



Sex, drugs and superbugs: The rise of drug resistant STIs

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ABSTRACT

Antimicrobial resistance (AMR) presents a swiftly advancing challenge to a wide range of healthcare and health promotion practices. While rising rates of AMR share some dimensions across contexts, the specificities of field, practice, place and population shape – and at times hinder attempts to stem – the rising tide of this health threat. Sexually transmitted infections (STIs) are one area of healthcare where the threat of AMR has traditionally been met with lethargy. In this paper, we draw on a range of stakeholder perspectives across practice, innovation and regulatory systems in Australia, the US and the UK to understand and examine the evolving nexus of STIs and AMR, including the roles of cultural reception, professional practice and political traction. We argue for a critical sociology of the nexus of sexual health and evolving resistance, which will be instructive for comprehending inaction and informing future developments. We also note that part of this critical sociology must involve challenging stigma concerning sexual practices and people/groups, and recognising the role of communities in driving positive change.

1. Introduction

In 2019 the World Health Organization declared antimicrobial resistance (AMR) to be one of the top ten global public health threats (EClinicalMedicine, 2021). Within the context of this and other recent global warnings, AMR has routinely been considered in a pan-disease manner. Yet the problem of resistance – biophysical and socio-political as it is – varies considerably across disease contexts as well as place. The character and threat of resistance, and thus how it is ‘managed’ in practice, is highly variable, often mirroring the enduring moralities and politics that structure care provision in health and wellbeing more broadly (Will, 2018). While the regional specificities of AMR have been extensively researched, including examinations of geopolitical and economic dynamics across low-and-middle-income countries (LMICs) and high-income countries (Willis & Chandler, 2019), relatively little emphasis has been placed on how the social dimensions of AMR vary

across fields within the context of (human) health provision (Neves et al., 2019).

Sexually transmitted infections (STIs) – also known as sexually transmitted diseases (STDs) – represent an intriguing area of rising AMR. As in other areas of medicine, rising resistance constitutes a major challenge in the context of STIs, as the ‘quick fix’ of modern antibiotics (Willis & Chandler, 2019) for bacterial infections begins to falter. The main STIs currently of concern for rising AMR are *Neisseria gonorrhoeae* (gonorrhoea) (Iwuji et al., 2022), and the lesser known but increasingly prominent *Mycoplasma genitalium* (MG) (Sweeney et al., 2022). Gonorrhoea has developed resistance to all antimicrobials historically recommended as first-line and/or second-line treatment. This includes sulfonamides, penicillins, tetracyclines, fluoroquinolones, early-generation macrolides, and cephalosporins (Unemo et al., 2019). MG shows increasing resistance and treatment failure rates to first and second-line treatments including doxycycline, azithromycin,

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moxifloxacin. For example, macrolide resistance mutations (conferring resistance to azithromycin) worldwide rose from 10% pre-2010 to 51% in 2016/17 (Machalek et al., 2020).

In the existing AMR scholarship, the context of illness and care has been shown to shape antimicrobial practices, including efforts to raise AMR's profile, improve judicious antimicrobial use, or incentivise research and innovation (Giubilini & Savulescu, 2020; Foster & Grundmann, 2006). For example, in the context of paediatric care, and in oncology, the fragility and high risk of immunocompromised patients offers distinct challenges to improving practices. In palliative care settings, reducing unnecessary drug use has similarly been shown to be difficult given the social contract around 'doing everything' to extend life (Broom et al., 2019). Yet little work has been done in the STI space. As resistance rises, contextual influences are becoming central to upscaling practice change and supporting innovation, centring the importance of understanding the habitus (Bourdieu, 1977) of specific scenes in attempts to address – and mobilise against – accelerating resistance.

In this paper we are concerned with the social, political and economic dimensions for resistance in the field of (increasingly resistant) bacterial STIs, as perceived and articulated by key stakeholders working in the field in Australia, the US and the UK. Our exploration includes a consideration of: the nexus of cultural politics and clinical practice; intersections of economic considerations and the innovation pipeline; and, associated public and political perceptions of the urgency (or otherwise) of resourcing solutions. Our analysis touches upon the impacts of many enduring problems in the field of STIs, while also exploring the potential for new (and potentially positive) dynamics induced by rising AMR. We offer insight into the importance of retaining a focus on *specificities* in comprehending the problem of AMR, while also illuminating social forces that play out, or could be mobilised, across diverse fields.

2. Background

2.1. Professional practice and medical moralities

While the broader infectious diseases literature has routinely examined the nexus of priority-setting, moralities, illness, and professional care (e.g., Smith et al., 2022), the field of AMR trails behind. Despite the work of a number of social scientists (e.g., Brown & Nettleton, 2017; Davis et al., 2021; Tarrant et al., 2020), there are considerable gaps in our understanding of how enduring and emerging moralities and cultural perceptions shape, and are shaping, AMR (Minssen et al., 2020). The broader pan-illness AMR scholarship has touched on these issues, albeit with a largely geopolitical focus (Willis & Chandler, 2019). The most obvious moral conundrum in the AMR scene, for instance, is that the 'burden' of AMR is much greater in LMICs, and yet most of the global 'intervention' and 'concern' has been focused on economically wealthier contexts (Overton et al., 2021). The AMR scholarship has also, to some extent, examined issues of stigma and social marginalisation, underlining (among other issues) the use of broad-spectrum antimicrobials in First Nations communities (Broom et al., 2017), inappropriate use of antimicrobials in the context of injecting drug use (Gordon & Lowy, 2005; Atkinson et al., 2009), and overprescribing in a range of other marginalised contexts (Charani et al., 2021). Such work points to marked and often intersecting inequities in access to health. Yet this work has only scratched the surface of the cultural politics of (in)action surrounding rising resistance.

