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Editorial

The Emerging Threat of Antimicrobial-Resistant Sexually Transmitted Infections: Epidemiology, Management and Detection

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Antimicrobial resistance (AMR) has become one of the most pressing public health crises, with sexually transmitted infections (STIs) of all types rapidly becoming resistant to treatments. One such infection of pressing concern is *Neisseria gonorrhoeae*. This infection, of which there were more than 82 million new cases worldwide in 2020, has shown resistance to all available forms of first-line treatment [1,2]. One study of Kenyan women found high-level tetracycline resistance in 96% of tested samples of *N. gonorrhoeae* [3], and numerous other common sexually transmitted infections have shown drug resistance across the globe, including syphilis, chlamydia, and trichomonas [4]. Of particular concern is the rise in drug-resistant human immunodeficiency virus (HIV), with the first strains of pan-resistant HIV now beginning to emerge [5].

A multifaceted approach will be required to curb these trends of increasing AMR in STIs, with new forms of treatment undoubtedly required. This will necessitate the creation of new antimicrobial drugs, as well as new, diverse methods of preventing, managing, treating, and curing STIs. While not particularly attractive for large for-profit companies, there is a clear need for the development of new antibiotic drugs to treat drug-resistant STIs; therefore, more collaborative global partnerships are needed to expedite the process of antimicrobial creation [6]. Additionally, research on the expansion of new, alternative treatment technologies is important. One such technology for the treatment of infection is bacteriophage therapy; however, research on this technology is in its infancy [7]. Vaccine development for STIs has also shown potential as a promising avenue for prevention, though much more research is needed [8,9]. In addition, there is also a need for concurrent examination and revision of the treatment guidelines, which may inadvertently increase, rather than decrease, drug resistance in STIs [10].

While establishing new treatment guidelines and new forms of management to address AMR in STIs is vital, the detection of drug-resistant STIs is also integral. This will involve the creation of rapid valid diagnostic tests for specific microbes of concern, such as *Neisseria gonorrhoeae* and *Chlamydia trachomatis* [11], as well as the improvement and expansion of other rapid diagnostic tests that can determine antimicrobial sensitivity without the need for the pre-purification of cultures [12]. This will entail the further expansion and application of numerous technologies, such as nucleic acid amplification, microfluidics, whole-genome sequencing, and hybridization [12]. Improvements in other detection and prevention methods, such as contact tracing and the utilization of existing rapid molecular test arrays prior to prescribing antibiotics, are also vital [13].

The scale and depth of the issue of drug-resistant STIs has demonstrated that there is an urgent need for action in many domains. To address this problem, research on epidemiology and clinical outcomes and the effectiveness of new/alternative treatment regimens, improvements in the detection of infection, and implementable preventative strategies, alongside major public health initiatives, are urgently needed.

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