they are heterogeneous. The study by Webster and colleagues[2] was done in obstetric patients (n=436) from a single hospital. Similarly, the study by Capareti and colleagues[3] was done at a single centre, with preoperative patients (n=156). The duration of catheterisation in these two populations is likely to be shorter than in our study of 1642 hospital inpatients at three sites.[1]

Additionally, there were important differences in the outcome measures used in the two older studies compared with our study. Both previous studies defined the outcome (UTI) as bacteriuria, assessed by routine culture 24 h after catheter placement in Webster and colleagues' study[2], and by routine assessment 3 days after the operation in Capareti and colleagues' study.[3] By contrast, in our study, we considered catheter-associated UTI defined by both clinical and microbiological criteria in accordance with the US Centers for Disease Control and Prevention guidelines, as well as asymptomatic bacteriuria.[4]

Both the clinical and statistical heterogeneity of the studies would caution against relying on a pooled estimate of effect size. It might be more useful to consider how the differences in populations, outcomes, and study designs might have affected the results of the three studies.

The available evidence suggests that the benefits of chlorhexidine use in preventing a clinically relevant infection could be substantial, with few potential risks. The routine use of chlorhexidine in hospital inpatients is inexpensive, with our cost-effectiveness evaluation suggesting that it is cost-saving compared with cleaning with saline.[5] Several factors are important in the consideration of evidence and its translation into recommendations: the balance between desirable and undesirable outcomes; the confidence in the magnitude of estimated effect of the interventions on important outcomes; values, preferences, and variability; and the resources needed.[6] Thus, we feel that the routine use of chlorhexidine for meatal cleaning is warranted while we await further studies.

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## Scaling up diagnostic-driven management of sexually transmitted infections in pregnancy

Curable sexually transmitted infections (STIs), for example *Chlamydia trachomatis* and *Neisseria gonorrhoeae*, are common worldwide[1] and can have severe consequences for women and, when occurring in pregnancy, their children.[2] WHO recommends a syndromic approach to STIs in low-resource settings where laboratory services are scarce, but this approach lacks sensitivity and specificity, missing many infections and causing overtreatment.

An Article by Marijn C Verwijs and colleagues[3] found that incorporating point-of-care (POC) STI testing with GeneXpert into case-finding and infection management improved identification of true infections and prevented overtreatment among women in Kigali, Rwanda. Similar results have been found for Botswana.[4] In their Comment on Verwijs and colleagues' study,[3] Rosanna Wai Wan Peeling and David Mabey[5] stated that POC tests have the potential to revolutionise STI management, but that the high costs of available tests might limit widespread scale-up in the high-burden, low-resource settings where they are needed most.

We agree that development of lower-cost diagnostics should be prioritised and, in the meantime, suggest that implementation research be used to identify approaches for expanding access to STI testing. We developed a decision model to estimate the 1-year costs and outcomes associated with different strategies for scaling-up *C trachomatis* and *N gonorrhoeae* testing for pregnant women in Botswana.[4] We compared syndromic management with three POC strategies: GeneXpert-based POC testing at all hospitals and clinics providing antenatal care, GeneXpert

testing at regional hospitals to analyse samples from multiple facilities, and a hub-and-spoke model whereby high-volume sites conduct POC testing and serve as hubs for samples collected from other sites in their areas. Our results suggest that the strategy of POC testing at every antenatal care facility was the most expensive because of large capital costs and might be unaffordable for low-income countries.[4] Although syndromic management was the least expensive strategy, it resulted in fewer infections cured and considerable overtreatment. Among testing strategies, we found that the hub-and-spoke approach would offer the optimal cost per infection averted.

Modelling analyses that incorporate system dynamics—ie, patient volume, disease burden, infrastructure, and budget effects—could inform plans to scale-up testing to improve STI management globally. Our analysis suggests strategies for reducing costs and maximising impact by strategically situating POC testing. There are additional opportunities for cost reductions, such as integrating testing into antenatal care services, maximising multiplex capacity, and using existing but underused resources, such as the GeneXpert *Mycobacterium tuberculosis* testing network, which could reduce capital costs and have important clinical and public health benefits.

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## Bloodstream infections caused by Enterobacteriaceae in China

Andrew Stewardson and colleagues[1] Article provides a comprehensive understanding of the emerging threat of carbapenem-resistant Enterobacteriaceae (CRE) in low-income and middle-income countries (LMICs). Furthermore, it offers a reference for the burden of carbapenem resistance in China, which has announced a national action plan to combat antimicrobial resistance.[2] Therefore, future studies should focus on the prevalence and molecular characteristics of bloodstream infection-causing isolates from China.

The Blood Bacterial Resistant Investigation Collaborative Systems (BRICS) is a prospective, multicentre, observational study for tracking antimicrobial resistance among bloodstream infection-causing isolates in China (appendix pp 1–6). Here, we present data from 26 sentinel hospitals of the BRICS project collected between January, 2014, and December, 2015. A set of 2569 non-duplicate Enterobacteriaceae isolates were included. *Escherichia coli* (n=1617) was the predominant species, followed by *Klebsiella pneumoniae* (n=570). 922 (57%) of 1617 *E coli* isolates and 171 (30%) of 570 *K pneumoniae* isolates produced extended-spectrum β-lactamases.

Notably, 83 meropenem non-susceptible isolates and 107 imipenem non-susceptible isolates were identified (the minimum inhibitory concentration cutoff for non-susceptible was ≥2 mg/L; appendix p 7), including 42 confirmed carbapenemase-producing Enterobacteriaceae (CPE) isolates, which were collected from 14 hospitals in 12 cities (appendix pp 8–11). The mean age of the 42 patients admitted to hospital was 61·1 years (SD 23·6), with a range of 1 year to 90 years, and 28 (62%) were male. 21 (50%) patients were admitted to the intensive care unit (including emergency and neonatal intensive care units). 15 (36%) patients died during the study, which is in line with previous studies on mortality attributable to CRE in LMICs.[3,4]

Among CPE isolates, 27 were *K pneumoniae* and five were *E coli* (appendix pp 8, 9). Although all isolates were resistant to a broad array of antimicrobials, most were susceptible to tigecycline, polymyxin B, and trimethoprim or sulfamethoxazole. Sanger sequencing showed that $bla_{KPC-2}$ was the most prevalent variant, in 31 (74%) of 42 isolates. Notably, multilocus sequence typing analysis showed that *K pneumoniae* sequence type (ST) 11 was the most common (22 [52%] of 42), followed by *E coli* ST167 (four [10%]) and *K pneumoniae* ST23 (two [5%]). ST11 KPC-2-producing *K pneumoniae* isolates were detected in ten hospitals and ST167 NDM-5-producing *E coli* isolates in

See Online for appendix