

## ORIGINAL ARTICLE

# A sociology of precision-in-practice: The affective and temporal complexities of everyday clinical care

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## Abstract

The idea of 'precision medicine', which has gained increasing traction since the early 2000s, is now ubiquitous in health and medicine. Though varied in its implementation across fields, precision medicine has raised hopes of revolutionary treatments and has spurred the proliferation of novel therapeutics, the alteration of professional trajectories and various reconfigurations of health/care. Nowhere is the promise of precision medicine more apparent, nor further institutionalised, than in the field of oncology. While the transformative potential of precision medicine is widely taken for granted, there remains scant attention to how it is being experienced at the coalface of care. Here, drawing on the perspectives of 54 cancer care professionals gleaned through eight focus group discussions in two hospitals in Australia, we explore clinicians' experiences of the day-to-day dynamics of precision-in-practice. We illustrate some of the affective and temporal complexities, analysed here under the rubrics of enchantment, acceleration and distraction that are emerging alongside the

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uptake of precision medicine in the field of oncology. We argue that these complexities, and their dis/continuities with earlier iterations of cancer care, demonstrate the need for sociological analyses of precision medicine as it is being implemented in practice and its varied effects on 'routine' care.

### KEYWORDS

Australia, cancer, care, immunotherapy, personalisation, precision medicine, qualitative, targeted therapy

## INTRODUCTION

The idea of precision medicine—of tailoring diagnostic tests and therapeutic interventions to the specific characteristics of individuals to improve patient outcomes—is now a driving imperative in biomedicine (Remon & Dienstmann, 2018). Like the allied terms 'personalised medicine', and to a lesser extent 'stratified' and 'P4' medicine, 'precision medicine' is used in a wide variety of ways, including: to signify cultural and clinical hopes for more efficacious, genetically tailored, treatments; to prefigure transformative therapeutic innovation; to drive investment in new pharmaceuticals; and to conjure a new era (and ethos) of intensified personalisation in clinical care (e.g. Hedgecoe, 2004; Juengst et al., 2016; Prainsack, 2017; Tutton, 2012; Vogt et al., 2016). Here, we consider 'precision medicine' broadly, paying attention to its rhetorical potency within both the cultural and the clinical imaginaries, its effects on research development and translation agendas, and the emergent complexities as therapies developed under its mantle are implemented in the clinic. We anchor our analysis in the field of oncology, where to date, precision medicine has gained its strongest foothold through the development of targeted and immunotherapies tailored to specific molecular tumour-markers (Prasad et al., 2016; Schwartzberg et al., 2018). While precision medicine has emerged as a new promissory horizon in the management of cancer (Dobosz & Dzieciatkowski, 2019), it is underpinned by wide range of heterogeneous, even contradictory practices (Day et al., 2021). Progress has been uneven (Moscow et al., 2018), and precision therapies remain unaffordable and/or unavailable to significant parts of the global population (Drake et al., 2018). The implications of precision medicine in cancer care are only beginning to receive critical sociological analysis (e.g. Bourret et al., 2021; Chorev, 2020; Day et al., 2017; Kerr et al., 2019). Here, drawing on the experiences of those working at the nexus of therapeutic innovation and clinical practice, we seek to contribute to this emerging sociology of precision-in-practice, using cancer care as an illustrative case. We ask: how is precision medicine being realised

and experienced, and with what consequences? Our analysis seeks to expand on the idea of precision medicine as offering unbridled hope and future possibility to explore some of its more challenging dimensions, including the affective and temporal complexities that emerge within everyday care as precision medicine is implemented in practice.

## BACKGROUND

### Possibility, at a price

In the rich world, the advent of precision medicine in oncology—specifically the development of targeted and immune therapies guided by individual molecular biomarkers—has revolutionised cancer care, radically improving some patient outcomes. As a result, it has placed oncology at the forefront of the clinical implementation of precision medicine more broadly (Moscow et al., 2018). For example, the well-known targeted cancer drug Trastuzumab (Herceptin™) has been credited with improving overall survival by almost 40% for patients with HER2-positive breast cancer (Perez et al., 2014). Melanoma and non-small cell lung cancers have also witnessed marked improvements in patient outcomes due to molecular diagnostics (Chapman et al., 2011; Cutler, 2020; Hyman et al., 2015; Mills & Maitra, 2019; Ramaswami et al., 2018; Skoulidis & Heymach, 2019). Immune checkpoint inhibitors, selected on the basis of molecular markers, have resulted in increased survival rates over the use of pre-existing cytotoxic chemotherapy regimens, and the recent identification of the Tumour Mutational Burden (tTMB) biomarker, which may predict a patient's response to immunotherapy drugs regardless of their particular cancer type further signals the therapeutic promise of precision oncology (see, respectively, Reck et al., 2016; Marabelle et al., 2020; Schmid et al., 2018; Shendure et al., 2019).

