

Emerging Dilemmas in the Age of Resistance: The Case of Sexually Transmitted Infections

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Abstract

The stage is set for a new era of precariousness in modern medicine, driven by the increasing failure of a key pharmaceutical pillar—antimicrobials. In the context of sexually transmitted infections (STIs), the rise of antimicrobial resistance is introducing urgent questions around what might constitute “best practice” in a rapidly evolving scene, including the value of asymptomatic screening (test and treat), and the consequent downstream collateral damage emerging from over-use of our diminishingly effective antimicrobial resources. Drawing on interviews with clinicians, experts, and industry representatives, we examine resistance as a site of emerging and co-constitutive moral, temporal, and economic dilemmas. Such dilemmas, as illustrated in participants’ accounts, involve complexities regarding prioritization between competing health demands; doing good work while meeting business requirements; considering trade-offs between visibility and amplifying the problem; difficulties balancing presents and futures; reconciling divergent clinical opinions and expertise; and managing patient subjectivities, while considering the implications of clinical practices for resistance. Importantly, centering dilemmas in context of antibiotic-resistant STIs open greater theoretical scope to consider the challenging spaces that key actors such as clinicians and decision-makers occupy, as they attempt to curb resistance while caring for individuals and the community.

Keywords

sociology; semi-structured interviews; STIs/STDs; sexual health; public health; sociology of care; antimicrobial resistance (AMR); clinical practice; qualitative research; Australia

Introduction

Intervening with the human body, or, indeed, the microbial ether, has always been a delicate balance. The discovery of antibiotics and their eventual scaled-up production has served—at least until very recently—as one of the core stabilizing structures of modern technoscientific medicine. Antibiotics came to provide a (somewhat) secure platform through which to address different forms of pathology and illness (Landecker, 2016). Underpinning most areas of medical intervention, from childbirth to sexual health, there are few spheres of medicine not reliant on antimicrobial efficacy. Until recently, the enduring stability of this pillar of medicine was largely assumed. Now, we are confronted with the increasing possibility of a post-antimicrobial world or, at least, one with relatively few remaining effective antimicrobial options available.

Surprisingly, the rise of antimicrobial resistance (AMR) has only gained political attention since the late

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1990s (Overton et al., 2021), even though it has been a problem for clinicians since the development of penicillin. As far back as World War II, gram-negative bacteria became unresponsive to penicillin, giving war physicians pause for thought in terms of what the future of treating infections may look like (Davenport, 2012; Murray, 2008). Fast forward to the present day and bacterial sensitivity to available antibiotics is waning at scale. This presents considerable and escalating uncertainty across almost every form of modern medical practice (World Health Organization [WHO], 2023a). It raises the stake in terms of uncertainty presented by resistance, even across routine forms of medical care, which we rely on. In the context of sexually transmitted infections (STIs), antibiotics fundamentally changed our ability to treat common pathogens more effectively (Kenyon et al., 2022). This influenced the landscape of human behaviors (e.g., reduced anxiety about STIs) and coincided with more liberal approaches to sex. However, rising AMR threatens to challenge such social changes (WHO, 2023b), affecting not only people's bodies but also their experiences of sexual pleasure and intimacy.

In this paper, drawing on semi-structured interviews with stakeholders in STI and AMR fields, we explore accounts of the significance of resistance, the current and likely future impacts on their stakeholders' practices, and the implications of AMR on sexual health more broadly. Following others in qualitative health research (Darabos et al., 2021; Miao et al., 2020), the use of semi-structured interviews provides a contextually grounded understanding of stakeholder experiences, useful to understanding the everyday complexities of addressing AMR in the contexts of STIs (Chandra, Broom, Haire, et al., 2024). That is to say, our use of a qualitative method, like similar work in social science AMR studies (Chandra, Broom, Haire, et al., 2024; Chandra, Broom, Ridge, et al., 2024; Dixon et al., 2021), illustrates how the biological and social are imbricated to create health outcomes through stakeholder experiences. This, we argue, in the context of our study, reveals a situation of rising moral, temporal, and economic dilemmas, induced by accelerating resistance. It produces an increasingly complicated space for managing resistance, innovation, practicing healthcare "well," and enacting change. In illuminating these dynamics, we contribute to the nascent exploration of AMR in an STI context, a context in which there has been limited scholarship to date. Unlike a deficit lens, which focuses on shortcomings and weaknesses, utilizing dilemmas as an analytic frame moves beyond this to consider how action (or inaction) is shaped by contradictions, paradoxes, and tensions, across contexts and scales. Doing so allows for an analysis of how different spheres of practice have implications for one another, while offering a lens through which to investigate the

subjectivities located within them. In the context of this study, the concept of dilemmas centers how clinicians and decision-makers in industry must regularly balance competing demands such as care for the individual and care for the collective, or business demands alongside innovation.

