to force jurisdictional negotiations among study participants. Yet, while the surgeons questioned the utility of TFGT for their practice, they nevertheless recognised that mainstreaming BRCA testing would benefit patients:

> *'I just think it needs to become more part and parcel of breast cancer treatment, and it needs to become much more routine and we need to work out a way in which it's easy for us to, easier, quick for it to be done* ***by the right people****, in a timely way'* (*our emphasis* BS6).

Crucially, it seemed that the surgeons did not regard themselves as being the right people for the task and, in fact, it appeared that both the genetics team and medical oncologists were sympathetic to the surgeons' position. As we have seen, medical oncologists regarded themselves as having more appropriate skills than the surgeons to take on consenting and testing while, as one member of the genetics team noted, '*…if I had to put a fair interpretation, I think they're [surgeons] very busy*' (CG4).

On speciality champions as 'boundary spanners'

Up to this point we have focused on the responses of surgeons and medical oncologists in relation to the proposal put forward by the genetics team to mainstream the breast care pathway. Referring to what Anteby et al (2016) call the 'doing lens' of occupational jurisdictional negotiations, we have seen the different ways in which these stakeholders have indicated their interest in, or ambivalence towards, the pilot. The responses of medical oncologists and surgeons have been linked to considerations of expertise, relevance, and workload raised by participants. For example, as evidenced above, the enthusiasm expressed by the medical oncologists fits with the general interest in personalised medicine that runs through the field of

oncology (Hamburg and Collins 2010). Yet, there was something more in our participants' accounts, namely, the interlinked consideration of the impact of professional disconnectedness constructed by virtue of the existing care pathway, and the role of speciality champions in facilitating cooperative communication. Our data suggest the negotiations that take place at times of pathway change can be conceptualised spatially, troubling established professional boundaries and hierarchies (Bleakley 2013). It was within this context of uncertainty at our field-site that specialty champions were viewed by some to be crucial in turning the pilot care pathway (a 'boundary object') into a 'boundary-object-in-use' (Allen 2009), that is, as acceptable to stakeholders and successfully implemented.

Allen notes that care pathways are symbolic 'boundary objects', which span 'several social worlds and fulfil a role in structuring relations between them' (Allen 2009: 355). Consequently, care pathways reify professional jurisdictions, and have the capacity to physically separate practitioners, as tasks are conducted in assigned spaces. In our study, the jurisdictional silos created by the standard care pathway were reinforced by the physical separateness of the breast unit from the genetics department, this physical space acting as a barrier to cooperation and mutual understanding. As one of the genetic counsellors reflected:

> '*It's hard, because it would make quite a lot of sense to co-locate. Because if you bump into people in the tearoom that's when you get to know them, isn't it? And you work well together when you know more about each other and what you do, what constraints there are on what you're doing and why you seem to be acting in a bizarre way. You know, you just get a better sense of what, where people are coming from*' (CG5).

It was not only the genetics team who felt this way. BS2 also talked about the need for further integration across the specialities, noting that the genetics clinic is physically removed from the breast unit, thereby limiting the possibility of frequent face-to-face interaction:

> '*I think, in other centres I've worked in, the geneticists are more integrated into the team on the ground. Whereas genetics here are removed from us. Everything is done by correspondence.* ***We never see any… the whites of anybody's eyes***' (*our emphasis* BS2).

Of particular interest, however, is that despite being located away from the genetics department, a collaborative cooperation was established between the genetic counsellors and medical oncologists. Our data provide insights into participants' explanations for this which go beyond concerns of expertise, workload and clinical relevance to focus on the role of a specialty champion in medical oncology. As one of the genetics team members noted:

> '*I think the oncologists will but that's just because of the experience with the ovarian and that somebody like [name]. I think [name] is likely to follow through on this, and [name] is interested. So there's, I think those are, those are people that understand, they genuinely seem to want to do it*' (CG4).

We suggest, thus, that the speciality champion might be viewed as a 'boundary spanner' – an individual whom, in promoting collaboration and overcoming the challenges of both physical separateness and communicative barriers which are reified in the standard pathway – is central in relation to 'the emerging cross-boundary practices-in-the-making' (Kislov 2018: 830). Put simply, the speciality champion as 'boundary spanner' facilitates the creation of a momentary dynamic communicative space wherein new roles and responsibilities could be negotiated. While there is little mention of champions in the literature (Keshet et al 2013), in their role as 'boundary spanners' they can be understood as pathway facilitators, integral to the successful implementation of new pathways (Hunter and Segrott 2008; Harvey and Currie 2000). Certainly, in our research, we found that key actors appeared fundamental to the success of the mainstreaming of *BRCA* testing within gynaecology (Wright et al 2018) and also the implementation of the breast care pilot. Specialty champions might then be considered as conduits for change, 'boundary spanners', facilitating the evolution of new pathways – in our

case, the making of an oncogenetic 'taskscape' (Ingold, 1993) for TFGT, which we will discuss below.