Given these dramatic successes, the field of oncology is increasingly focussed on the pursuit of molecular interventions, animated by the affective orientation of intensified hope and expectation that often underpins therapeutic innovation (see Brown & Michael, 2003; Novas, 2006; Petersen & Wilkinson, 2015; Sturdy, 2017). However, these developments are beset by accelerating costs, as well as by incongruous alignment between targets/mutations identified and efficacious therapeutic solutions. In terms of costs, the United States *doubled* its spending on precision therapies between 2012 and 2017 (Cutler, 2020; Prasad et al., 2017), with the median monthly cost of cancer drugs now sitting at over US\$13,000 (Vokinger et al., 2020). Similar spending increases can be observed across OECD countries with a recent study showing that public expenditure on cancer treatments has *tripled* between 2005 and 2018 (Wilking et al., 2020). The recent (somewhat controversial) decision of the U.S. Food and Drug Administration (FDA) to approve two targeted drugs and immunotherapies across all solid tumours (so-called 'pan-cancer' or 'tumour agnostic' approvals) (Khasraw et al., 2020; Strickler et al., 2021) is likely to lead to a further escalation of costs. In Australia, where cancer care is financed through a complex mix of Federal and State funding, private health insurance and out-of-pocket funds, and delivered by both the public and private hospital systems, costs are also rising quickly across the board (AIHW, 2021).

The above examples illustrate an emerging tension between the promissory potential of precision medicine, and the costly realities of the varied practices and therapeutics that are being developed and implemented under its mantle. The resulting dilemmas around possibility vs. affordability make precision medicine an important space for sociological analyses, especially as it is increasingly being implemented in practice.

## Enchantment and acceleration: Precision-in-practice

An emerging corpus of social science scholarship on precision medicine has increasingly attended to the ethics, biopolitics and (potential) injustices of genomic innovation (e.g. Feiler et al., 2017; Kerr et al., 2019; Prainsack, 2015; Sturdy, 2017; Sun, 2020); the changing taxonomies of knowledge and implications of molecular testing (e.g. Bourret & Cambrosio, 2019; Cambrosio et al., 2021; Chorev, 2020; Kuch et al., 2020); and commercialisation versus contested assessments of patient benefit (Gavan et al., 2018; Gyawali & Sullivan, 2017). Few have sought to explore precision as it is subjectively experienced day to day, especially by those working at the frontline of patient care (though see Bergeron et al., 2021; Crabu, 2021; Kerr et al., 2021). Here, we build on and expand on this growing corpus of work—drawing on both classical and contemporary social and political theory—to help widen the analytic lens and better capture some of the affective and temporal complexities that are accompanying precision medicine as it is implemented in everyday clinical settings.

The first notion that we argue may assist in better understanding the lived experience of precision medicine in cancer care is *enchantment*. Jane Bennet uses enchantment to name a sense of wonder, presence and intensity that manifests, in part, as the alteration of chronological time (Bennett, 2001). Other authors have used the notion of enchantment to refer to something that emerges from a complex net of social relations (see: Bennett, 2001; Berman, 1981), including dynamics of hope and (future) possibility, as well as the socio-material relations of investment in progress-towards-cure (see also Novas, 2006). In our own study, enchantment captures the affective and temporal complexities emergent from the allure of (future) therapeutic innovation, (current) professional ambitions (to cure, to heal) and enduring questions of meaning (especially in terms of care). But as the quotes below show, enchantment also makes visible tensions between the pursuit of cure and the provision of care, and the temporalities that inflect each of these (see Kenny et al., 2017). Precision oncology and the accompanying rapid proliferation of therapeutic innovation has created an acceleration of potential opportunities, creating the impression that future possibilities are materialising, in real time, if patients can hold on until the future arrives. This focus on future opportunities can distract from enduring difficulties that pervade cancer care, for example from questions around affliction, grief and mortality.