Dilemmas of Resistance

The concept of dilemmas speaks to the "greyness" in medical practice and decision making, where clinicians are located in positions that require balancing competing demands, patient needs, uncertainties, ongoing changes to medical practices, and broader structural and everyday conditions (Broom et al., 2021; Fox, 1980; Griffiths et al., 2006; Montgomery & Lipworth, 2019; Williams, 2006). As noted in the bioethics literature, the idea of dilemmas centers the moral valence of such decision making, ultimately addressing "what is the right thing to do?" in the face of competing ontological frameworks and outcomes (DeGrazia & Millum, 2021; Lucassen, 2021; Vaughn, 2013). Overall, the social sciences of health and medicine have often focused on dilemmas at the level of everyday clinical operations, such as prescription practices (Ceuterick et al., 2023), the distribution of therapies (Wadmann et al., 2023), and balancing patient harm and care (Haahr et al., 2020). In these circumstances, health providers are required to navigate multiple considerations such as potential risks to patients, the cost-benefits of therapies, ideals (i.e., deliberations about equity and fairness), and tensions between one's own beliefs and professional requirements.

Drawing on this work, we argue the current era of rising AMR and the complexities induced by mutating resistance across timescales, subjects, and contexts creates a series of expanding dilemmas (see Kollock, 1998; Liebrand & Messick, 1996). This includes competing demands of resolving immediate infective risks to individuals while facing the clear consequences of (over) treating and reducing the efficacy of antibiotics for future populations by accelerating resistance (Cook et al., 2022). Within this scholarship, researchers have noted the complex multifaceted contexts where resistance plays out. For example, they have noted the use of broad-spectrum antibiotics to fill systemic healthcare gaps, where there is limited access to appropriate medication (Dixon et al., 2021), or the reliance on antibiotics to ensure essential food security (Kirchhelle et al., 2020). Such considerations point to the way tensions, which at times seem irreconcilable, constitute an important aspect of AMR policy, where curbing resistance exists alongside everyday realities. For this reason, Tompson and Chandler (2021) highlight that addressing the rise of AMR requires thinking through practices, structural conditions, and networks, which assemble to create the conditions for

resistance. As such, the notion of “dilemmas” provides a useful analytical tool to make sense of the paradoxes (i.e., much needed food production versus resistance) that constitute the multi-scalar dimensions of AMR, which we extend to the STI context through our engagement with stakeholders.

Synthesizing these strands of scholarship shows that resistance-induced dilemmas reflect moral, material, and ethical relations, which have implications for care. They are often evident in feelings of *being torn* between multiple desirable outcomes, and competing priorities, which are “non-resolvable” but still require a decision, across multiple contexts and scales (see [Tompson et al., 2021](#); [Wadmann et al., 2023](#)). These dilemmas, we argue, can be conceptualized as the result of assemblages ([Deleuze & Guattari, 1988/2013](#)), defined broadly “as a provisional gathering together of diverse and often ill-fitting elements into a socio-spatial formation, without becoming a fixed totality” ([Lorne et al., 2019](#)). The unfolding circumstances to arise from the assemblage of STIs, resistance, care, and current practices create a context for thinking through, in [Bourdieu’s \(1977\)](#) frame, the so-called “common sense,” or doxa, characterizing current medical practices as they relate to sexual health (e.g., regular testing and treatment).

As stated, the multi-scalar and multi-dimensional aspects of resistance mean different spheres of practice shape one another and have implications for practices across contexts ([Chandler, 2019](#); [Varadan et al., 2023](#)). For this reason, we conceptualize the field of STIs and AMR as made up of “co-constitutive” dilemmas as different elements, such as prioritization, visibility, patient biographies, morality, and business sustainability, assemble and shape one another. As such, thinking with the idea of “co-constitutive” dilemmas deepens our understandings of how these dilemmas are made and play out. This includes and extends beyond the clinical encounter, which has often been the focus of social science health and medicine research when thinking about dilemmas. Importantly, situating resistance within a dilemmas framework also provides a more nuanced understanding of the complexities faced by individual actors, such as clinicians, and those working in industry, as they attempt to address the issue. This sheds light on the everyday circumstances where decisions about innovation, investment, and care are made and the implications this has for our conceptualizations of responsibility across dimensions.

Methods

Sampling and Data Collection

In this article, we draw on data from a research project aimed at understanding the economic, social, and political

drivers of AMR in the context of STIs. As part of the project, semi-structured qualitative interviews were undertaken (based on interview guides) between 2021 and 2023 with a range of stakeholders ($n = 23$; male = 10, female = 13) with expertise in STIs and AMR. Study participants were purposively sampled via email through researcher networks, as the specificity of the subject matter required professional expertise appropriate to the topic. The invitation letter emailed to potential participants informed them about the scope of the project, the value of their expertise to the project aims, and what voluntary participation would entail (i.e., a semi-structured interview).

Interviews were conducted by a cisgender man and two cisgender women, academics with expertise in qualitative methodologies in the health social sciences. The sample included general practitioners (GPs) and sexual health clinicians, representatives from pan-national organizations, and key industry representatives (specializing in pharmaceutical and diagnostic development), all of whom had expertise in STIs and AMR. The entire sample of clinical participants ($n = 13$) came from Australia, while participants from pan-national organizations and industry came from Australia ($n = 5$), Europe ($n = 3$), and the United States ($n = 2$). As such, the dataset is skewed toward Australian experiences ($n = 18$) and therefore reflects dilemmas as they pertain to this context in particular.

