changes in hand hygiene during the study period would contribute to the results.

Abbas et al. also suggested that other interventions during the trial may not have been disclosed. Whilst it is correct that Sentara Healthcare system did decide to deploy both the Cupron Medical linens and Cupron Enhanced EOS Surfaces, this study was of the Medical Textile products only and was performed prior to the deployment of any of the hard surface biocidal composite surfaces.

The terminology for patient mix, as questioned by Abbas et al., is widely used and adopted in the US; the Case Mix Index, an indicator of patient wellness, is a relative value assigned to a diagnosis-related group (DRG/MSDRG) of patients in a medical care environment. As much infection data by microorganism type as were available under the NHSN reporting guidelines were included in the Results section. Demographic and infection type data were not available, because this information does not form part of the standardized US healthcare NHSN definitions.

Abbas and colleagues also request the economic data of the copper linens, however the economic analysis of this intervention cannot be presented as the linens are owned, supplied and cleaned by an independent laundry. The price of the contract for the linen supplied to the building cannot be separated from additional linens including healthcare worker apparel, cleaning textiles and other textiles. Therefore the economic pricing for a comparison to the cost of the infection is not available, and cost-effectiveness was not assessed in this study; the author recognizes that future trials should include a robust cost—effect analysis.

Abbas et al. were disappointed with the before-after design. However, the practical realities of deploying an intervention across multiple facilities in a healthcare system without interrupting patient flow meant that this trial design was the most pragmatic. For statistical analysis the primary comparison of interest in the manuscript was the 240 day analysis comparing infection rates over the 240 days to the infection rates during the same calendar months from the previous year. The alpha of 0.05 was applied to the analysis of the 240 day data. If the 240 day analysis was significant then the 90 day and 180 day subsets were also analyzed. As such, no adjustment was made for multiple testing since the subsets were analyzed after determining significance on the 240 day data. Whilst alternative analytical models could have been used, it is contended that the method used in the study was robust.

Whilst the interest of Abbas et al. in the research is appreciated, this author, whilst acknowledging the practical limitations of studies of this kind, considers that Sentara Healthcare's experience of implementing medical linens in an effort to deliver the best patient care and safety, delivered valid findings that are worthy of reporting.

Conflict of interest statement
None declared.

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The unknown role of disinfectant-detergents for failure of effective endoscope reprocessing

Sir,

Bourigault *et al.* recently reported an outbreak of carbapenemase-producing *Klebsiella pneumoniae* (OXA-48) via duodenoscopes in France [1]. Several possible explanations for persistence of the pathogen and its transmission were discussed, such as the possible viable but non-culturable state of the pathogen, a delay between the endoscopic procedure and the detection of *K. pneumoniae* carriage, the partially complex design of the endoscope, and the partial non-compliance with the manufacturer's reprocessing protocol during reprocessing. I would like to add another aspect which may be relevant in this context. In 2004, the French Ministry for Health published a guideline for manual reprocessing of medical devices including flexible endoscopes [2]. This guideline recommends a first cleaning of at least 10 min, followed by a rinse and a second cleaning for another 5 min. Recommended cleaning solutions include detergents and disinfectant-detergents without aldehydes. Based on the latest positive list for disinfectants published by the French Society for Hospital Hygiene in 2009, disinfectant-detergents are often based on quaternary ammonium compounds such as benzalkonium chloride (BAC) [3]. It may well be that disinfectant-detergents are still used for the pre-cleaning or cleaning step, which may have relevant implications. It has been shown recently that BAC binds to metals and plastic compounds, leading to its detection on surfaces based on these materials [4]. Remaining BAC at low levels has the potential, especially in Gram-negative species, to lead to increased tolerance to BAC (e.g. an increased minimum inhibitory concentration of 2500 mg/L in *Pseudomonas aeruginosa*); increased tolerance to other biocidal agents such as didecyldimethylammonium bromide, didecyldimethylammonium chloride, triclosan and chlorhexidine; and increased tolerance to selected antibiotics such as

ampicillin, cefotaxime and ceftazidime [5]. Finally, biofilm formation can be enhanced in *Escherichia coli* [5]. If it were the case that disinfectant-detergents based on BAC are still used for cleaning of flexible endoscopes, I would expect the biocidal compound to be present at (probably) low concentration on various materials of the flexible endoscope. The persistent presence of BAC on the plastic may reduce the susceptibility of surviving nosocomial pathogens to biocidal agents and selected antibiotics and may even enhance *P. aeruginosa* biofilm formation [6]. This is an aspect that may be worth further evaluation in the future.

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Fibrin sheath infections can be safely and successfully treated with percutaneous vacuum-assisted thrombectomy

Sir,

Central venous catheters (CVCs) have become commonplace in modern clinical practice. Despite their myriad benefits, they are associated with a host of complications, of which thrombosis (2—26%) and infection (5—26%) are the most common [1]. Catheter-related bloodstream infections (CRBSIs) are well-studied, and have high rates of morbidity and mortality which pose a significant burden to health systems. We present the case of a patient with infection of a retained catheter-related fibrin sheath, a rarely described form of CRBSI, who was successfully treated with percutaneous vacuum-assisted thrombectomy.

A 43-year-old woman with a past medical history of end-stage renal disease on haemodialysis presented to our hospital complaining of fevers for three days. Of note, she had a tunnelled CVC to be used for haemodialysis placed eight months prior to admission; her clinical course after catheter placement was uncomplicated and was free of any previous infection. On arrival, her physical examination was significant for a temperature of 39.3°C as well as erythema and oedema over the site of her tunnelled CVC on her right chest wall. Given her toxic appearance, she had urgent and immediate removal of her CVC on the day of her arrival, and she was treated with empiric vancomycin and cefepime. Blood cultures drawn at the time of arrival returned positive for meticillin-susceptible *Staphylococcus aureus* (MSSA) on day 2 of admission, and her antibiotic treatment was transitioned to cefazolin.

Transthoracic echocardiogram (TTE) was obtained to evaluate endocardial involvement, and was unremarkable without any vegetations, however transoesophageal echocardiogram (TOE) showed a highly mobile tubular mass in the right atrium originating from the superior vena cava (SVC) (Figure 1). A follow-up computed tomography venogram revealed septic emboli in the right upper and right lower lobes of her lungs, and confirmed a retained fibrin sheath in the right brachiocephalic vein and SVC; she was started on empiric anticoagulation with heparin infusion. Two sets of blood cultures were drawn daily since her arrival at hospital, and all remained positive for MSSA until they eventually cleared after five days of antibiotic therapy.

Despite resolution of bacteraemia, the provider care team remained concerned that the fibrin sheath should be removed to reduce embolic risk and achieve source control. After multidisciplinary discussion, our patient had successful removal of her fibrin sheath with a percutaneous vacuum-assisted thrombectomy device on day 12 of hospitalization. She was discharged home to complete a six-week total course of cefazolin,