The pace of precision innovation has not only led to a reimagined future (i.e. shaped ideas about where the 'field' will be in 5–10 years). In wealthy industrialised settings, it has also fundamentally changed how oncology is practised in the here and now. Here, enchantment intersects with social dynamics of *acceleration*, which have been of enduring concern to a broad range of social theorists (Adams, 2003; Rosa, 2003; Wajcman, 2008; Wajcman & Dodd, 2017). While the meanings and consequences of acceleration remain contested, sociologists such as Wajcman and Dodd (2017) point out the centrality of technological innovation in the acceleration of social life, which together have served to substantially reconfigure temporal experience—the individual and collective sense of *being* in time. Our dual emphasis on enchantment and acceleration, we argue, may be useful in understanding both the allure of new discoveries and the sense of the future materialising in the present through precision medicine. Drawing on the perspectives of cancer care professionals, below we focus on the context of precision oncology, offering a closer examination of the emerging affective and temporal complexities of precision medicine within (and beyond) cancer care.

## METHODS

### Data collection and sample

This paper draws on 8 face-to-face focus groups (FG) carried out across two public hospital settings in two different states in Australia from July 2019 to March 2020. The overarching aim was to explore how the precision medicine is being understood and experienced by a range of cancer care professionals. After we obtained ethics approval from a hospital human research ethics committee (HREC), and site approval at each location, an invitation was sent via email to relevant stakeholders (working in cancer care) across the two hospitals. In total, 54 individuals were available to participate in 8 focus groups with 4 to 9 participants in each group. These groups included medical oncologists (FG 1 & 5); nurses and cancer care coordinators (FG 2 & 6); junior doctors (FG 3 & 7); clinical trial coordinators (FG 4 & 6); and clinical trial coordinators and nurses (FG 8). The focus groups were conducted by KK & AB, lasted between 50 and 70 minutes, were audio recorded and fully transcribed. There were 41 female and 13 male participants, all assigned pseudonyms to protect their anonymity. Medical staff included representation from medical oncology, radiation oncology, haematology and palliative care. The study was framed in terms of wanting to explore participants' understandings, experiences and reflections on precision medicine and discussion was focussed around the domains of value (how it is assessed); access (how precision medicine is institutionally mediated), interests (what is perceived to influence practice); and encounters (in participants' day-to-day work); and cost and benefit (in all their varied manifestations).

### Analysis

The methodology for this project draws on the interpretive traditions within qualitative research (e.g. Charmaz, 1990). This involved taking an in-depth exploratory approach to data collection, aimed at documenting the subjective and complex experiences of the participants. The aim was to achieve a detailed understanding of the varying positions adhered to, and to locate these within a spectrum of broader underlying beliefs and/or agendas. The approach used was developmental, in that knowledge generated in the early focus groups was challenged, compared with, and built on by later groups. This provided an opportunity to establish initial themes and then search for divergent cases, complicating our observations and retaining the complexity of the data. An initial thematic analysis was conducted independently by KK, AB, AP and BP, who coded the data, wrote notes and subsequently discussed potential themes together as a research team. Data analysis took place concurrently with the qualitative fieldwork over a period of months, with an initial analysis completed after each group to identify themes within the groups. Once all focus groups were completed, KK and AP again reviewed the transcripts to identify and confirm themes that ran across the different groups. Throughout this process, we continually sought to retain the richness of the respondents' experiences, documenting the full range of perspectives, conflicts and contradictions within the data. The final step involved revisiting the literature and seeking out conceptual tools that could be employed to make sense of the themes we identified from the data.

## RESULTS

### The collective affects of ‘low-hanging fruit’, ‘spectacular winners’ and ‘lumpy landscapes’

The development of precision medicine in cancer care—specifically the development and implementation of targeted and immune therapies—was viewed as highly transformative by our focus group participants, regardless of the many complexities that also emerged over the course of the discussions. Novel targeted and immune therapies were viewed as a ‘win’ not only for patients, but for cancer care professionals, as well:

**Linda:** That’s the thrill of it. Five years ago, he would’ve been dead in six months. So, he’s now three years down the track, [and doing] really well. So that’s the thrill to have a patient journey that’s just, you know [great]. Wendy’s had contact with him for these three years, every four weeks. And seeing somebody well like that is just very thrilling and rewarding, and the patient’s great.