Interviews were conducted by authors Alex Broom, Michelle Peterie, and Lise Lafferty using video conferencing and ranged between 30 and 60 minutes in duration. Interviews were audio-recorded and transcribed verbatim. As part of this process, all identifying information was removed to ensure participant confidentiality. Interview questions were open in nature but focused on three key themes: participants’ perceptions and direct experiences of AMR in the context of STIs, their ongoing efforts to develop and implement AMR solutions in their respective contexts, and the support or challenges faced when working to do so. Key interview questions to understand these experiences included: What are the main strategies currently used to ameliorate resistance in STIs, in your context? What do you see as the main (short, mid and/or and longer term) costs in terms of effects of resistant STIs? To what extent does AMR shape your practice in STI care, and has this changed over time? Ethics approval was secured through the University of Sydney’s Human Research Ethics Committee (reference: 2022/128). All participants provided written informed consent to participate in the study.

Data Analysis

Data were analyzed using a framework approach ([Pope & Mays, 2006](#)). This involved five key steps:

(1) Familiarization: in this step, members of the research team reviewed transcripts to develop a sense of familiarity with the data. (2) Identification: discussion among research team members led to the identification of key themes that answered the research questions. (3) Application of themes: next, transcripts were coded thematically, which involved the identification of key excerpts that reflected themes. This included inductively organizing data into sub-themes. (4) Charting: this step involved developing an overall picture of the data by using headings and sub-headings, which included sub-themes that had been identified in step 3. (5) Mapping and interpretation: associations between data points were clarified, and explanations developed and written by members of the research team.

The research team decided thematic saturation had been reached once ideas and experiences new participants described echoed findings noted in earlier interviews (see Guest et al., 2020). Multiple team members with extensive experience in qualitative analysis across several projects undertook coding of the data, and team discussions of the data were used to confirm the consistency and credibility of the interpretation, which also ensured consensus was reached about findings. Emphasis in this study was on identifying recurring and dominant themes within the dataset, to understand how stakeholders approach resistance in context of STIs, and their conceptualizations of the situation. This included their reflections on doxic, “common sense” practices, and considerations of “the right thing to do” in decision making, and the provision of care. However, atypical, negative, conflicting, and contradictory items were also identified during theme development and coding to enhance analytic rigor. Divergences/incongruity within the data, such as the cost–benefit of treating versus not treating asymptomatic STIs, and differing clinician opinions were particularly important. They demonstrated the presence of dilemmas in approaches to antibiotic-resistant STIs, which helped form an analytic framework for making sense of the data, as we explore below.

Results

Dilemmas of Priority

The threat of antibiotic-resistant STIs exists within a broader context where limited infrastructure, precious finite medical resources, business sustainability, and infections assemble to create dilemmas of prioritization. Within such a context, antibiotic-resistant STIs are made sense of in relation to other health priorities and concerns, which has implications for their perceived urgency. Ironically, the severity of many STIs has been curtailed by antibiotics themselves, which means these successes

position STIs in ways that can work against mobilizing concern and action (i.e., as being “low level,” as “less acute,” as “not life threatening,” and so forth). Moreover, antibiotic-resistant STIs increasingly exist alongside ongoing contending demands and priorities of health services and societal infrastructures, as an interviewee noted: “the problem, I think, is that there are a lot of competing health areas, competition for health dollars” (*Clinician, Australia*), which shape hierarchies of prioritization.

In this context, participants identified how the importance of STIs as a health concern for populations develops significance alongside other medical needs and priorities. As such, the relative importance of STIs, and their de-prioritization, is shaped by the dilemma of where scarce resources should be allocated, especially considering questions of mortality, as one participant explained:

If you have this amount of money, you have to prioritize the life threatening ones, right. I don't think there's a debate about that, right. You can't have a TB patient dying and say, “We can't treat you because you can't afford it. And you can't stay in hospital because you can probably go home and transmit it to all family members and the community and that.” So, no argument for something like that. But if there's more than—I guess—long term benefits worth considering. And, like I say, quality of life is important. No point living—just living. Living [a] healthy sexual health life is important. (*Clinician, Australia*)

While dilemmas of prioritization centered implications for mortality, they simultaneously encompassed broader ontological concerns about the importance of sexual pleasure, joy, and what it means to live well.