Antibiotic 'overprescribing' is routinely identified as a driver of resistance. As we show in this paper, a key problematic of this practice emerges at the intersection of professional practice and cultural moralities, where enduring 'virtues' of STI care come into conflict with the broader undulations of resistance (see also Broom et al., 2019). In the context of STIs, antimicrobial (over)prescribing reflects a professional imperative to deliver benevolent care, as well as enduring moralities vis-à-vis the prevention of transmission and contamination. Whether at the level of the corporeal therapeutic encounter or societal/government

economic investment, the antimicrobial-microbial-human interface is infused with ritual practices, professional habits, and cultural ideas about abjection and horror. As Williams (1998, p. 437) notes in relation to the moralities of health more broadly, the pursuit of health:

"is an embodied practice and moral performance in which bodies, literally and metaphorically, become 'viable' – i.e. socially and culturally legitimated, materially shaped and practically 'enmattered' – and the contradictory features of western society, at one and the same time, are both ritually expressed and symbolically 'resolved': reordering, in effect, 'matter out of place' and 'balancing' in the process, the libidinal push of corporeal desire and the disciplinary pull of social order."

The 'out of place' (Douglas, 2003) in this context, is the STI. The antimicrobial offers potential resolution by removing this out of place matter or 'dirt' (Douglas, 2003), albeit with accelerating costs. Professional habits map onto these aforementioned moralities – treat, ameliorate, expunge, eradicate – and are notoriously hard to dislodge, despite increasingly spawning resistant bugs in the person's body, and enhanced selective pressure and resistance in the community.

As we trace below, habit – often, in this context, taking the form of *syndromic care*, where antimicrobials are prescribed on the basis of a patient's symptoms, either without microbiological testing or before test results are known – is hard to break, formed, as it is, in the enduring relations of immediate, benevolent and cost-effective care (Bradshaw et al., 2018). Practice operates in a dialectical tension between individual/symptomatic/syndromic intervention and population/future fixes, with the clinician acting to both help their patient and to protect members of their patient's sexual network. The perceived 'transgressions' of the subjects of care (vis-à-vis their continued engagement in sexual practices that place them and their sexual partners at heightened risk of repeat infection) not only reflect the complexities of care in this context (see also Beasley, 2008), but also reveal enduring cultural taboos around multiple sexual partners and men who have sex with men (MSM) which continue to shape how STIs are perceived and managed.

2.2. The cultural politics of (microbial) visibility

The rise of resistance in bacterial STIs creates a palpable tension between the utility of knowing and the benefits of non-knowing (i.e., 'ignorance') (McGoey, 2012; DeNicola, 2017; El Kassar). These include the political and economic consequences of *making visible* (in this case, making visible the extent of STIs, or resistant strains therein), and, in turn, the value or risks associated with group- or population-level knowing of microbial presence (resistant or otherwise). The ripple effects of *knowing* via efforts to detect and treat even asymptomatic STIs through screening programs that target 'at risk' populations, for example, are significant and shifting, with mixed and sometimes problematic effects in the public and state imaginary. Resulting data concerning the uneven distribution of (resistant) STIs within and between social groups, for instance, can contribute to problematic perceptions of such infections as 'the fault of a few', as 'not deadly', and so on. Equally, they can compound the stigmatisation of already marginalised groups via their subsequent framing as 'a risk to all'.

The global rise of AMR has generated considerable momentum towards *knowing more* (e.g., more genomics, more sensitivity testing) and *knowing faster* (e.g., 'before they transmit', 'before we overtreat') (Frost et al., 2021; WHO, 2021). Such information is widely viewed as essential for curbing resistance by enabling targeted social interventions and more appropriate prescribing at the individual level. It is also beginning to reveal, however, the value of *knowing less* (e.g., less asymptomatic screening, less surveillance). As McGoey (2012) observes, ignorance can at times be a strategic choice (see also Gross & McGoey, 2023). 'Undone science', or gaps in scientific knowledge, frequently reflect and serve the vested interests of the powerful (see, for example, Frickel & Vincent,

2007; Hess, 2020). Yet in the context of STIs, ignorance may at times deliver social benefits. In removing the imperative to act (e.g., to treat detected asymptomatic infections in individual patients), ignorance may enable forms of strategic inaction that ultimately rein in antimicrobial use. Resistance, we therefore argue in this paper, is swiftly producing paradoxical effects in the cultural politics of (microbial) visibility, raising the stakes of visibility, but also raising the possibility that knowing more may at times be counterproductive and even harmful. The merits of strategic ignorance are thus beginning to garner attention within the STI field (see Doran et al., 2021; Kenyon, 2018, 2020; Kenyon et al., 2022; Marcus et al., 2021).

Allied to the cultural dilemmas of knowing/not-knowing (Aradau, 2017; Gross, 2016; Herwig & Engel, 2016; Hess, 2020), the strategic aspects of attention are growing in prominence, both fuelled by and fuelling a politics of horror in which the broader citizenry is perceived as 'at threat' from the contagion of resistance in STIs in specific (often stigmatised) communities. A new politics of resistance in STIs thus emerges, in which the case for action/investment can be made by leveraging a (productive but at times problematic) horror narrative concerning the consequences of multi-resistance-STIs not merely for the stigmatised 'transgressive' citizenry, but also for the wider population.