**Fran:** I’ve got this lovely one. A phase one trial, brand new, first time in humans... one [patient] was 32 [years old] at the time. She had a [primary site] with secondaries in her bones and her liver, barely could walk because of bone fractures...She had a little girl who was two. Anyway, we popped her on and she was on the drug... we’re now down to about four years now and she has nothing hot on her PET scan, she’s jogging, her little girl’s starting school. We see her every three months now with a scan, and still she’s doing great guns. And that’s a brand new [molecular] drug we [had] never seen before.

– Focus Group (FG) 6, Nurses & Clinical Trial Coordinators

The transformative potential of targeted and immune therapies was set in marked contrast to conventional therapies, as having radically changed the prognosis of patients, as well as heralding new possibilities for the field of oncology:

**Luke:** So, I think an excellent example [of the impact of precision] would be the advancements of lung cancer... we’ve gone from... a median survival of less than a year in the metastatic setting with conventional chemo, to now it’s estimated that a newly diagnosed patient with modern targeted therapy... their median survival was probably closer to five years. And that’s with 2019 science, technology, and drugs, and we would anticipate that actually may get better.

– FG 1, Medical Oncologists

While the anticipation of continued increases in survival across cancer types was a core feature of participants’ understandings of precision medicine, our participants described a much more uneven landscape in practice, intimating some of the potential inequalities (in terms of access and across cancer types) within precision innovation:

**Georgia:** I think that there’s a stall at the moment as well too. I think the science has picked off the low-hanging fruit in terms of targeted therapies and immunotherapy

and we're at a point at the moment where the next phase is harder to predict and much more difficult to develop...

– FG 1, Medical Oncologists

## Another participant

**Will:** So, I think we're in this very early stage of personalised medicine and it's an uneven and lumpy and unfair landscape. But we want to engage with it because we see that biologically, it's meaningful–

**Erica:** It has to [be].

**Will:** –and that possibly there will be some patients who will do spectacularly better. Now, what's sort of complicated it too, is with immunotherapy, of which there are actually very poor ways of predicting who will work, but there are these spectacular winners.

– FG 5, Medical Oncologists

The disconnect between the animating allure of precision innovation and the more uneven reality of precision-in-practice could be a source of difficulty for practising clinicians, both in terms of managing what participants described as 'patient expectations', care pathways and potential side effect including financial toxicities:

**Luke:** I think there is an increasing disconnect between what the public perception is of what we can do and what we can actually do. And that's probably compounded by the fact that we now have ready access, even if it's not funded, to super expensive drugs. There's a smorgasbord of things that you could potentially prescribe for someone that might have little to no benefit. And I do wonder privately, whether there's a lot more of a push to, 'Well, what have we got to lose?' And I suspect that those oncologists don't necessarily talk to the patients about the financial toxicity that they have to lose. [...]

**Nadine:** ...these aren't our pathologists in our hospital... often it's a geneticist, someone in a lab that doesn't have any clinical background or context, and they give you something and it basically goes from practicing medicine to doing an experiment in your patient, which I find very, very difficult.

– FG 1, Medical Oncologists

Caring within precision oncology, then, was articulated as juggling the diverse and sometimes contradictory imperatives of research and development, patient expectations, financial considerations and clinical care. There was recognition of the generalised attention to precision medicine and the promissory horizon of therapeutic innovation therein, as well as the general dependence of precision medicine on questions of cost and access, including the economic interests of pharmaceutical corporations. Yet, the pharmaceutical industry was also seen as central to advancing the scientific base of oncology practice, representing an interesting set of circumstances

and accompanying tensions. The successes of (some) targeted therapies are here entangled with collective affective attachments to possible cures, thus creating widespread enchantment with precision innovation, but also obscuring the uneven landscape and potential toxicities for patients (and their families), financial and otherwise (see: Marchiano et al., 2018). For oncology professionals, then, caring *with and through* precision oncology is still suspended between the uneven present reality of precision-in-practice, and the alluring horizon of the promissory future.