These dilemmas around prioritization and *relative risk* (i.e., life threatening or not) are interwoven with temporal dimensions of prioritization. The slow-burn character of resistance (i.e., not quite a crisis but clearly a crisis in the making), and what may be described as a *slow emergency* (Viens & Littmann, 2015), produces dilemmas of whether immediate action is necessary. This is especially the case for STIs as last-line antibiotic options still work (i.e., for gonorrhea), however alongside decreasing efficacy. Such perceptions of temporality exist within a broader moral economy of STIs and sexuality, which in turn shaped dilemmas, as a participant stated:

... I think there's a big assumption of, “Well, it serves them right. It's their fault that they've got this.” There's a lot of blame associated with STIs over any other disease. Pneumonia, “Well, someone just coughed on you obviously, so you couldn't do anything about that,” but STI, “You went out and deliberately got this disease.” [...] So how you overcome all of that, particularly in the mainstream when you're fighting against every other health issue there is, some of

which are “nicer” than STIs, is really quite difficult. (Clinician, Australia)

The mix of STIs’ relative importance, relative significance, relative risk, severity, and moral causality wove together to shape the atmosphere of the field and (in effect) the clinic. This could be pushed up against, however ultimately framed and constrained practice:

Sexual health services aren’t funded well traditionally, and I think that’s still the case. I’m not sure who is lower on the pecking order, ourselves or drug and alcohol services, in terms of stigma and ick factor, but I think we’re not front of mind. And there’s so much pressure on the health budget at the moment, and money seems to be increasingly going into fixing clinical problems in the hospitals rather than preventing problems. (Clinician, Australia)

As participants indicated, dilemmas surrounding resource allocation to address antibiotic-resistant STIs and other health priorities are always situated within a broader moral context, which shapes the “terms” by which dilemmas are produced and play out. These dilemmas about resource allocation also extend to the development of STI innovations, where industry must grapple with competing priorities within their own internal structures and institutional limitations.

Participants observed that investment in more precise STI diagnostic tools (see below for more) and antibiotics exists alongside competing business demands, including different areas of health, and the financial viability of exploration. For example, they stated:

... you might get a [...] nibble or a lukewarm response [around STIs]. A lot of that comes down to a lot of conflicting priorities in terms of a lot of parallel work that is going on. Because STIs is not the only area that we’re working in, because we’re working in respiratory disease, et cetera, and then enterics and stuff like that. So, it’s actually a real struggle as to where we ultimately put resources on a month to month, year to year sort of area. (Industry, Australia)

There’s no space for organizations to experiment. If they have a set standard of care and they want to have a look at something new, it’s often challenging to get the financial backing from executives to actually do that, because they’re under pressure with their own budgets. (Industry, Australia)

Fundamentally, the business “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).

Participants contended that “an element of risk sharing” (Industry, Australia) between industry, government

agencies, and health services can assist with innovation. Importantly, these commercial considerations and priorities existed alongside a desire and willingness to work with researchers, institutes, and medical bodies, to collectively develop solutions and improve patient care:

I think that open mindset to try out new technologies, to see whether they can really help clinical decision making or improve the patient pathway [is important]. So, even we would be interested in seeing that, where our technologies would really impact the patient at ground level. (Industry, Australia)

While it is often easy to reduce businesses to commercial interests, findings suggest a more complex picture, where commercial interests, different areas of medicine, and business sustainability are entangled with desires to improve people’s lives. This presents dilemmas on where to invest resources and capital, which has cascading effects on the type of care patients receive on the ground, and implications for practices that drive or reduce resistance. These industrial dilemmas of prioritization weave through diagnostics, testing, and treatment, which represented probably the most contested areas of the field; responsible for both identifying the presence of bugs but also driving up antibiotic resistance.

Dilemmas of Visibility

Visibility emerged as a significant frame within which dilemmas surrounding STIs take shape and play out. Contemporary bio-medical surveillance practices objectify bodies as sites of precarity, where individuals inhabit a subjectivity that is always at “risk” of disease and infection (Armstrong, 1995). As such, individuals with no symptoms of disease or infection are required to “make their bodies available to health professionals for regular inspection” (Armstrong & Eborall, 2012). This has led to concerns that such doxic, “common sense” practices are leading to overtesting and over-treatment, ultimately causing more harm than good (Armstrong, 2018; Moynihan et al., 2012; Opdal, 2019).

Interviewees reflected these wider debates, often focusing on the ramping up of surveillance of men who have sex with men (MSM) and the potentialities for harm vis-à-vis benefits in terms of resistance and overtreatment. Participants observed the routine “treatment” of asymptomatic STIs, identified through regular screening,¹ increased the use of antibiotics and thus applied selective pressure to microbes. This dilemma of *making visible*, and its potential collateral damage, was considered short-sighted by one clinician in some infective scenarios:

... 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. (Clinician, Australia)

Advocacy for reducing testing and treatment from participants challenged the orthodoxies of bio-medical approaches to STI care and surveillance, where testing for, and eradication of, gonorrhoea and chlamydia remains the norm. Concerns about routine, asymptomatic testing, and the role it plays in STI resistance were expressed by participants. They sought to broaden the binary conception of "infected" and "non-infected" bodies to advance a more complex and practice-appropriate paradigm. This paradigm, as they envisaged it, would not only address the microbe's risk to the person but also ameliorate the adverse impacts of antibiotics on the microbiome, immunity, and the development of resistance in other organisms:

... 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)

I think there are lots of good peer reviewed journal articles about excessive screening of sexually transmitted infections without patients having any symptoms and then aborting [treating] the infection early. But is that causing arrest in immunity, where the patient doesn't develop his own immunity to the infection, so that when that person is exposed to the infection, their own immune system can clear it. (Clinician, Australia)

... I guess the wider picture is "I'll be encouraging resistance in non-sexual health-related organisms or commensals" or whatever else. And that tends to be a worry for other clinicians, from the meetings I've been to as well. Using all these antibiotics, are we making a chest bug more resistant to something and it becomes a problem. Hard to know. (Clinician, Australia)

As shown above, dilemmas spanned the need to broaden concepts of vulnerability, risk, and the value of antibiotic intervention. In doing so, they revealed a growing appreciation for the complexity of the human body, the potential for direct and collateral harm, and the

uncertainties associated with both (Fox, 1980). These accounts of moving from a "more than" STI perspective—and a more multi-dimensional view of the body—challenge much of the implicit normativity and doxic practice of prevailing STI care (Carter, 2018), typified by the finding and destroying of infections.

