

A contribution to the management of genito-urinary infections in Rwanda

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Effective management for infectious illness rests on the three pillars of prevention, diagnosis, and treatment. A good diagnosis of sexually transmitted infections (STIs) is a cornerstone for surveillance, effective public health interventions, and optimal disease management. There is an urgent need for improved and cost effective diagnostic tests that will reduce the burden of STIs in the developing world. Urinary tract infection (UTI) is considered to be one of the most common bacterial infections. In general practice, because the microbiology of UTI is highly predictable, treatment of UTI is usually empirical and routine urine culture is not generally recommended. Antimicrobial selection should be guided by knowledge regarding the local susceptibility profiles of common uropathogens. Therefore, to ensure appropriate management of UTIs, knowledge of the organisms that cause UTI and their antibiotic susceptibility is mandatory. The overall aim of the thesis was to contribute to the enhancement of microbiological diagnostic capacities for genito-urinary tract infections in Rwanda. The research findings are presented in five chapters as presented hereunder.

The first chapter, a general introduction to our thesis, focused on the literature review of several aspects of STIs, their relationship with infertility and the management of UTIs in the era of increased antimicrobial resistance. In the second chapter, studies mainly focused on the evaluation and demonstration of the utility of a novel multiplex polymerase chain reaction (PCR) technology for the simultaneous detection of seven clinically relevant pathogens of STIs. The results show that the multiplex “STDfinder” assay has comparable clinical sensitivity to the conventional single and duplex real-time PCR assay and are suitable for the routine detection of a broad spectrum of these STIs at relatively low cost due to multiplexing. It also presents studies on the comparisons and diagnostic value of serological assays for the detection of *Chlamydia trachomatis* antibodies in a population of subfertile women. The target group in these studies were mostly infertile and fertile women of reproductive age. The findings show that the two enzyme linked immunosorbent assays (ELISAs) performed equally and slightly better than MIF assays for the detection of antibodies to *C. trachomatis*. These peptide-based serological assays for *Chlamydia* also showed an excellent negative predictive value for lower genital tract infection, and may be suitable for use for screening in Rwanda with low prevalence

of *C. trachomatis*. Chapter 3 explored the association of STIs with infertility in Rwanda. Results indicated that among the STIs examined, HSV-2 and HIV infections were the most important determinants of infertility for both men and women. Our data suggest that in women *C. trachomatis* is not the primary pathogen responsible for tubal pathology. The study described in chapter 4 aimed at determining recent data on susceptibility patterns of pathogens responsible for UTIs in Rwanda to antimicrobials agents currently used to treat UTIs. For the first time the prevalence ESBL-producing strains in Rwanda are described here. The results revealed that Gram-negative organisms, especially *Escherichia coli* were the most common organisms isolated. We found that antibiotics commonly used for the treatment of UTI in Rwanda such as nalidixic acid, nitrofurantoin and ciprofloxacin are far from effective. ESBL producers are, as in many countries, frequent in enterobacteriaceae in Rwanda. The main findings of the thesis are summarized and discussed in the chapter 5 and it ends with some implications for future research. This thesis showed that there are several options to improve current management of genitor-urinary tract infection in Rwanda. It can be concluded that improved diagnostics capacity play an important role in STIs control programmes. However, because of constraints in terms of cost, expertise and inconsistencies in supplies and other support, the practicality and availability of molecular tests are severely limited in many – if not most – settings. Such tests should be confined to situations where they are essential for clinical or programmatic decisions. These include i) determining the etiology of common STD syndromes for the development of flow-charts for care management; ii) diagnosis of complicated or referred patients at reference centres. Being specific with high predictive value to detect lower *C. trachomatis* infection, the availability of ELISA assays holds promise for large epidemiological studies of *C. trachomatis* infections in a developing country like Rwanda. Finally, the thesis suggests that antimicrobial agents such as fosfomycin-trometamol could be an alternative therapy for uncomplicated UTI, and should be introduced in the national guidelines, and in view of the high resistance of bacteria to available antibiotics, carbapenems are needed for the treatment of serious infections in the hospitals.