## Anticipation, benefit and participation

Another key dynamic articulated by participants in our focus group discussions was how the allure of therapeutic innovation creates a temporal pull towards the future—encouraging survival at *all costs*, be they affective and/or material. Of course, the affective and temporal pull of survival is not unique to precision medicine, and the question of when to transition from active treatment to palliation, even in the face of therapeutic innovation, has long antecedents in oncology (e.g. Baszanger, 2012). Nevertheless, as illustrated through participants' reflections below, precision oncology was experienced as operating simultaneously across a range of timescales, including the anticipated future, where appraisals of the future benefit of (imagined) technological innovation of tomorrow governed practices (and the decisions) of today, intensifying the problematic pull of survival. Yet this presents various challenges for patients and health professionals alike:

**Deborah:** I think it [precision innovation] might be giving them more options where there wasn't options before. I think—

**Larissa:** And hope.

**Deborah:** Yeah. Yeah... they want more time...

**Larissa:** It is very difficult. Because I think cancer care and cancer treatments and options wouldn't be where they are today unless people had taken those risks and all of that. But balancing that up, I mean, there are those that you don't have to be an oncologist to actually know. We all know that the patient's dying, and we predicted that weeks before their death, but they're still having treatments, which perhaps may have high cost to them... There's not the resources to go around and I think it's making sure that it's fair and equitable to people who have hope of life or extension of a good quality life for X amount of time.

– FG 2, Nurses & Cancer Care Coordinators

The intertemporal dynamics of participation in precision innovation, often through clinical trials research, presented challenging questions of relative benefit across time:

**Patricia:** We have patients, I guess, who are desperate to try anything... our patients... will do almost anything to get on the trial.

**Larissa:** It's beneficial on multiple levels, right?



**Patricia:** Yeah.

**Larissa:** I mean, you've got people who are funding the research who are ultimately going to benefit.

**Patricia:** Yep.

**Larissa:** You've got the clinicians who are monitoring the trials, who are actually learning. And you've got the patients, who hopefully, if not those particular patients, but if not, then patients in the future who are going to be benefiting medically from that. And then hopefully us all financially.

– FG 2, Nurses & Cancer Care Coordinators

As detailed across many of the focus group discussions, the push for more time—driven by the dynamics of hope, which have intensified alongside the rise of precision innovation—often became the overriding imperative for patients (and their families), eliminating the space for contemplation of other facets of encountering cancer: 'coming to terms' with it, 'the quiet progression' of disease and 'grieving' the life that may have been. While such tensions between cultivating life and allowing death are common when caring in the context of potential mortality (e.g. Baszanger, 2012; Broom & Kirby, 2013; Broom et al., 2013), the affective pull of accelerated innovation was often articulated as a further distraction from discussion around the finality of mortality:

**Larissa:** As I say, [discussing palliative care is] far easier if it comes from the patient. It's a very frustrating part of our job because sometimes you know that somebody should be having a better death than what they're already having. People don't have, what I call, the quiet progression. Some, I suppose, for want of a better analogy, *screech into death*. The family haven't had time to sort of come to terms with things. There's no quietness around the bedside, there's no time for grieving beforehand. It's all go, go, go until maybe a couple of days before. [...]

**Patricia:** They [patients] think if they can *get more time* it's worth it, rather than thinking what they will actually be like and be able to spend that time they have. But it's not something everyone thinks about, especially if they've not seen it before... They think their Mum's going to be here for an extra couple of months, and they'll be fine, and keep going.

– FG 2, Nurses & Cancer Care Coordinators

The uncertain benefit of participation in precision innovation is offset here by an ethic of participation in the project of oncological progress. This is akin to an intertemporal social contract between the past subjects of biomedical research whose participation made possible the innovations of today, the future subjects who will hopefully benefit from current research, and those living-with-cancer, whose participation often incurs a 'high cost to them[selves]'. In this way, the present subjects of precision innovation are temporally suspended between the legacy of past progress and the anticipation of future developments. The value of precision oncology for patients, then, often remained *promissory*, or, as something to be realised in the future, but which *required participation* in the present:

**Debbie:** What I struggle with is that sometimes I think some of these things [precision therapies] may well be the future, but if we don't, if we just open the doors and let everybody do all these things, you're never going to get any evidence.

**Luke:** But the ability to do these tests is outpacing the ability to understand, evaluate, interpret, and incorporate that treatment into standard of practice.