However, such demands for paradigm shifts and concomitant practice changes existed alongside reflections that not treating infections could also contribute to STI resistance, compounding dilemmas surrounding visibility and treatment. Participants explained:

People might get an antibiotic for some unrelated issue and then you basically nurture these really resistant organisms because of that, because they survive this mild antibiotic, the pill you would maybe take for a sinus infection. So, I think if these undiagnosed infections were around [...] resistance will accelerate. So, being able to diagnose and being able to treat easily is the biggest factor that helps us reduce resistance... (Clinician, Australia)

So the argument is, AMR might develop in the throat. Because if you've got gonorrhoea sitting there, it takes genes that determine resistance from other bacteria that sit in the throat, so other *Neisseria* species, for example. So the argument is, if you treat the gonorrhoea, then it won't be there to pick up the resistance. (Expert, Europe)

While participants noted the dilemma posed by such potentialities, overall, there was an emphasis on screening and treating MSM less often for gonorrhoea and chlamydia than is currently done. In other words, the dilemma was "resolved" through an educated guess—a choosing of "the lesser evil"—rendering medical practice an "artful" consideration of probabilities, including vis-à-vis practices of surveillance (Rosenberg, 2009). Moreover, these educated guesses attest that notions of "common sense" are shifting and that "judgments" also evolve as they respond to dilemmas, including what constitutes care in this shifting landscape.

Discussions of visibility also extended beyond the immediacy of the clinical context, to encompass its role in enabling a more panoramic understanding of resistance, and the development of diagnostics. This produced another set of dilemmas with flow on effects for industry and technological innovation. Surveillance provides an understanding of the prevalence, and progress of AMR, important to addressing the issue. For example, within a UK context, surveillance has been conducive to a comprehensive understanding of the nature and scope of antibiotic-resistant STIs. In this context, STIs are primarily treated at sexual health clinics where microbial resistance testing is performed on identified gonorrhoea infections. As one participant explained:

... I think 90% of gonorrhoea is diagnosed in sexual health clinics in the UK. And even if it was picked up by a general practitioner, they'd be referred into a sexual health clinic for treatment. [...] our guidance says that every single patient should have a culture taken. [...] So they're actually doing it for surveillance purposes [...] it's to pick up, has any resistance emerged... (Expert, Europe)

Another participant stated, "you have to collect data on resistance. So I think that's really key" (*International Expert, Europe*) to developing strategies to address drug-resistant STIs. In other words, while surveillance may lead to greater problems (overtreatment and selective pressure on STIs), it is simultaneously important for understanding the nature and scope of AMR, which also has potential implications for resource allocation (Wu et al., 2024). Moreover, surveillance was also considered potentially leading to technological innovation and development, which might assist in more effective STI treatment, as a participant explained:

So there's a lot of sequencing that's going on from specimens that get sent [to the institution]. And I think the lab is really interested in trying to identify molecular markers for resistance that could potentially be packaged into commercial tests so that you would know, not only do you have gonorrhoea, but your gonorrhoea may be particularly less susceptible to Cefixime... (Industry, US)

Clinicians repeatedly stated that such molecular technologies, which don't have the inherent delays of culture-based resistance testing, are expected to provide faster and more precise testing and can lead to better clinical outcomes:

I think really, using the genomics and point-of-care resistance test to better select antibiotics [will make a significant difference]. I mean, I personally think that's probably the only currently achievable thing that we have evidence that it's implementable and it would make an impact. (Clinician, Australia)

In other words, there are complexities inherent in this "surveillance paradox." A dilemma is created by the tension to reduce screening (and therefore reduce the use of antimicrobials for asymptomatic positive tests) but also to retain an ongoing global view of the state of AMR (which requires testing to identify resistant strains). Traditional PCR testing identifies the presence of infection but no information on the resistance profile of the infection. However, future molecular tests may offer greater resistance information, which requires surveillance for genetic sequencing purposes. Moreover, information around resistance progression is critical to

informing treatment guidelines, public health strategies, and so on. These imperatives exist alongside a tension created by market forces—testing incentivizes business to develop new technologies, and cutting back on surveillance more broadly works against these market incentives. As such, surveillance sits at the intersection of competing demands and priorities, which have interdependent effects on clinical care, business decisions, understandings of AMR, and the development of resistance itself. Practitioners then approach these considerations with diverse (and at times diverging) opinions, introducing another layer to dilemmas at the level of competing expertise.