DISCUSSION

This study offers timely examination of the reconfiguration of professional jurisdictions amongst surgeons, medical oncologists and genetics team members in response to the implementation of a proposal to pilot a mainstreamed pathway for the delivery of TFGT to breast cancer patients at a regional hospital. While significant attention has been given to the relationship between new genetic technologies and individual (often female patient) responsibility (Arribas-Ayllon 2016), we have focused here on the relationship between genetics and *professional* responsibility, as innovative applications of technologies are integrated into clinical practice. As our findings demonstrate, this integration in different specialities results in the renegotiation of work territories and jurisdictional boundaries, which contribute to relatively scant research on the emergence of cooperative, *generative* occupational relations (in this case, between the medical oncologists and genetics team) in the context of jurisdictional negotiations (Anteby et al 2016). Drawing upon theories of professional boundary-making our data suggests that the introduction of TFGT elicits multiple responses in relation to shifting boundaries of expertise and practice: defending positions (surgeons); a willingness to expand the boundaries (oncologists) and; a desire to re-assign tasks and re-establish boundary of expertise and practice (genetics team).

Crucially, our research offers an example of jurisdictional negotiations that are not hinged upon competition, encroachment and defence of territory – the common concerns of sociological studies of professions (see Zetka 2001). Rather, our findings offer a different, and intriguing, example of a profession (clinical genetics) willingly relinquishing tasks to others, and the response of surgeons (ambivalence, and maintenance of existing jurisdictions) and medical oncologists (enthusiasm, and expansion of their role) to this offer. The genetics team's efforts to

467 reassign a subset of their tasks, should not, however, be seen as professionally cavalier. Quite the
468 contrary, in handing tasks to others, the genetics team were acting in what they saw as their, and
469 their patients', best interests - to re-establish clear boundaries around their jurisdiction, and re-
470 assert their expertise. The introduction of TFGT had made their jurisdiction unbounded.
471 Relinquishing less-specialised tasks to others offered the genetics team the opportunity to return
472 to clearer jurisdictional expertise. The actions on the part of the genetics team could, thus, be
473 understood as an active 'discarding of unwanted tasks to another provider' of similar training
474 (Nancarrow and Borthwick 2005: 905), a process which can result from mutually agreed transfer,
475 or be stifled by conflict. As we have seen in relation to our study, there was enthusiasm from the
476 medical oncologists to expand their jurisdiction, linked to an understanding that this made
477 pragmatic sense (Nancarrow and Borthwick), while the surgeons remained distant.

478

479 In summary, our data suggest that the question of professional jurisdictions in relation to the
480 delivery of genetics in medicine generally, and cancer care specifically, is not simply about turf
481 battles (Miller et al. 2008). Instead, the question that should be asked is what genetic technologies
482 can achieve in clinical practice (Miller et al. 2008; Hedgecoe 2008). As our study, and others'
483 (Hamburg and Collins 2010; Miller et al. 2008) have shown, oncology appears to be a specialism
484 where the uptake of mainstreaming is welcomed, this almost certainly because medical
485 oncologists regard the streamlining of genetic/genomic testing as a clear, practice-focused
486 rationale, informed by the results of clinical trials.

487 **The making of an oncogenetic taskscape**

488 Thus far, this paper has presented the findings from our study pertaining to the views and
489 experiences of healthcare practitioners in relation to a proposed, mainstreamed TFGT pathway
490 for breast cancer patients at the field-site hospital. The data suggest our interviewees fall into two
491 discrete groups – those who viewed themselves as collaborators in the mainstream pathway (the

492 medical oncologists and the genetics team), versus those who did not (the surgeons). Ingold's
493 (1993) 'taskscape', a concept which refers to an ensemble of mutually interlocking tasks and
494 related activities that forge dynamic connections- collaborations- between people, can be seen as
495 a useful lens through which to interrogate the relationship between care pathway development
496 and the professional jurisdictional negotiations at our field-site. Indeed, the design and
497 implementation of the mainstreamed care pathway for breast cancer patients is an ongoing social
498 process, which hinges upon the forging of productive and collaborative inter-professional
499 relationships in order to successfully create and maintain this new pathway for care provision.