**Debbie:** But it's almost impossible to see that we'll ever manage to do enough research to be able to understand all of it, because it's just so vast.

– FG 1, Medical Oncologists

Caring through precision innovation, then, is lived in explicit reference to the future, striving towards its realisation by managing participation (and care) in the present. Despite lacking comprehensive targets *yet*, and an ongoing incapacity to translate the latest developments into the clinic and everyday care as per above ('we're not quite there *yet*' / 'it hasn't made such a big impact *yet*' / 'we really don't know *yet*'), participation in precision innovation is driven by the sense of its *potential* efficacy and the *hope* for future cures. Yet the intertemporal coherence of participation at the cutting edge of precision medicine was articulated as precarious, as the pace of innovation jarred with the immediacy of patients' hopes for new treatments:

**Georgia:** ...something I've noticed, because I have a foot in the lab as well and so I understand the researchers, they're often trying to really publicise their pre-clinical results. Because in the world of science, there's a lot of competition about funding. So getting publication, getting your name out there, can bring money. And so, I think probably a lot of us have had the experience where the [Australian newspaper] will publish like, 'New Hope for Breast Cancer' and it'll be some–

**Luke:** Yeah, they've killed two cells in the lab.

**Georgia:** Yeah, or something.

**Debbie:** Well, at least a mouse...

**Georgia:** And patients will come clutching this into clinic and say–

**Luke:** Yeah, 'I want this'.

**Georgia:** And I now understand why this is happening, but I also find that in some levels it can sort of shape, in my view, into irresponsibility.

– FG 1, Medical Oncologists

The ethics of participation here speak to the ongoing *actionability gaps* of precision medicine (e.g. Moscow et al., 2018). While the ability to participate in testing for genetic mutations and the make-up of tumours is more readily available (though often at exorbitant cost to healthcare systems and patients), the capacity to use this information for treatment was discussed as lagging far behind cultural expectations. In this way, the allure of future possibility was articulated as distracting from the provision of care in the present.

## 'Moonshots' and 'rabbit holes': Diversion of research and innovation

The broad project of precision medicine has received relatively little analytic attention in terms of its overall public health impact and implications for health systems (though see Ramaswami et al., 2018). This, we argue, evades critical questions about the pursuit of precision vis-à-vis notions of a 'rational' investment in care. As is shown below, some participants perceived a diversion of funding away from 'routine' care or 'smaller scale' research towards the longer-term pursuit of precision innovation through 'moonshot' and 'rabbit hole' initiatives:

**Leslie:** ...all the current research funding is being diverted towards Moonshot programs in the US... and that long-term view is very attractive, but given scarce funding, there's nothing on actually impacting short term or the majority of patient outcomes, and that concerns me...

– FG 5, Medical Oncologists

The diversion of resources away from routine cancer care (see: Marquart et al., 2018) was viewed as emergent from research funding guided by a cultural and clinical preoccupation with precision medicine and by the commercial interests of pharmaceutical companies. Our participants noted how such priorities were often at odds with their own sense of proportionality:

**Will:** ...there's a lot of biology that's understood, but it's just been a bit of a neglected area in terms of potential targeted therapies.

**Focus Group Convener:** And why do you think it's being neglected?

**Will:** It's just not seen, I guess, from commercial pharmaceutical companies. It's not as big a market as some of the other types of cancer. So, there's tumour stream discrimination. There's also been the impact of immunotherapy, and in some ways, that's actually diverted a lot of the attention and, I guess, research activity.

– FG 5, Medical Oncologists

**Linda:** So, if we've committed to putting five patients on a trial, and we put nobody on a trial in six months, they're on the phone going, 'Why haven't you? What's wrong? Can we help you?' [later] They have their timelines and agendas, and they've got to complete a study within a certain time to make it worthwhile for them.

– FG 6, Nurses & Clinical Trial Coordinators

This perceived 'diversion' of/to participation in trials was accompanied by a perception of higher levels of care (i.e. interpersonal, supportive and therapeutic focussed) within the trial context than in the context of publicly funded standard-of-care treatment, due to higher resourcing. This, in turn, increased levels of patient satisfaction from trial participation:

**Focus Group Convener:** Why do we have so much more support in the trial space?

**Linda:** Because we have an allocated staff member to each trial. And so that allocated staff member stays with those patients on that trial. Whereas patients having standard of care perhaps, chemotherapy, immunotherapy, down in the day treatment

unit, they'll get whichever nurse is on for the day, which might be a casual nurse, an [agency] nurse. Very rarely they would get the same nurse each time. Whereas on trial, the patient has the same nurse coordinator with them through the journey, through the trial.