3. Methods

3.1. Data collection

In this article, we draw insights from our ongoing program of research on the social, political and economic drivers of AMR (e.g., Broom et al., 2021; Broom et al., 2022a; Broom et al., 2022b) to explore and illuminate how these dynamics shape the specificities of practice and resistance in relation to STIs. Specifically, we present findings from qualitative interviews conducted between 2021 and 2023 with a diverse range of stakeholders in the STI and AMR space. Data collection for the study involved in-depth, semi-structured interviews with stakeholders responsible for combating AMR in clinical, pan-national, and private sector contexts. Participants (n = 23; male = 10, female = 13) included sexual health clinicians and general practitioners (GPs), representatives of peak pan-national organisations, and key industry stakeholders involved in pharmaceutical and/or diagnostic research and development. All clinical participants (n = 13) were based in Australia, while other participants came from Australia (n = 5), the US (n = 2) and the UK (n = 3). Interviews were conducted via video conference by authors A, B and D, and ranged between 30 and 60 minutes. Interviews were audio-recorded and transcribed verbatim. Identifying information was removed from the transcripts to preserve study participants' privacy. Interviews were guided by questions about participants' perceptions and direct experiences of AMR in the context of STIs, their efforts to develop and implement AMR solutions in their respective contexts, and any support or challenges they faced working to do so. Together, participants provided a high-level multistakeholder view of AMR in the context of STIs as manifest across a range of countries and contexts. Ethics approval for this research was provided by the University of Sydney's Human Research Ethics Committee.

3.2. Data context

Data were collected from participants in the Global North countries of Australia, the US and the UK. As sites for studying resistant STIs, these countries share a number of important similarities, as well as notable differences.

Approaches to STI diagnosis and treatment differ in Australia, the US and the UK, reflecting marked differences in these countries' health systems. In Australia, access to STI diagnosis and management generally occurs through sexual health or GPs clinics, both of which are publicly funded through Australia's universal healthcare (Medicare) system. A patient co-payment is often, though not always, required for these

services (King et al., 2022). Both specialist sexual health clinics and 'bulk-billed' GP services (where no co-payment is required) are largely concentrated in urban areas (Graham et al., 2023). In the US, STI specialty clinics were key to reducing STIs in the early 2000s, but subsequent budget cuts, staffing cuts and the introduction of patient co-payments have contributed to reduced access to the services that specialty STI clinics traditionally provided. This has diverted STI care to GPs and emergency departments, where skills in and awareness of STI management, prevention, client-centred approaches, and risk reduction strategies is typically less developed (US Department of Health and Human Services, 2020). In the UK, STIs are predominantly diagnosed through a broad range of publicly funded health services including specialist sexual health services, GPs, pharmacies and internet-based services. The majority of face-to-face diagnoses are made at specialist sexual health services (GUM clinics and similar) (Public Health England, 2020). Surveillance of STIs diagnosed from all commissioned sexual health services in England is mandatory through a Genitourinary Medicine Clinical Activity Database (GUMCAD).

2021 data indicate that STI diagnosis rates in the US are significantly higher than in either Australia or England.¹ Across all three countries, however, minority groups (including sexual and gender minorities and persons of colour) and young people are disproportionately impacted by STIs. In the US, MSM, adolescents and pregnant woman carry the highest STI burden, and certain racial minorities and regions of the country (South and West) have an increased prevalence of STI disease. Gonorrhoea in MSM is more likely to be resistant to antimicrobials relative to men who have sex with women. The rate of chlamydia and gonorrhoea in Black males is 6.8 and 7.7 times the rate in white males respectively (US Department of Health and Human Services, 2020; CDC, 2021). Over recent years, Australia has observed a rise in STIs in vulnerable populations, including syphilis in gay men and Aboriginal and Torres Strait Islander people, gonorrhoea in gay men and other MSM, and gonorrhoea and chlamydia in young people (Australian Government, 2018). In the UK, broad gains have been made in the overall STI diagnosis rate, with previously increasing rates now static. However, rates of bacterial STI diagnoses among gay, bisexual and other MSM continue to rise (UK Health Security Agency, 2022). Action plans and strategies for all three countries thus acknowledge an urgent need for culturally sensitive and linguistically appropriate community engagement, education, stigma reduction, access to STI management and harm reduction, surveillance and contact tracing.

Against this backdrop of pronounced inequalities, this study examined how STIs – and resistant infections therein – are perceived and addressed across these three national contexts. While national differences in health systems and cultures undoubtedly infect stakeholders' attitudes and actions, our focus, in this paper, is on identifying the *shared* themes and *recurring* narratives that shape clinical and industry understandings of AMR in the context of STIs across these three Global North settings.

3.3. Data analysis

Data were analysed using a framework approach (Pope et al., 2006). Analysis involved: (1) Familiarisation: researchers reviewed the transcripts. (2) Identification: researchers discussed and identified key themes in the transcripts, as relevant to the study aims. (3) Application of

¹ Based on numbers of diagnoses of chlamydia, gonorrhoea and infectious syphilis. In Australia in 2021 (population 25,690,000) there were 86,916 diagnoses of chlamydia, 26,577 of gonorrhoea, and 5,570 of infectious syphilis (King et al., 2022). In the US in 2021 (population 331,900,000) there were 1,644,416 diagnoses of chlamydia, 710,151 or gonorrhoea, and 176,713 of syphilis (CDC, 2021). In England in 2021 (population 56,536,000) there were 159,448 diagnoses of chlamydia, 51,074 of gonorrhoea and 7,506 diagnoses of infectious syphilis (UK Health Security Agency, 2022).

themes to text: researchers coded the transcripts thematically, identifying key excerpts that spoke to the identified themes and organising these data inductively into sub-themes. (4) Charting: headings and sub-headings were used to build an overall picture of the data, including the sub-themes identified in step 3. (5) Mapping and interpretation: associations were clarified and explanations developed. This analysis was led by authors A and B, to develop a robust interpretation of the data. Analysis was then shared and discussed with the wider research team, including clinician-researchers, to confirm the consistency and credibility of the interpretation. While analytic rigour was enhanced by searching for negative, atypical and conflicting or contradictory items in coding and theme development, our emphasis was on identifying recurring themes and narratives across the dataset. This focus was appropriate given the exploratory nature of the study; it also reflected our comparatively small sample sizes, which precluded more fine-grained analysis of differences between different types of stakeholders or stakeholders in different countries (see Section 6 on Limitations).

