

## **Providing adequate treatment capacity for sexually-transmitted infections is cost-saving**

by Dr Peter J White, Department of Infectious Disease Epidemiology, Imperial College Faculty of Medicine.

E-mail: [p.white@imperial.ac.uk](mailto:p.white@imperial.ac.uk); website: [www.imperial.ac.uk/medicine/people/p.white](http://www.imperial.ac.uk/medicine/people/p.white)

*For details of Imperial College's professional short course introducing mathematical modelling of infectious diseases for public health officials, policy makers, health economists and researchers, please see <http://www.imperial.ac.uk/cpd/epidemiology/>.*

### **1 Adequate clinic capacity in GU medicine is key to reducing sexually-transmitted infection rates, according to a study carried out at Imperial College London and University College London<sup>1</sup>.**

Controlling bacterial sexually-transmitted infections (STIs) requires timely and appropriate treatment of infections, through easily and rapidly accessible treatment services, which reduces the duration of infection and thus the likelihood of onward transmission: treatment is a form of prevention. Inadequate treatment capacity creates a vicious circle where unmet demand for treatment leads to preventable onward transmission of infection maintains high demand for treatment, whilst adequate capacity leads to a virtuous circle where demand for treatment is kept low.

### **2 GUM clinic capacity has not kept up with the increase in STIs in the last ten years**

Currently in Britain there is a resurgence of bacterial STI, with annual diagnoses of chlamydia and gonorrhoea having doubled between 1997 and 2002<sup>4</sup>. Genitourinary medicine (GUM) service capacity has not kept pace and has become over-stretched. Many patients wait weeks to be seen<sup>5-8</sup> – and some will be unable to obtain GUM-clinic care at all. General practitioners provide a variable standard of care: some prescribe inappropriate treatment, many do not test for STIs, and many simply refer patients to GUM clinics<sup>9,10</sup>. Other patients will not receive care at all: some do not go to their GP due to stigma or are not registered with one<sup>11</sup>. Consequently, the proportion of cases treated appropriately has declined and those who *are* treated are waiting longer on average to receive care. Both factors promote onward transmission of infection, further stretching the health care system.

### **3 The Imperial & UCL study team created a computer model to explore how demand and capacity affect incidence of new cases, taking account of the infectious nature of STIs.**

We constructed a computer model<sup>1</sup> of gonorrhoea transmission in Britain, incorporating patterns of patient flow through general practitioners (GPs) and GUM clinics, as well as variation in people's numbers of sex partners<sup>1</sup>. In particular, we considered how GUM-clinic waiting times affect patient treatment-seeking behaviour: the proportion of patients who seek GP care instead of GUM-clinic care, and the proportion who fail to obtain care at all, increase with GUM clinic waiting time. Many diseases place demands on GUM clinics, but we considered just one infection to understand clearly how the dynamics of patient treatment-seeking behaviour and clinic capacity interact to affect the spreading of infection.

### **4 The computer model demonstrates that with inadequate treatment capacity, a vicious circle occurs, where unmet demand leads to high transmission rates. Delayed treatment – and untreated infections – fuels that increase by allowing further individuals to become infected.**

**5 An adequate increase in capacity can break this vicious circle and enter an ultimately cost-saving virtuous circle in which rapid treatment of a majority of new infections limits onward transmission, resulting in low infection rates and low demand for treatment.**

If infection is 'out of control' then a temporary increase in capacity that is sufficient to bring spreading of infection under control – by breaking out of the vicious circle and entering the virtuous circle – offers cost reductions by reducing future demand for treatment, as well as bringing public health improvements. (However, *inadequate* increases in capacity do not break out of the vicious circle and so must be maintained indefinitely, because demand remains high, although they do bring some health benefits by causing some reduction in onward transmission.)

Larger increases in capacity gain control of transmission faster and so can be more short-term. Consequently, within reasonable limits, it is more cost-saving to have a larger increase in capacity than a smaller one. Nevertheless, it may take a while for the full benefit to be realised. Since it takes some time to gain control of infection spreading and for the demand for treatment to fall to within the GUM clinic's capacity (because individuals who missed-out on treatment can remain infectious for months), it takes time for the benefit of the intervention to become apparent from a reduction in recorded cases and monitoring of waiting times.

It is much easier to maintain control of transmission than to regain it once it has been lost. However, it is necessary to provide sufficient spare capacity (i.e. capacity that can be flexibly and rapidly redeployed) to meet small, short-term increases in demand, to prevent their growing into large, long-term increases as the system re-enters the vicious circle.

**6 The policy implications are:**

- A substantial increase in capacity is needed to meet current demand for STI treatment.
- This increase need only be temporary provided it is of adequate size. The larger the increase the shorter-term it can be.
- This increase in capacity will lead to an increase in clinic activity. In addition, recorded diagnoses may increase as more of the demand is met. The gap between true incidence of infection and the annual number of diagnoses may be large when waiting times are long. The key performance indicator is patient waiting time, which should decrease substantially when capacity is adequate to meet demand.
- The financial implications are sustained cost reductions realised from the medium term in return for a short-term increase in investment.
- Once control has been gained, it is important to maintain it.

In the case of STIs such as gonorrhoea and chlamydia, gaining control of transmission is cost-saving not only because it reduces the number of future infections requiring treatment, but also it increases the proportion of those infections that do occur that is treated appropriately, thus reducing the incidence of complications which are costly to treat, such as infertility.

Treatment of STIs has an important role to play in prevention of transmission of HIV, because STIs promote HIV transmission by making HIV-negative individuals more susceptible to HIV infection and making HIV-

positive individuals more infectious<sup>12</sup>. In addition, individuals who have been diagnosed with an STI are more receptive to safer sex messages, so prompt treatment provides a good opportunity for targeted prevention work, provided GUM clinics have the capacity to provide it.

### **7 The Patsi study: current research**

This analysis is one of the products of the 'Patsi' collaboration, involving Imperial College, UCL and 8 GUM clinics. Our model is based upon the best data available, but we have identified several gaps in our knowledge, and we have an empirical study ('Patsi') currently underway to address some of these issues. Particularly important questions are how long patients persevere in seeking care; how the length of the waiting time at GUM clinics affects the proportion of patients who choose to seek care there; where patients seek care as an alternative to GUM clinics; what quality of care they receive from different clinical services; and whether infected patients continue to have unprotected sex whilst seeking care – and with how many partners. Although we know that many STI patients seek GP care<sup>11</sup>, the numbers nationally are not known at present. Nor do we know exactly how many infections remain untreated.

### **References**

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