**Narelle:** And you're also able to offer them a bit more money, funding, I suppose. If they have a side-effect, for instance, and they need to see endocrine, we can send them to a private endocrinologist and the trial, potentially, would pay for that. Whereas patients here, if they're in the public hospital and they don't have health insurance, they have to go to the public clinic. So, I don't think it makes that much of a difference—

**Linda:** No, it does. Yeah.

**Narelle:** —but patients kind of get that little bit more specialised, kind of— Yeah. [...]

**Tyra:** Yeah. So, they know once they're on the trial they would be *really taken care of*. So, they have that comfort and trust. So, that's a big, big, big thing for us... They know they'd be taken care of, this is a good trial, the drugs are working very well. So, that's really pushed them [to participate].

— FG 6, Nurses & Clinical Trial Coordinators

The better-resourced trial context thus provided another dimension to the allure of participation in precision innovation, which had the potential to position translational research and standard care as somewhat neglected by comparison, diverting attention (and resources) away from the pursuit of more immediate 'real world' patient impacts:

**Ron:** The hype, basically, and the expectations [for precision medicine] is so overinflated that we can't get funding for grass roots research... because it's gone to someone who's actually added genomic sequencing into their study. Because it sounds great. You're going to learn about the tumour. But what are you going to do? How are you going to impact? Whereas, 'We're doing real world research for immediate impact on the patient. Come fund it'. It's not perceived as interesting or fascinating.

**Susan:** But it's not sexy is it? [...]

**Leslie:** ...And I think that if you have that kind of bias in the evaluators, then it shifts funding towards something that is realistically unlikely to alter treatment in the majority of patients. It identifies subgroups, but is it really diverting scarce funding away from other worthy resources that will truly improve patient's quality of life?... The word on the street is, is pretty much anything that does not have genomic in the title or as a correlative is very unlikely to attract significant interest. And, for me, that's a concern because, well, we've got a scarce pot of money... diverted to other things, and if it's all diverted to this, there's no money left to do anything else. And I think that's not a good thing. And we just sort of agree that this is promising, but what does that mean? Are we really making bad decisions otherwise as a result...?

— FG 5, Medical Oncologists

Precision medicine's affective pull was palpable across the focus group discussions, with participants repeatedly highlighting how a wide range of cultural, professional and economic influences lead to diversion away from other, also worthy, modes of cancer care. The materialisation of precision medicine in oncology may thus be forging a newly reconfigured landscape in which the relentless pursuit of (precision) cure may be diverting attention and resources away from more 'mundane' forms of care.

## DISCUSSION

The rise of precision medicine has heralded much transformative potential, with spectacular gains in particular areas of cancer care. However, these gains have been achieved within a complex social, political and economic context that has received limited sociological attention at least insofar as it inflects clinical practice. This is despite precision therapies drawing an increasing proportion of research and development funding and health system resources (Reed et al., 2017; Vokinger et al., 2020) while also encountering various challenges in being integrated into routine care (Filoche et al., 2019; Olstad & McIntyre, 2019; Ramaswami et al., 2018). How precision medicine is being implemented—in cancer care and beyond—and with what consequences is thus in need of sustained critical attention.

Here, we have highlighted how the affective pull of innovation represents one aspect of precision-in-practice that has not yet been highlighted. That is, how collective affects—aspirations of progress and hopes for cure analysed here under the rubric of enchantment—can obscure more critical approaches to the institutionalisation of precision medicine in cancer care. At the same time, we have argued that precision medicine has contributed to—or perhaps joined—a temporal acceleration, in which the sheer velocity of therapeutic innovation risks leaving behind important questions of value, cost and benefit (in all their multifarious meanings). This acceleration is evident across scales from the *interpersonal* (e.g. of scrambling to deal with diagnosis, trials and proliferation of treatments), *professional* (e.g. in 'keeping up' with the latest molecular-driven innovations), to the level of the *cultural and clinical imaginary* (e.g. where precision medicine is imagined to be a rapidly materialising source of every-more-promising cures). As a result of these affective and temporal complexities of precision-in-practice, attention can be diverted from the ultimately contestable nature of what constitutes 'a good outcome' in oncology and, in turn, from age-old problems, for example, of affliction, grief and mortality (e.g. Broom et al., 2019).