4. Results

4.1. Unseen and unclear

How rising rates of resistance play out in the field of STIs is inseparable from the cultural politics of sex and sexuality. As our interviews with clinical, regulatory and industry stakeholders revealed, cultural ideas about sex and morality, worthiness and responsibility continue to shape the entire STI space, including stakeholders' capacity to 'get traction' around the emerging problem of resistance. Gaining traction is an ongoing issue in the area of sexual health more widely, as struggles to make pre-exposure prophylaxis (PrEP) for HIV more accessible to those who need it demonstrate (Catalan et al., 2020). This has most recently been apparent in complex community debates over monkeypox, including how to ensure those at greatest risk receive crucial information in a non-stigmatising manner, how to reduce harms in high transmission scenarios (like sex-on-premise venues), and how to address inequities (e.g., for at-risk Black men with lower vaccination rates, see Pan et al., 2022; Vusirikala et al., 2022; Delaney, 2022).

With respect to AMR, complexities of this kind shape – and present unique challenges and opportunities regarding – the emerging untreatability of some resistant STIs. As numerous participants explained, STIs continue to attract little public attention and (somewhat ironically) are rarely seen by policymakers as a 'sexy' issue that warrants funding and a seat at the decision-making table:

30 years of being devalued ... Despite endless business cases to increase our resources, sexual health is not on anyone's agenda ... And I'm not suggesting we're the answer ... But ... we are a repository for educating people on issues like antibiotic resistance ... [Clinician, Australia, Female]

Reflecting on the plight of resistance in this broader scene of devaluing sexual health, interviewees underlined a number of factors that contribute to this systematic de-prioritisation in countries where STIs are not widespread. Key among these were sexual taboos and the assumed 'character' of populations that carry the greatest burden of STIs. Put simply, STIs were viewed as a politically niche issue, affecting only small and largely 'irrelevant' sub-sections of the population that were already marginalised. Participants noted that scarce health dollars are therefore routinely directed elsewhere:

I think that the STD space was never particularly well-funded. And I think, to some extent, that's because, politically, the populations that you work with are not really the folks that your common voter is really excited to help. They're sort of people marginalised ... I think STD was kind of like hanging onto like the coattails of HIV for a while, but never was really getting those resources. ... it was just a persistent sense that this was not sort of a priority. [Industry, US, Male]

Stigma – including misplaced assumptions about 'the other' who has or is at risk of acquiring an STI, inflected by lingering taboos about multiple sex partners, certain sexual practices and uncleanness (Douglas, 2003) therein – thus play a central role in assembling this scene in which STIs routinely fail to gain policy traction:

[T]here is still this somewhat outdated notion around what kind of a person gets an STI and what that must mean about them in like a moral, ethical judgement ... I'm still surprised when I'm dealing with people in the US and that overlay is still there, to the point where there's even consideration that they want to address the STI epidemic, but they want to try to do it without having to ask people about their sexual history, which is fascinating. So, it's multilayered. [Industry, Australia, Male]

The moral taint that continued to attach to STIs was seen to curb meaningful discussion about the rising problem of resistant infections, with implications for attempts to prevent transmission, but also for procuring funding at the level of both clinical practice and research and innovation:

For heterosexual populations, I think it's not something that is on their mind. And that people that are at risk for STDs sometimes don't perceive themselves to be at risk, and then people who get STDs don't really want to talk about that they got STDs. So, there's nobody that's really invested in this issue because, regardless of what side, you're sort of not really all that excited about being an out proud advocate. So, I think the advocacy in the community isn't there. [Industry, US, Male]

The fundamental problem, another participant summarised, "is that there are a lot of competing health areas, competition for health dollars, and there is stigma around STIs" (Clinician, Australia, Female). In the 'competition' for finite resources, the marginalisation of STIs as unclean militates against the pressing nature of the problem of AMR.

4.2. The costs of being 'non-deadly'

Perceptions of severity emerged as a critical part of this picture. Many participants viewed resistant STIs as the 'poor cousin' within the broader AMR calculus. When compared to other health areas – such as oncology, which has experienced dramatic reductions in the viability of available interventions and an associated increase in deaths due to AMR (Cornejo-Juárez et al., 2015), or transplant surgery, which has seen an increase in failed organ transplants and a growing unwillingness to donate in the context of heightened risks of hospital-acquired resistant infections (Fisher et al., 2017) – resistant STIs were routinely trivialised. As one interviewee put it, STIs cause significant suffering, but they rarely result in death: "most people don't die of an STI" [Industry, Australia, Female]. The 'problem' with this low mortality rate is the resulting perception that STIs deserve less investment than deadlier conditions:

The STD space is really predicated on mortality, and not very many people die from STDs so it's hard to make the sort of business or economic case that this is where you need to devote your money. But there's a whole range of morbidity that's associated with it, that I think is discounted, so that it causes a lot of misery, but there's not a lot of death. And I think the misery component is not sort of incorporated into the equation. [Industry, US, Male]

What these statements speak to is the way that resource allocations are bound up with hierarchies of perceived worthiness, which often align with notions of deadliness. Even *within* the STI field, STIs compete for funding on the basis of perceived severity.

If you have a hierarchy of aggressiveness, you've got gonorrhoea at the top, you've got chlamydia next, and then you've got Mycoplasma genitalium, which, on the whole, is a more indolent pathogen ... It's

just if you have limited money, you're going to put it into the one that can cause disseminated gonorrhoea, the really, really florid symptoms, raging PID [pelvic inflammatory disease] in women, things like that. [Clinician, Australia, Female]

In a moral economy where death is equated with deservingness, non-fatal infections – especially those that are sexually transmitted – can easily slide down the hierarchy of funding priorities.