Dilemmas of Divergence

The role of *divided opinion* is particularly important in contexts where a field of medicine/healthcare is changing rapidly or, as is the case here, where a major problem on the horizon requires fundamental change. When consensus does not exist, and professional communities are at odds over how to manage shifts in practice, this introduces dilemmas of divergence, as well as differing communities of practice, as one participant explained:

Everybody has their opinion, but I think we struggle in the guidelines to really have a clear evidence base for some of the things that we put in place to limit that [screening] and, yeah, it ends up being one person's expert opinion versus another person's expert opinion on it. (Clinician, Australia)

While a number of participants advocated for decreased testing to ameliorate overtreatment and curb resistance, it was noted that current data did not enable a consensus on the matter. Certain participants expressed a preference for a "find and eliminate" approach to STIs, stating:

We know that even asymptotically it [gonorrhoea and chlamydia] definitely can be transmissible and eventually can cause issues and all that too. I think we definitely should test for that and treat, right. I don't think there's a debate about that. (Clinician, Australia)

So, I think it's very effective to test regularly and to treat early. So, very effective. [...] Because then we can treat the contacts and reduce the amount of infection in the community. And, I guess, undiagnosed infections are the biggest risk, as far as I see it, for resistance developing over time. (Clinician, Australia)

Even within the relatively small sample here, there are divergences over what should be done, and how clinicians should practice, particularly in regard to testing. Similarly, while most participants expressed reservations about

syndromic treatment—that is, treatment based on symptoms when the causative organism is unknown—as it may contribute to AMR, one participant strongly advocated for the practice, explaining:

I totally agree with syndromic treatment because, clinically, you have to treat the patient and you have to use your best guess, which, unfortunately, in a lot of instances, you need to treat for a few things, right. But it wouldn't be fair [to ask a patient] to wait for a week and say, "Come back. We have the exact treatment for you." (Clinician, Australia)

Such competing approaches were premised on fundamental tensions in medical practice, which involve navigating the collective good versus individual needs (Will, 2018), and how this dilemma plays out in spheres of care. A participant explained this dilemma as follows:

Now, my collaborators in Scandinavia think it is ridiculous not to ask people to wait 24 to 48 hours and to come back for treatment. In Australia and the US, UK, totally unacceptable. They need to be given something. They couldn't possibly wait. [...] we [Australia] are far more of a capitalist individual society than Denmark and Sweden and the Nordic countries where there is a better understanding of the collective good and less of a distribution on the normal distribution curve of everything, wealth and the works. [...] So, I think those cultures have better levels of antibiotic consumption because people are just generally less demanding ... (Clinician, Australia)

Diverging opinions on guidelines, testing, and treatment practices demonstrate the contested nature of current STI practices broadly and increasingly in relation to AMR. This introduces dilemmas around the lack of streamlined, consensus-driven approaches, shaped by the fundamental dilemma of caring for the individual vis-à-vis implications for the collective. These dilemmas of approach are then further complicated in clinical contexts, as practitioners are required to navigate the everyday realities of patients and their biographies.

Clinical Dilemmas

The management of practice, within the broader context of the dilemmas highlighted above, ultimately takes place in interpersonal networks, encompassing practitioner and patient biographies, subjectivities, and contexts (Broom, 2009; McQuoid, 2017; Mol, 2008). Often, clinicians are required to make judgments about the most appropriate course of action, while limiting harm to patients and their potential future sexual partners, minimizing the spread of infections, while simultaneously considering antibiotic resistance, and care for patients (Ceuterick et al., 2023;

Will, 2018). As we see below, patient circumstances, levels of comfort, and individual desires shape decisions about antibiotic use and testing. For example, participants explained:

We've got a lot of FIFO [fly in, fly out] workers, as you can imagine, here in [Australian state]. So if they're going to be away for two weeks and we're not going to be able to get them and they're not going to have access to any therapy, do you treat them on the spot or do you at least give them the medication they might take away with them? So there's some of those pragmatic issues. (Clinician, Australia)

I think it's still over 50% in my practice [who would want immediate treatment]. I guess it's probably 50% to 60% would still just, "I just want this gone. I don't like the idea that I've got chlamydia in me somewhere," or gonorrhoea in me somewhere, "and the weekend's coming up and I just don't want it there." So that's quite strong. And also the idea that once I take the antibiotics, it should be seven days before I have sex again, so if I'm going to delay things for another three or four days, that's more time before I can have sex again. I think that comes into it too. (Clinician, Australia)

These tensions were fundamentally about patient agency, where clinicians must balance what will help address AMR (more targeted treatment that may involve more time), and the desires of patients to move on with their sexual lives and safeguard their emotional well-being (e.g., not having to think about carrying an STI in one's body). In other words, these situations brought the moral valence of decision making to the fore. Clinicians were required to consider AMR (and the collective) alongside individual patient subjectivities, including people's ability to experience pleasure. It was in these circumstances, participants stressed, that innovation toward more rapid and precise testing would be most beneficial.