Thus, we argue that in addition to ideas of enchantment and acceleration, the idea of *distraction* may help make sense of the consequences of precision medicine as they are playing out in practice (see: North, 2011). As Taussig (1991) characterises it, distraction names a distinctly modern apperceptive mode, which contrasts with an earlier, more contemplative, experience of attention. Taussig (1991) uses the term to refer to 'the type of flitting and barely conscious peripheral-vision perception unleashed with great vigour by modern life at the crossroads of the city, the capitalist market, and modern technology' (p. 148). If the ideal-typical figure of earlier modes of attention was the lone worshiper contemplating the divine, the modern embodiment of distraction comes through mass communication, the business cycle and the perpetual motion of the everyday. Importantly, distraction is not a hostile or even intentional force, but rather is emblematic of the pace and proliferation of competing calls for attention in contemporary societies, especially amidst various forms of acceleration. Here, distraction helps make sense of the multivalent, sometimes discordant meanings of precision medicine. This includes the dissonances

between the pervasive affective orientation of hope and possibility inspired by the *idea* of precision medicine, and the more heterogeneous and complicated realities that emerge *in practice*. Operating across scales from the individual to the global, distraction speaks to processes and developments that ask us to *pay attention* to certain things over others, for example attending to the hope inspired by precision medicine over the costs incurred by the implementation of different precision therapies in practice. Considering the distracting potentiality of precision medicine in this way requires that we ask, whether the collective affects of enchantment and acceleration turns our attention *towards* precision innovation, from what else do they potentially distract?

We note here that innovation not only ‘advances’ the field, but also reconfigures it. On the basis of participants’ reflections in the focus group discussions analysed above, it is evident that precision medicine has already yielded considerable gains in terms of novel treatments and patient survival. Alongside these advances, though, we argue it is worth pausing to consider how precision medicine as it is being implemented in cancer care may contribute to *uneven innovation* and even, more controversially, *structural neglect*. In contrast to the everyday connotation of neglect as entailing in-attention, irresponsibility and even deliberate interpersonal harm (see Reader et al., 2014), here we deploy neglect as emergent from the disjuncture between what we collectively hope precision medicine will be, and the more uneven reality of precision-in-practice the idea of precision medicine as a promissory horizon and its more uneven reality as it is being implemented in cancer care. Here, the affective and temporal complexities of precision medicine forge an attentional landscape in which the allure of therapeutic innovation can distract from routine care. This draws our analytic attention to the unintended, emergent voids and omissions that are arising alongside precision medicine, that is, to the paradox of precision innovation—how advances in precision medicine can offer enchanting therapeutic potential while simultaneously creating new vulnerabilities (in terms of access, in terms of care). Such paradoxes demand sustained sociological attention, including at the bedside and in the clinic, as precision medicine moves from promissory horizon to an emerging (albeit uneven) clinical reality.

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## CONFLICT OF INTEREST

None.

## AUTHOR CONTRIBUTION

**Katherine Kenny:** Conceptualization (equal); Formal analysis (equal); Funding acquisition (equal); Investigation (equal); Methodology (equal); Project administration (equal); Supervision (equal); Writing-original draft (equal); Writing-review & editing (equal). **Alex Broom:** Conceptualization (equal); Formal analysis (equal); Funding acquisition (lead); Investigation (equal); Methodology (equal); Supervision (equal); Writing-original draft (equal); Writing-review & editing (equal). **Alexander Page:** Conceptualization (equal); Data curation (equal); Formal analysis (equal); Investigation (equal); Project administration (equal); Writing-original draft (equal); Writing-review & editing (equal). **Barbara Prainsack:** Conceptualization (equal); Formal analysis (equal); Funding acquisition (equal); Writing-original draft (equal); Writing-review & editing (equal). **Claire Wakefield:** Conceptualization (equal); Funding acquisition (equal); Writing-review & editing

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## DATA AVAILABILITY STATEMENT

The data that support the findings of this study may be made available from the corresponding author upon reasonable request.

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