4.3. The uneven rise of resistant STIs

The particularities of bacterial resistance were reflected on in the interviews as critical for comprehending the social, political and economic dimensions of AMR. AMR was talked about as non-linear, playing out differently across bugs, contexts and drugs. This was in turn viewed as creating multiplicity and undermining the ability to disseminate a coherent story – i.e., worsening/stable/improving – through which to lobby publics and policymakers towards supporting concerted action. In the STI context, the acute problems already emerging around gonorrhoea were talked about as differing from those associated with the largely unknown but increasingly problematic MG. The business-as-usual situation with syphilis and chlamydia offered a different scene yet again. These contrasting dynamics were seen as contributing to a highly differentiated STI space:

[W]hen it comes to STIs, the two main STIs that are really problematic when it comes to AMR are gonorrhoea and *Mycoplasma genitalium*. We don't see AMR as an issue in chlamydia, for whatever reason. For syphilis, while we do see the emergence of resistance to antibiotics, it's not to penicillin, which has been the principal treatment for decades, and it's still highly susceptible to penicillin. So, those are our four main bacterial STIs, and so it's really two of them [that are a serious problem at the moment] ... we have lost every single antibiotic we have ever used for gonorrhoea. [Clinician, Australia, Female]

Participants described the increasing regularity with which they now encounter resistant infections, particularly in the context of gonorrhoea and MG. Rising resistance is now a clinical reality that shapes therapeutic encounters.

We're all, at [clinic], com[ing] up against very drug-resistant *Mycoplasma genitalium*, and that is quite difficult because you're putting people through antibiotic after antibiotic after antibiotic in an attempt to clear something that is, by this stage, no longer symptomatic. And most people feel a lot of discomfort [with moxifloxacin] side effects, including peripheral neuropathy and tendonitis. [Clinician, Australia, Female]

Many participants described a growing discomfort among STI clinicians concerning the role of their own professional practices in fuelling resistance.

[I]t's well known that we're [in sexual health] doing a lot of screening, we're attending to a lot of infections and we're hence using a lot of antibiotics and we assume that has impacts on antimicrobial susceptibility ... it seems fairly clear we don't really have a great idea of the risk-benefit [of using them], the trade-off there. [Clinician, Australia, Male]

Despite the context of little political traction and continued cultural marginalisation, a sense that change was needed was emerging in some clinical contexts.

4.4. The collateral damage of syndromic care

Clinical interviewees frequently underlined the role of 'syndromic' care – underpinned by perceived normative social expectations for

pharmaceutically-driven microbial eradication – in driving resistance in STIs. Acts of prescribing represent complex interpersonal and ritualised moments, communicating care (Tarrant et al., 2020), but also exposing structural vulnerabilities in fragile healthcare systems (Moloney, 2017). Interviewees presented a complex picture in which the valorisation of (pharmacological) care within the STI field emerged as central both to the problem of resistant STIs, and to the broader selective pressure driving resistance across contexts:

Let's use urethritis, for example. Every male walked in the door with urethritis, they all got azithromycin, but some of them had chlamydia, some of them had *Mycoplasma genitalium*, some will end up having gonorrhoea. It's far better to practise etiologic management, where you identify the pathogen and you treat the pathogen, and you don't syndromically treat every person who comes in with symptoms and find out five days later that they had a completely different bug ... So, our poor antibiotic stewardship results in overtreatment, overuse, and misuse of antibiotics. [Clinician, Australia, Female]

The norm of syndromic prescribing was viewed as deeply embedded in the specificities of STI medicine, including the brevity of many encounters between clinicians and patients, the limited resources in sexual health, the perceived desire of patients to receive treatment quickly, and the (associated) imperative clinicians often feel to treat potential infections before others are placed at risk.

In some marginalised population groups, the practice of syndromic prescribing was talked about as driven by clinicians' concern that their patients might not return for a follow-up appointment. Indeed, the enduring stigma of accessing STI care is such that some patients travel long distances to access specialist services, rather than presenting to their local GPs. In these situations, delaying treatment might advance optimal prescribing practices, but is viewed by clinicians as carrying another set of risks.

[W]e have a lot of patients who will not go to their GP for these issues, so that means they're only coming here [to the sexual health clinic] for these issues. So that means, if they have to then wait one or two hours to get seen by the doctor, and they are then going to have to come back in a day or two and potentially wait one or two hours, you can see that that's a big deterrent. Or maybe they've travelled from the other side of the city, or we get rural patients who come from a couple of hours away, and, of course, they're going to want to be treated then and there, because they're not going to go to their GP and access that service for treatment of gonorrhoea in two days when the result's available. [Clinician, Australia, Female]

Even when non-attendance was not considered a primary concern, enduring taboos around STIs (including perceptions of dirtiness and contamination therein) were described as intersecting with cultural values concerning 'responsible' sexual behaviour to shape patient and clinician preferences concerning treatment timelines – often in ways that were viewed as encouraging syndromic care:

Yeah, they feel a bit dirty, I think. A bit, "Ergh, I've got this sexually transmitted bug in me possibly. Let's just get rid of it." But you're quite right, I think there is also the thing, "I don't want to pass this on. I'm hooking up with someone next week," or, "my boyfriend's coming back from FIFO [fly-in-fly-out work] next week," or whatever, bush doof [outback dance party] or a rave coming up, "So yeah, I want to just get this out of the way. And I've got other things going on in my life too. I don't want to have to ring up next week, find out I've got something, to come back in or take an antibiotic [later]. I just want it dealt with." [Clinician, Australia, Male]

Compounding this problem, participants noted that many doctors were under immense pressure to 'churn' patients through their clinics as quickly as possible. This left little time for patient education, including nuanced discussions about the merits (or otherwise) of delaying

treatment until definitive test results are available.