500 Drawing on Ingold's (1993) concept, we suggest that our findings might be understood as an
501 'oncogenetic taskscape in the making'. First, we refer to the oncogenetic taskscape as a way to
502 conceptualise the dynamic social process of professional jurisdictional negotiations that were
503 ongoing during our fieldwork. In these discussions, the genetics team members and medical
504 oncologists were united in their opinion that TFGT was a *diagnostic* test and, therefore, should fall
505 under the jurisdictional responsibility of the oncologists. This echoes somewhat the community
506 of practice that espoused an oncogenetic vision of cancer care in Miller et al. (2008). Yet, our
507 oncogenetic taskscape differs from the oncogenetic vision described by Miller et al. because in
508 our study the medical oncologists had an enduring recognition of the genetics team's expertise,
509 most notably in relation to the interpretation of complex results (i.e. genetic variants of uncertain
510 significance). Thus, the oncogenetic taskscape recognises that neither party see transferring the
511 task of offering TFGT to oncology as challenging the genetics team's expertise. Thus, while it
512 has been suggested that the future of genetic medicine is in devolved, diasporic pathways, located
513 in disease specific areas of care provision (Guttmacher, Jenkins and Uhlmann 2001), our study
514 offers a different outlook. The oncogenetic taskscape emphasises the creation of an inter-
515 professional collaboration which, while seeing the transferal of certain tasks to disease specific
516 areas (in our case, oncology), as Guttmacher et al. (2001) predicted, the speciality of clinical

517 genetics nevertheless maintains sovereignty over genetic expertise in the interpretation of
518 complex results and concerns of the family.

519 To our oncogenetic taskscape, we add 'in the making', and in so doing acknowledge Pinder et
520 al's (2005) assertion that the process of creating care pathways (the cultural cartography of which
521 they write) must be regarded as a process that is 'always in the making' (2005: 776). We similarly
522 emphasise 'in the making' to indicate that the negotiation of professional jurisdiction associated
523 with the design of the new mainstreamed pathway is co-evolving, ongoing and, as such,
524 unknown. Indeed, as Hunter and Segrott note in their review of the use of clinical pathways by
525 nurses and midwives, despite their status as tools which map things out clearly, care pathways, in
526 their implementation, often represent a 'journey into the unknown' for those involved (2008:
527 623). Furthermore, the implementation of new technologies or, in this case, new applications of
528 existing technologies, not only require adjustments to work routines, but also unfold 'along a
529 course that is a bit uncertain' (Zetka 2001: 1512). Thus, we suggest that the 'oncogenetic
530 taskscape in the making' represents, both, the collaborative space forged by medical oncologists
531 and genetic team members who, buoyed by a shared understanding of the potential benefits of
532 the new pathway, undertook the task of negotiating new jurisdictional boundaries, and the still
533 uncertain character of the pathway, which is yet to transition from pilot phase to official
534 pathway.

535 **Limitations**

536 There are limitations to this study. In the first instance, it captured only the moments of planning
537 and early implementation of the mainstreamed care pathway in breast cancer care at our field-site
538 and so does not speak to the experiences of clinicians and genetics team members as they put
539 their plans into practice, nor does it assess the success, or shortcomings, of the pilot. Certainly,
540 while not viewing substitution as a risk to their professional expertise, it is nevertheless the case
541 that it remains to be seen what the implications of implementation of the mainstream pilot will

be for the genetics team. Furthermore, the findings are limited to one location and a particular group of participants. Despite these shortcomings, this study offers an in-depth, contextual examination of the process of change to professional jurisdictions that accompanies the introduction of new technologies and, thus, provides a clear example of how the growing impetus on moving genomics in clinical practice impacts on inter-professional relationships and the provision of care.

Conclusions

This study offers a detailed analysis of the locally negotiated process to implement a mainstreamed TFGT pathway at our field-site. By focusing on professionals' experiences as they negotiate the possibilities of a new, mainstreamed pathway for patients with breast cancer and their respective roles within this, we found that members of different professional groups differed in terms of their willingness to expand their jurisdiction and maintain professional boundaries. Reasons for, either, support for the pilot or lack of enthusiasm linked to issues of perceived clinical relevance of the technology for their clinical practice, and their beliefs about acceptable jurisdictional parameters. Our data suggests that the design and implementation of new pathways in patient care is a processual and dynamic social arrangement, which is on-going, fluid and uncertain. Capturing a period of time wherein negotiations for the pilot were underway, it remains to be seen how this new pathway, and the continued integration of new genetic technologies into standard care more generally, will impact on professional jurisdictional boundaries, inter-professional communications and patient care. In closing, we propose that the *oncogenetic taskscape in the making* is a helpful concept that not only captures ongoing negotiations of the pathway, and the inter-professional dynamics of change-making within the context of the integration of mainstreamed TFGT into the breast cancer care pathway, but also is illustrative of the locally mediated, dynamic jurisdictional negotiations which are likely to arise as a consequence of the integration of genetic technologies into clinical care.

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ACKNOWLEDGEMENTS

We would like to sincerely thank all the practitioners who participated in these interviews, and for allowing us to observe their daily practice at the clinic. We would also like to thank Julia Lawton for feedback on an earlier draft of this manuscript. We would also like to acknowledge Breast Cancer Now who funded this project, Grant no: [2016MayPR700].