Such considerations were key when clinicians spoke about why precautionary use of antibiotics (when someone may potentially have been exposed to an STI) still takes place, even though this may contribute to AMR. Two participants explained:

That's still occurring because you do it for two reasons. One, the patient in front of you is anxious and worried and concerned about getting an STI, and then you're also concerned about the onward transmission if you don't curtail the infection immediately. [...] 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)

... if you see a patient, and all clinics have them, the very chaotic patient who only comes when there's an issue, et cetera, and you might never see it again for a year or two. I guess something in that context would be a close example of maybe a patient in a variable setting who might have difficulty accessing healthcare. I guess in those instances, clinically, it's probably better to overdo things than underdo it. So, I guess the threshold for maybe either precautionary or part of their treatment might be higher. [...] And clinics have those patients and they know them well. (Clinician, Australia)

Even though precautionary use of antibiotics hinders efforts at curbing AMR, clinicians' assessments of their patients' circumstances, patients' psychological needs, and clinician capacity to educate about the broader health impacts of antibiotics introduced dilemmas of whether to treat now or later. Decisions were based, at least in part, on a "risk calculation," where clinicians were required to make a judgment about the "riskiness" of the individual, including their structural and personal circumstances. A sense of "biographical intimacy" with the patient provided a way to "resolve" the dilemma because familiarity gave greater certitude to decisions about immediate treatment. Significantly, while patient education (i.e., about the microbiome) could help prevent precautionary use of antibiotics, this was not always feasible due to time allocations, illustrating how structural conditions shape clinical dilemmas around antibiotic use and AMR. Moreover, these clinical dilemmas existed alongside broader socio-political contexts related to sex and sexuality, which also shaped clinician approaches to care.

Historically, sexual norms have been subject to ongoing revision and change. The development of "safe sex" by the gay community during the 1980s to prevent HIV transmission was largely premised on the use of condoms for anal intercourse among MSM (Chambers, 1994; Race, 2018). However, more effective HIV treatments, and the subsequent evidence showing "Undetectable equals Untransmittable (U = U),"² alongside increased access to PrEP for effective HIV prevention appear to have led to shifts in norms around sexual practices, including reduced condom use (Holt et al., 2018). These shifts in meaning and practices have implications for health professionals and introduce a new clinical dilemma, as messaging around sexual practices becomes increasingly fraught in the context of AMR:

And I think we are really at a point where, people say this all the time, "But you can't ask people to change their behaviours. You can't ask people to use condoms. You can't do that

and they're not going to do that." [...] but we do need to have the discussion with people about what's going on. And then there certainly are people, and I have patients who go, "Yeah, okay. I understand that." "Did you know there's a syphilis epidemic going on? Do you now know there's monkeypox? Okay." Everyone understood reproductive rates with COVID. Reduce your number of contacts, wear a mask. Well, same. Reduce your number of contacts, wear a condom. I don't think this message has to be so politically incorrect. I think it can be a mutual discussion that's had with respect. (Clinician, Australia)

And also with PrEP, there's far less condom use. [...] some patients might even feel like it's judgmental to say that they should use them. [...] I was talking to one of the supervisors [a colleague] [...] And they said that they had a patient that week whose GP had told them that they should wear condoms and that they were incredibly upset that the GP had even suggested this, that that was a judgemental comment [...] [because they were telling them] what they should be doing with their sexual behaviours ... (Clinician, Australia)

The use of condoms among MSM is political as much as it is preventative and thus subject to change. Recent debate within the gay community about the uptake of PrEP and condom use suggests condoms—among other meanings—may represent ideas of symbolically controlling sexual "excess" and "unbridled" sexuality (Race, 2018). Within such a context, clinician advocacy of condom use (or indeed of fewer sexual partners) may be seen as a historical continuation of controlling marginalized sexualities, thus passing judgment on what one group in society does in their private lives (see Bersani, 1987/2010). Thinking with the idea of dilemmas allows us to conceptualize this as clinicians having to navigate care at the intersection of sexual pleasure and politics, the threat of rising resistance, and genuine desires to protect communities.

Discussion

In this article, we have explored the context of antibiotic-resistant STIs through the concept of dilemmas. The emergent nature of medical practice means the concept of evolving and co-constitutive "dilemmas" centers the moral valence and complexity of resolving "what is the right thing to do," in the context of a swiftly changing field. Dilemmas address the unknowns of STI practice, while simultaneously encompassing the assemblage of paradoxes, tensions, divergences, and competing priorities, which form the fields within which resistant STIs are located, thought about, and "made." Importantly, given the skew toward Australian participants in our study, the analysis of dilemmas, especially as they pertain to a

clinical setting, predominantly speaks to the local specificity of this context. Further research in clinical settings more globally will provide a deeper understanding of how dilemmas, in the context of resistant STIs, may play out differently across settings.

Our analysis illustrates that dilemmas on how to address drug-resistant STIs spill across dimensions and scales, with cascading effects across institutions, organizations, and services. The issue of resistant STIs sits within an overarching context of multiple health priorities, where competition for scarce resources leads to the prioritization of immediacy, and is more broadly framed by moralities surrounding sex and sexuality (Power, 2011). This simultaneously shapes discourses of deservingness for resources and investment (Ludlow, 2021). In turn, businesses developing antibiotics and diagnostic tests, like other social institutions, grapple with dilemmas of where to invest funds, time, and resources, while trying to improve patient care, balance commercial demands, and ensure the sustainability of enterprise, amid other areas of competing medical investment.