Behavioural changes are very difficult to make, as we know. So, unless you can say to the patient, “Look, let’s do a test today, but you may not show up the infection because it may be too early, and then we’ll repeat the test in a week’s time.” In that week, can we address the damage that’s been done in that time? Can we trust the patient not to spread the infection if they have it at that time? So, we work on the premise that you might as well treat the infection because the risks of spread when the patient leaves your room is high. But obviously, if you can get the patient on your side and do a lot of education and talk about the implications of increased antibiotic consumption on their microbiome and their gut health, et cetera, then probably appeal to the patient’s better judgment, but then that demands a lot of time. [Clinician, Australia, Female]

In this context, syndromic treatment emerged not only as a means of managing perceived patient expectations, but also as a tactic of risk mitigation, designed to address infections before they spread.

Syndromic treatment thus emerged a practical response to the challenges of good STI management, as filtered through piecemeal healthcare provision and enduring forms of marginalisation and stigmatisation. Yet – in the mid- and long-term – syndromic prescribing was also viewed as contributing to the growing burden of resistance. As one participant explained, potential costs are considerable in that syndromic management of one STI has the capacity to induce resistance in another:

So, we used to use one gram of ceftriaxone in the syndromic management of sexually transmitted infection because we know it’s first line for chlamydia. It was also used in some gonorrhoea regiment, and we were using dual resistance therapy. And as a result of that, there’s been a rapid decline in azithromycin cure for *Mycoplasma genitalium*, okay. Also, the *Mycoplasma* itself can actually become resistant in vivo, right. So, I think a lot of it is because it was used in syndromic management and its first line, okay. And then also, we tend to increase the antibiotic consumption, right. For example, when somebody comes in with, say, proctitis, we treat them syndromically for all the organisms because they’re in a lot of pain and they want treatment at that point, but we’re treating many organisms over a period of time without having a diagnosis, without having a cause for that condition. So, I think that [syndromic treatment] is also contributing [to resistance]. [Clinician, Australia, Female]

Practices of care within the STI field therefore have contradictory effects, often contributing to inadvertent harms for both the person/s receiving (syndromic) treatment, and members of their sexual networks and the wider communities.

[I]t is actually, the way we practice medicine in sexual health, I believe, promotes AMR. ... It’s all about finding the STI and treating it ... MSM have the most STIs ... [We] test them really, really, really frequently, and we’ll do it every three months and we’ll send reminders, and we’ll make sure that we get them in and that we keep trying to treat their gonorrhoea. Well, when you actually see ... their drug chart, they’ve had ceftriaxone four times this year, they’ve had benzathine penicillin three times, they’ve had 15 doses of azithromycin, they’ve had doxycycline. So their [antimicrobial] consumption is enormous. Absolutely enormous. And where is all the resistance? It’s in that population. But, of course, it doesn’t stay in that population. It leaks over more broadly. [Clinician, Australia, Female]

The imperative to provide (immediate) care, perceived community expectations for swift microbial eradication, and limited resources for conversations about the health consequences of premature or ‘over’ treatment, are all part of the multidimensional problem of AMR in the STI context. As we show below, these features of practice are accentuated, in many instances, by cultures of surveillance, and the paradox of microbial

visibility (to ‘treat’ or not to ‘treat’) once presence of infection is detected.

4.5. Screening, disciplining and the problem of bodies

As our interviewees described it, the habitus of care and innovation in the STI field is heavily shaped by norms of screening. Beyond patterns of widespread syndromic treatment, participants noted that over-prescribing was informed by a sector-wide focus on screening as a means of preventing STI transmission. Such practices see clinicians seeking out and treating *asymptomatic* infections with antimicrobials, including those that pose minimal threat to the patient, and/or which might clear up on their own.

Yeah, the men who come in are actually very interested when you talk about it. They are interested. They had no idea that gonorrhoea would actually go away by itself. So we haven’t engaged people enough in conversation [about non-antimicrobial recovery]. We’ve just decided that we screen, we screen and we detect, and we treat. Only, it could be two weeks later that someone actually gets the same infection. [Clinician, Australia, Female]

As another participant argued, the cycle of ‘screen, detect, treat’ dramatically increases the antimicrobial load and causes potential damage to individual microbiota. Yet its impact on overall infection rates is seen as negligible by some clinician.

But so, this whole premise of going, looking for STIs, trying to treat them and eradicate them, doesn’t seem to be reducing the burden of these infections. It’s massively increasing antibiotic consumption, and antibiotic consumption is directly correlated with AMR in gonorrhoea, syphilis, *Mycoplasma genitalium*. So, we can see the collateral damage, and we’re not even measuring the impact on gut microbiota. [Clinician, Australia, Female]

Again, practice imperatives, bound up with the habitus of care in STI contexts, were seen as heavily shaping the steady (and increasing) use of antimicrobials. Noting the omnipresence of population-level screening programs, and the close relationship between detection of infection and the deployment of antimicrobials, some participants questioned the need to seek out and destroy that which *contaminated* the body, but might ultimately resolve on its own:

[My view is] ... stop screening gay men for STIs, particularly chlamydia and gonorrhoea. Syphilis is different. HIV, obviously different. But chlamydia and gonorrhoea, increasingly, I think we shouldn’t be screening men. And that’s quite different to testing men. If you’ve got a urethral discharge or bum proctitis, that’s quite different, but totally asymptomatic, you’ve got a bit of gono in your throat, disappears after a while, big deal [sarcastic]. Let’s not look for it, let’s not treat it. Because at the moment, doing three monthly screening of gay men on PrEP, six monthly or maybe sometimes more for gay men who are HIV positive, is probably excessive and we’re probably not doing anything to reduce prevalence or reduce harms. Cervixes are different. That is quite different. But for gay men, we’re seeing a lot of them and we’re screening them an awful lot and I’m just not sure that’s of great value anymore. And part of it, I think, goes back to the stigma and the ick factor. If I’m a gay man, the idea that I’m carrying gono around in my bum or my throat is horrible, so I just want it looked for and gone. So, I think clinicians and the community would need to be taken on a journey with this and it’s going to take time, if it ever happens. [Clinician, Australia, Male]

The human desire for order and control – for mastery over the body – is thus central to AMR’s assembly (Williams, 1998). As shown above, there is a paradox evident at the point of care. Increased attention to bugs, through greater levels of surveillance, is productive and revealing of a different problem – the intolerability of the (often asymptomatic)

bugs being discovered, despite their potential for (natural) remission.

Questions concerning the value of screening and the benefits of asymptomatic treatment are a live question in the AMR literature (see, for example, Kenyon, 2018, 2020; Kenyon et al., 2022). These issues are particularly pertinent with respect to MG – an extremely slow-growing organism that is diagnosed through NAAT testing (i.e., culture for sensitive testing not easily performed) and that has high rates of resistance. While some NAAT testing platforms do now offer macrolide resistance testing to provide an indication as to initial treatment for symptomatic patients, there is growing debate surrounding the utility of screening asymptomatic patients (via rectal and throat swabs or urine PCR), including vis-à-vis the benefits of diagnosis relative to the resistance-related risks and challenges that are likely to arise if infection is detected. The specificities of particular organisms therefore inflect evolving clinician perspectives concerning the merits (or otherwise) of STI screening, and the potential value of strategic ignorance.

4.6. The politics of attention and the traction of horror

Another paradox of AMR in the context of STIs is that rising resistance – driven, in part, by the treatment norms described above – has delivered unexpected benefits to the field vis-à-vis the politics of attention. The World Health Organization's identification of AMR as a top-ten global health threat – and indeed, the specific identification of *Neisseria gonorrhoeae* as "a priority organism on the CDC [Center for Disease Control and Prevention] top threat list" [Regulator/Clinician, UK, Female] – was perceived by many participants as particularly helpful in broader efforts to secure resources for the field. The emerging AMR crisis presents a perceived opportunity for an otherwise marginalised field to garner the attention of the media and public and, by extension, of politicians. As one participant explained in the UK context, this has significant resource implications, cutting through what they described as "entrenched complacency" and "cultural taboo", and causing policymakers to pay attention in unprecedented ways:

[O]ur government, I'd say, is quite responsive to what's in the media ... it was about 2015 and we were picking up an outbreak of gonorrhoea that had high level azithromycin resistance. ... And no one was particularly interested in helping or doing sequencing or anything like that ... what happened was the clinic or the clinical network went to the press and the media picked up this story and sort of ran with it and it became a big story in the UK about outbreak of awful gonorrhoea ... Super gonorrhoea they called it. And suddenly the government were then coming to us saying, "What's this 'super gonorrhoea' that we don't know about?" And I said, "I had tried to tell you, but you weren't interested." And suddenly we were given resources to do whole genome sequencing and a comms team and a lot of resources. [Regulator/Clinician, UK, Female]

Another participant shared a similar perspective. "[H]aving an AMR story", she explained, helps to overcome the aforementioned issues of taboo and perceived triviality, convincing funders that STIs are a serious concern and require investment:

Yeah. I mean, I think things are changing. I think we were always way down the priority list. I think it was always TB and other infections, and STIs are always seen as a bit of like, "Oh well, those people, they're not important," or they're often affecting minority groups, marginalised people. It's never been a great priority for a lot of governments. But I think things have changed a lot over the years. And actually, in a way, having an AMR story helps. So, with gonorrhoea, I think gonorrhoea would be completely ignored completely if it didn't have the bit that excites these funding bodies, such as the words "XDR" [extensively drug resistant]. [Regulator/Clinician, UK, Female]

In the US, a parallel trend was emerging. Previously disinterested Senators, who had been turned off by what an Australian participant (above) described as the "ick factor" of STIs [Clinician, Australia], began paying attention when confronted with the 'scary' prospect of 'super gonorrhoea'.

I think that the greater field of STD prevention has not done an excellent job of making the case for why it's important, and I think as a result of that, in combination with it being a thing that people don't really want to talk about. So, when you go to advocate in the United States, like Congress, to a Senator that we need more funding and you talk about genitals and discharge, people are like, "Ergh. Make this short and quick. What am I going to get with this investment?" And I don't think there's been a really good case made. ... That being said, [resistant gonorrhoea] it's a little bit scarier and I think people pay a little bit more attention to it because sometimes it gets presented as scary, like 'super gonorrhoea'. [Industry, US, Male]

The currency of attention is important, here, in part because it enables policy makers to invest in research and innovation. The development of new antimicrobial drugs – as well as rapid point-of-care diagnostic technologies that have the potential to dramatically curb syndromic treatment – has been stalled by issues of financial non-viability in an industry beholden to market principles and plagued (as extrapolated above) by perceived unimportance.

Well, companies have their own decision-making processes. So, you're at a disadvantage in the STI field to begin with. It's not cancer, it's not heart disease, it's not diabetes, it's not depression. So overall, everybody's less interested in STIs, so the market opportunities contracted to begin with ... So, first of all, for a company to want to invest money in something, they need to know it's a sufficient global problem, it's a sufficient public health problem, it causes sufficient disease, and there's sufficient interest in providers in using their assay or their drug. And STIs are the lowest priority for antimicrobial or for the pharmaceutical industry. [Clinician, Australia, Female]

As our interviewees stressed across countries and contexts, without political investment – and, indeed, broad public and sector interest to increase the size and value of the prospective market – research and development is difficult to sustain.