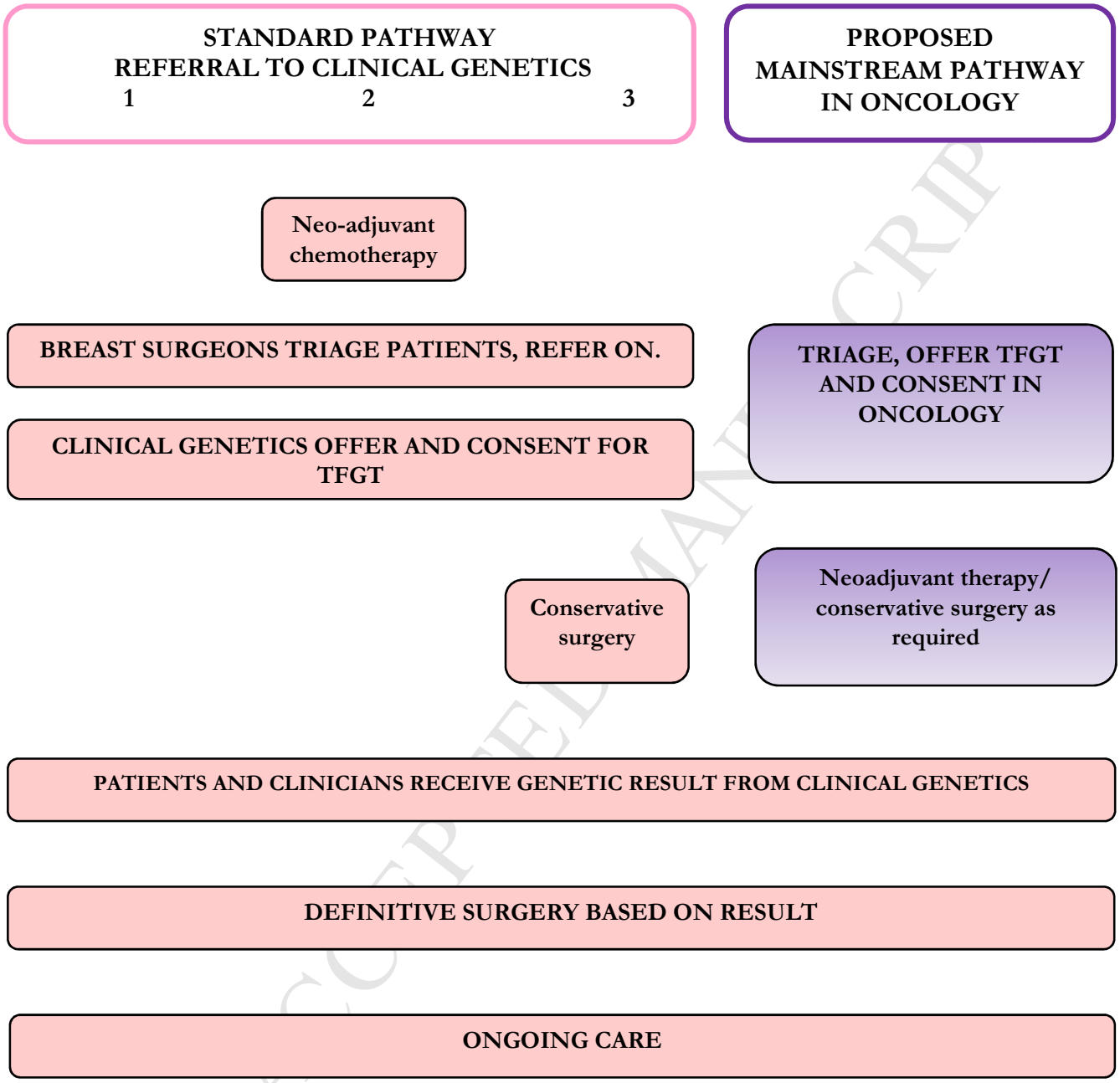
Compliance with Ethical Standards

Conflict of Interest SW, MP, DS, JL, OY, and NH declare that they have no conflict of interest.

CG has sat on advisory boards for AstraZeneca, Clovis and Tesaro, has received lecture fees from AstraZeneca and Tesaro and received research funding for clinical trials from AstraZeneca and Tesaro.

Human Studies and Informed Consent All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 (5). Informed consent was obtained from all patients for being included in the study.

Figure 1: Current and proposed breast cancer pathways



HIGHLIGHTS

A micro-level examination of clinicians' work assembling an 'oncogenetic taskscape'.

Mainstreaming genomic testing requires changes to professional jurisdictions.

Technology's clinical relevance informs clinicians' acceptance of mainstreaming.

Clinical implementation of new technology requires inter-professional collaboration.