This has flow-on effects for everyday clinical interventions, making point-of-care testing more difficult and contributing to syndromic management of STIs. It leads to the treatment of patients based on signs and symptoms as the causative organism of infection is unknown due to a lack of fast and precise diagnostic assays. This in turn creates a new dilemma about whether to treat a patient now or later, where “incorrect” treatment may contribute to resistance. This dilemma is also shaped by the assemblage of patient subjectivity and needs, diverging clinician treatment practices and opinions, limited clinical resourcing, and the politics of messaging around condom use to reduce STI transmission (Ceuterick et al., 2023; Race, 2018). Importantly, extrapolating from findings reveals diverging clinical expertise has the potential to induce a new dilemma, as it relates to community experiences. Patients may be required to navigate different clinician orientations to syndromic treatment, and this will have implications for the type of care (or lack thereof) they feel they have received or expect, which future patient-centered research may wish to investigate.

Findings reveal that clinical practices are also framed by a “surveillance paradox.” Resistance data provides a valuable panoramic understanding of the unfolding crisis and delineates the problem that needs to be addressed in the first place. This also assists in the development of diagnostics that can provide the immediacy required for optimized treatment in a clinical context. While much of the literature has highlighted problematic aspects of surveillance (Greene et al., 2017; Sewell et al., 2016), these findings also demonstrate its generative potential

(Bardwell et al., 2024). However, this jars with clinician suggestions for reduced testing and treatment of asymptomatic bacterial STIs. As a result, this introduces the additional dilemma of whether development of rapid testing is lucrative for businesses, and a worthwhile investment, if there is a desire to reduce treatment of asymptomatic infections in the first place.

Our results also demonstrate that thinking with the concept of dilemmas can center the positionality of subjectivities, and the situational contingencies they are located in (Montgomery & Lipworth, 2019), which has implications for the conceptualization of responsibilities. Such analysis provides a more complex understanding of actors such as clinicians, and others in industry, beyond inaction, judgmentalism, and practices of over-determinism. Dilemmas surrounding patient care, investment, and business sustainability, and desires to work with patients to address the rise of resistance, mean individual actors are often doing their best within the constraints imposed by the structural conditions of their work lives. Seeing such individuals as embroiled in the trade-off of ongoing dilemmas offers a way of complicating subjectivities, and gestures toward the importance of working with people, in ways that acknowledge varying circumstances, and inbuilt tensions, as actors grapple with “what is the right thing to do now?” That is to say, the idea of dilemmas extends and distributes understandings of responsibility and responsabilization, allowing for a more panoramic and dispersed framework in the context of resistant STIs, and healthcare broadly (Pala & Kenny, 2024).

As such, the framing of “dilemmas” extends the existent AMR scholarship, which highlights how addressing resistance entails working across multiple intersecting spheres and scales (Chandler, 2019; Tompson & Chandler, 2021). Thinking with the concept of dilemmas, as we have shown, provides a theoretical framing through which to center the tensions within and across these different dimensions, complicating the “obviousness” of how AMR needs to be addressed. The notion of dilemmas can also be extended to other health concerns beyond AMR, such as viral infections like COVID-19, and questions regarding the extent to which behavioral interventions are necessary, for what now appears to be an embedded and taken-for-granted infection, alongside the implications this has for mortality. In a similar manner, a “dilemmas” framework provides theoretical scope to consider the ethical dimensions of reduced screening of other diseases, such as cancer (Moynihan et al., 2012; Srivastava et al., 2019), and how this sits alongside patient needs for care, and potentially missing cases that can result in death. In other words, a dilemmas framework focuses attention on the “grey” aspects of making health and care, critical to

understanding contemporary medicine, clinical contexts, and public health.

Conclusion

This study shows that dilemmas about the most appropriate approaches and modes of practice to curb the rise of antibiotic-resistant STIs encompass and enfold multiple considerations across dimensions and scales, cutting across political, social, and economic considerations, requiring individuals to navigate the intersections they give rise to. While not all dilemmas can be resolved through structural change, shifts such as greater resourcing of clinical contexts, risk sharing, and forward thinking can go some way in clarifying dilemmas. Importantly, the framing of actors within a context of co-constitutive dilemmas not only centers the structural conditions of their decision making but also disperses and complicates responsibility, which is instructive for thinking about collaboration, and ways forward in addressing antibiotic-resistant STIs.

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Ethical Statement

Ethics Approval


Ethics approval was sought and granted from the University of Sydney's Human Research Ethics Committee (reference: 2022/128).

Informed Consent

All participants provided written consent to take part in the study.

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Notes

1. The uptake of pre-exposure prophylaxis (PrEP) for HIV among gay men, and other men who have sex with men

(MSM), requires quarterly testing for gonorrhea, chlamydia, syphilis, and HIV in Australia.

2. This means a person with an undetectable HIV viral load cannot transmit the infection to others.

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