[I]f you actually have a look at the world, and you have a look at what is out there in terms of [AMR technologies], there's actually bugged all. [...] [I]t also tells you what the big companies are actually thinking. You know what I mean? If they thought it's there and it's sort of a low hanging fruit and a place where a commercial entity can make some money, there would be more people in the game, I guess. I guess it speaks to the fact that it's not that easy. It's [AMR is] really important obviously, which is why we are all believers. But it's not that easy. I mean, [our company] has to make money or we can't pay our staff. We all go home again if we don't make money out of it, which is the hard, cold, commercial fact. [Industry, Australia, Female]

Attention thus has monetary value and, as such, has the potential to pump prime a stalled innovation scene and ultimately reshape clinical practice.

5. Discussion

In many respects, resistance has shared qualities across contexts. The cultural fetish of immediacy (Broom et al., 2017); the expectation of benevolent care for patients in distress (Broom et al., 2014); patients' perceived desire for a quick recovery (Dahal et al., 2021); health systems with (often) limited resources, in need of a 'quick fix' (Willis & Chandler, 2019); and innovators and industry looking elsewhere for politically

palatable and profitable investments (Roope et al., 2019). Yet resistance is also a highly diversified scene, with STIs serving as an instructive example of the intricate relationships between resistance, social life, stigma, cultural norms, evolving cultural practices and technological development. The dimensions to this problem, we argue, are *interpersonal*, *political-economic*, and *cultural*. AMR in the STI context brings together enduring issues in the (discrete) areas of resistance and sexual health. Comprehending this problem thus requires a broad sociological lens.

The *interpersonal* dimension of the problem, as revealed in this article, centres on the performance of, and desire for, care. And on a persistently narrow conception of what care involves in relation to histories and habits of antimicrobial use in STIs. The spectre of stigma, or the ‘ick factor’, dominates the repertoires of STI care. The swabbing for bugs, the use of antimicrobials ‘just in case’, and the alignment of antimicrobials to new potentials for sexual freedom (e.g., PrEP). Such repertoires are not simply matters for challenging or changing. Rather, the bases for their emergence and proliferation need to remain in focus as any shifts in the practices and norms that induce (further) resistance are considered. Syndromic care represents a social contract of sorts, which requires work to transform.

The *political-economic* scene in the context of resistance and STIs is a complex and shifting one. On one level, it is not dissimilar to other spheres of health (e.g., short consultation times, repeat appointments, out-of-pocket cost), but it also has certain distinct qualities in terms of what facilitates *attention* and induces *action*. It has suffered, in our stakeholders’ perspectives, from systematic de-prioritisation. Yet, at the same time, resistance has brought new opportunities for traction in the field of STIs, as the politics of horror and media-induced moments of public attention (particularly surrounding the threat of resistant superbugs, especially within the ‘general population’) has raised the stakes vis-à-vis funding solutions.

The least surprising but perhaps the most palpable normative force pervading this scene concerns the *cultural* politics of sex (albeit certain kinds, certain citizens, and so forth), and its continued moral work. These norms and taboos inflect the potential to address or practice ‘better’ in relation to resistance. Health is a thoroughly moral phenomenon, and illness gets ‘treated’ in line with its moral positioning in society. Funding lines up not only with purity but also disaster/death. Community activists and practitioners intervene with moral citizenry, and publics donate and sympathise in line with ideas about moral worth. However, as the history of HIV shows, publics and policymakers can be swayed towards highly effective responses (Catlan et al., 2020).

What our findings may ultimately point to is thus a need for sex-positive, inventive and highly consultative ways of dealing with the unfolding emergency of AMR. Historically, it is affected communities (and their activists) who have pathed the way forward in STIs in partnership with research, clinical and health promotion professionals. It was, for example, gay community activists who first invented and promoted safe sex when HIV arrived on the scene (Watney, 2002). By the time government responses moved beyond moralistic calls for abstinence (Gonsalves et al., 2022), the gay community had already modified their behaviours (Watney, 2002). Again, when monkeypox emerged in 2022, MSM rapidly modified their sexual practices, including reducing one time partnerships, in ways that are likely to have significantly reduced the spread of transmission (Delaney, 2022; Spicknall et al., 2022). Community activists also met with a range of stakeholders and took to social media to tackle stigma and complacency concerning monkeypox, including through educational campaigns and efforts to emphasise the importance of rapidly making vaccinations available (Mahase, 2022; Ng et al., 2022). This recent history underlines the importance of close consultation between stakeholders and affected communities. It is within these collaborations with affected communities that creative, non-stigmatising and *context-sensitive* narratives and approaches to addressing resistant STIs are likely to emerge.

6. Limitations and directions for future research

Our focus in this exploratory study has been on identifying shared themes in the experiences and perspectives of diverse study participants working at the intersection of STIs and AMR in Australia, the UK and the US. Our study’s comparatively small sample size – together with our analytical focus on commonalities – mean that it is beyond the scope of this paper to identify or critically analyse differences in participants’ experiences and/or perspectives based on their national and/or employment contexts. While our emphasis has allowed us to paint a valuable preliminary picture of the broader habitus of the STI/AMR field, further comparative research is needed to draw out the nuances of this habitus in different national contexts and/or employment settings.

A second and related limitation of this study concerns the exclusion of patient and community voices. Additional research to bring patient and community perspectives into dialogue with those of other stakeholders would be highly instructive, adding a valuable additional layer to our burgeoning understanding of this unique empirical scene.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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