

before phenotypic results were available, and showed that the isolates were quite distinct genotypically (Table 1).

All MLST data from this study are available on the MLST website (<http://www.mlst.net/new/index.htm>).

Although MLST has been used previously to differentiate meningococcal strains in a university outbreak,³ we believe this to be the first time that a national MLST and *porA* gene sequencing service has been used to discriminate strains in a family cluster and potential university cluster.

MLST and *porA* gene sequencing can be performed quickly – often more quickly than phenotypic methods, if appropriate facilities exist – so that strains can be differentiated within the timescale required for public health management. The service provided in Scotland, for example, can provide results within 24 hours.

In conclusion, MLST and *porA* gene sequencing provides a rapid and portable typing method for differentiating strains that appear identical phenotypically, and can be introduced as a national service for typing cluster strains. □

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Prevalence of *Campylobacter* species among HIV/AIDS patients in Nigeria

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Numerous opportunistic pathogens of viral, bacterial, fungal and parasitic origin are associated with human immunodeficiency virus (HIV) infection and acquired immune deficiency syndrome (AIDS). Such infections are incriminated as the most important causes of morbidity and mortality in HIV/AIDS patients,¹ and some are associated with HIV/AIDS infections in Lagos, Nigeria.²

Diarrhoea is the most common gastrointestinal symptom of AIDS and affects 50-90% of patients.³ *Campylobacter* spp. are known to be one of the more prevalent organisms in HIV diarrhoea,⁴ and have been mentioned among paediatric patients.⁵

This study aims to establish the prevalence of *Campylobacter* spp. associated with diarrhoea among HIV/AIDS patients in Lagos, their prevalent biotypes, antibiotic susceptibility patterns and plasmid profiles.

Of 160 stool and rectal swab samples collected from confirmed cases of HIV/AIDS, 40 isolates were obtained. *Campylobacter* spp. were isolated from six (7%) out of 84 patients with diarrhoea and two (2.5%) out of 76 patients without diarrhoea. Other bacterial agents included *Enterobacter* spp. (12 [7.5%]), *Salmonella paratyphi* A (8 [5%]) and *Escherichia coli* (4 [2.5%]), followed by *Shigella sonnei*, *Klebsiella pneumoniae*, *Proteus vulgaris* and *Candida* spp. (two each [1.25%]).

All HIV-infected patients were heterosexual, with an age range between 15 and 55 years, and diarrhoea was more prevalent in males (120 [75%]) than females (40 [25%]).

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Antimicrobial resistance patterns showed that all the isolates were resistant to ampicillin and cotrimoxazole, but only 65% were resistant to tetracycline and 45% to erythromycin. All isolates were sensitive to ciprofloxacin and gentamicin. Plasmid profile analyses showed the *C. jejuni* isolates lacked detectable plasmids.

Prevalence of *Campylobacter* spp. in the HIV/AIDS patients studied was similar to that which Tee and Mijch⁶ (who reported on campylobacter bacteraemia) and Sorvillo *et al.*⁷ found in their studies. The latter reported that campylobacter enteritis and campylobacter bacteraemia were more common in patients with AIDS than in the general public. However, in the paediatric (zero - 24 months) study conducted in Lagos,⁸ campylobacter enteritis was more common (16.5%) than in patients with AIDS in the present study.

Study of campylobacter enteritis among adults in Nigeria has not been performed and so comparison of prevalence rates with an HIV population cannot be made. In addition, the disease does not appear to be important in adults in the general population in developing countries, perhaps because those adult populations that have been studied for campylobacter diarrhoea had been exposed to so many antibiotics as a result of abuse and misuse of across-the-counter purchase.

In another report by Adetunji,⁹ it was suggested that HIV/AIDS incidence was higher in developing countries than in developed ones, and that this could lead to higher mortality among children under five in an epidemic setting, and to an increase in the number of campylobacter infections in the adult population. Molina *et al.*¹⁰ suggested that failure to identify *Campylobacter* spp. in stool samples does not rule out their presence because they are fastidious organisms. Blaser *et al.*¹¹ suggested that invasive *C. jejuni* disease occurs predominantly at the extremes of life, affecting infants younger than a year and adults over 60.

Only one *C. jejuni* isolate was obtained from a patient without diarrhoea at the time of specimen collection, although this patient had previously had chronic diarrhoea and showed clinical features similar to those in the diarrhoea group.

When the isolation rate of *Campylobacter* spp. (7%) was compared with all other isolates, it came second only to *Salmonella* spp. (9.5%). Although this agrees with other studies,^{4,12} isolation rates elsewhere have been higher. *Campylobacter* spp. have also been associated with a high mortality rate (33%) in bacteraemic cases among HIV patients, and reported to be more common and more severe in the HIV-seropositive population.⁶

In the present study, mortality due to campylobacters was not assessed as it did not look at campylobacter bacteraemia but at enteritis, most cases of which are usually self-limiting. In a previous study (data not published), campylobacters showed 25% cross-resistance to quinolones in non-HIV-infected patients; however, in the current study (HIV/AIDS patients) all isolates were sensitive to ciprofloxacin (a quinolone) but showed multiple resistance to a number of antibiotics commonly purchased in our environment.

Tee and Mijch⁶ suggested that the prolonged and persistent nature of campylobacter diarrhoea in patients with AIDS has led to emergence of multidrug resistance in *C. jejuni* following multiple antibiotic treatment, and

suggested that HIV-infected patients require more aggressive treatment with multiple antibiotics. Unlike the findings reported here, where all isolates were sensitive to ciprofloxacin, Tee and Mijch⁶ reported that two HIV-infected patients with ongoing campylobacter enteritis prior to bacteraemia had ciprofloxacin-resistant *C. jejuni*. Molina *et al.*¹⁰ suggested that the failure of *C. jejuni* to respond to antibiotic therapy was due to the lack of an adequate humoral response to infection.

Since all isolates in the present study were susceptible to gentamicin and ciprofloxacin, treatment should include aminoglycosides or fluoroquinolones for severely ill patients, especially HIV-infected individuals.

In conclusion, prevalence of *Campylobacter* spp. in HIV/AIDS patients in Lagos was found to be 7% in patients with diarrhoea and 2.5% in patients without diarrhoea; although, from previous reports, negative stool culture does not mean that *Campylobacter* spp. are absent. *C. jejuni* biotype I was the most common biotype and gentamicin and ciprofloxacin proved to be the drugs of choice for *Campylobacter* spp. in HIV-infected patients. □

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