



# Outsourcing cleaning services increases MRSA incidence: Evidence from 126 English acute trusts



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## ABSTRACT

There has been extensive outsourcing of hospital cleaning services in the NHS in England, in part because of the potential to reduce costs. Yet some argue that this leads to lower hygiene standards and more infections, such as MRSA and, perhaps because of this, the Scottish, Welsh, and Northern Irish health services have rejected outsourcing. This study evaluates whether contracting out cleaning services in English acute hospital Trusts (legal authorities that run one or more hospitals) is associated with risks of hospital-borne MRSA infection and lower economic costs.

By linking data on MRSA incidence per 100,000 hospital bed-days with surveys of cleanliness among patient and staff in 126 English acute hospital Trusts during 2010–2014, we find that outsourcing cleaning services was associated with greater incidence of MRSA, fewer cleaning staff per hospital bed, worse patient perceptions of cleanliness and staff perceptions of availability of handwashing facilities. However, outsourcing was also associated with lower economic costs (without accounting for additional costs associated with treatment of hospital acquired infections).

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## 1. Introduction

There is a long-standing debate in the United Kingdom about the impact of outsourcing of hospital cleaning services to private sector contractors. Beginning in 1983, cleaning services were one of the first parts of the NHS to be contracted to private providers under HC(8318) “Competitive tendering in the provision of domestic, catering and laundry services”. The then Department of Health and Social Security wanted hospitals to save money and argued that they would “make the maximum possible savings by putting services like laundry, catering and hospital cleaning out to competitive tender. We are tightening up, too, on management costs, and getting much firmer control of staff numbers” (Conservative Party, 1983).<sub>ENREF\_1</sub><sub>ENREF\_1</sub>

Always controversial, in the 1990s critics linked outsourcing to growing concerns about hospital acquired infections, and in particular, *methicillin-resistant Staphylococcus aureus* (MRSA), which was felt to be especially frequent in the UK (Johnson, 2011;

Washer and Joffe, 2006). Media coverage emphasised the role played by “dirty” hospitals (Chan et al., 2010), drawing on evidence of the importance of hospital cleanliness (Dancer, 2009; Dancer, 2008; Davies, 2009; Davies, 2010), patients’ perception of cleanliness (Greaves et al., 2012; Trucano and Kaldenberg, 2007) and frequency of handwashing to preventing infections (Sroka et al., 2010; Stone et al., 2012). There was speculation, and extensive anecdotal evidence, that contractors were seeking to save money, for example by employing fewer staff, with poorer working conditions and hence lower motivation, and were as a result achieving lower levels of cleanliness than the in-house NHS staff they replaced (Davies, 2010). In addition, contracted-out services were considered too inflexible to deal with changing circumstances, including problems with unscheduled cleaning out-of-hours, which might have increased risks of outbreaks (Davies, 2010). Because of these concerns, the Royal College of Nursing called for hospital cleaning to be brought in-house in 2008 (BBC News, 2008) and, later that year, Nicola Sturgeon, then Scottish Health Minister, instructed that this be done in all Scottish hospitals to reduce risks of infection (European Federation of Public Service Unions, 2011)<sub>ENREF\_11</sub><sub>ENREF\_1</sub>, later linking this move with the subsequent fall in cases of *C. difficile* infection (Daily Record, 2011), although

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this view was not universally accepted, with others linking it to improved antimicrobial stewardship (Nathwani et al., 2012). Outsourcing has also ceased in Wales and Northern Ireland (European Federation of Public Service Unions, 2011). However, these fears were dismissed by others, with the Business Services Association, representing outsourcing companies, arguing that “There is no evidence to suggest that outsourcing cleaning services causes increased rates of infection” (BBC News, 2008)\_ENREF\_11.

This debate has been handicapped by the scarcity of robust empirical evidence on the impact of outsourcing *per se*. A few descriptive studies from the 1990s, which compared the crude NHS Audit scores across hospitals, suggested potentially worse performance among hospitals outsourcing cleaning services (Davies, 2010). These studies argued that outsourcing to private contractors led to poorer coordination between nursing staff and independent cleaners, especially as previous lines of accountability had been broken. However, the ability to evaluate these claims was limited by \_ENREF\_9a lack of data on rates of hospital-acquired infection. This has now changed, with the NHS’s mandatory surveillance of MRSA, implemented in 2005 (Johnson et al., 2012), creating a set of comparative data over time. Under the new system, the MRSA rate is calculated as the number of MRSA bacteraemia reports from that Hospital Trust per 100,000 bed days (in the UK a Hospital Trust is a public entity that hospital operates facilities on one or more sites). Starting from October 2005, all Trusts in England were asked to submit data electronically, and in 2006 this system was further enhanced to provide data on possible sources of the MRSA bacteraemia, although this was only on voluntary basis. Until 2009 reports on MRSA bacteraemia rates in each acute Trust were published at six or 12 months interval; afterwards the reports were published on a monthly, quarterly and annual basis.

Here, for the first time to our knowledge, we test the hypothesis that outsourcing cleaning facilities is associated with greater incidence of MRSA, by linking newly available comparative data on its incidence with data on the provision of cleaning across English Acute Hospital Trusts.

## 2. Methods

### 2.1. Data sources

We linked data on MRSA incidence with patient reports of perceived hospital cleanliness, and health workers’ reports of availability of handwashing facilities for 126 Acute Trusts. Data on hospital-borne MRSA incidence per 100,000 hospital bed-days were taken from Public Health England’s annual reports (Public Health England, 2015). Data on patient-reported cleanliness were obtained from the Picker Institute NHS Patient Survey Programme (Care Quality Commission, 2010–2014) while data on handwashing facilities were from the Picker NHS National Staff Survey (Picker Institute Europe, 2010–2014). The two surveys are commissioned by NHS England from Picker Institute Europe. In the first, each Trust sends a questionnaire to 850 patients who have spent at least one night in the hospital between June and August each year. All the sampled patients are asked “In your opinion, how clean was the hospital room or ward (toilets and bathrooms) that you were (used) in? Very clean (excellent), fairly clean, not very clean, not clean at all”. In the NHS staff survey, each Trust selects a random group of staff (sample sizes will depend on the number of staff employed by the organisation from 600 to 850) to be interviewed. The survey asks all selected employees about their job, management, health/safety, and well-being in the Trust as well as their personal development. Here we are interested in a particular question “Are handwashing materials always available? Yes/No”. All data were for the years 2010–2014. Data on whether hospitals outsourced

cleaning were obtained from Patient Environment Action Teams (2010–2)(Health & Social Care Information Centre, 2010–2014b) and Patient-Led Assessments of the Care Environment (2013–4) (Health & Social Information Centre, 2013–2014) (the name changed but collection practices did not). In practice, virtually all Trusts either fully outsourced or operated in-house cleaning services. Additional data on economic costs of cleaning per bed, staff numbers, patient mix and demographics, as well as size and services provided by the hospitals were taken from Estates Return Information Collection (ERIC) for the period 2010–2014 (Health & Social Care Information Centre, 2010–2014a). Table 1 in the web appendix provides further descriptive statistics for all variables used in the study.

Our initial sampling frame included all acute general hospital Trusts in England. We excluded single speciality orthopaedic, cardiac/ophthalmology/otolaryngology, gynaecology and paediatric hospitals given their atypical case mix (namely, Harefield, Royal National Orthopaedic, Royal National Throat, Nose and East Hospital, Papworth, Alder Hey, Robert Jones and Agnes Hunt Orthopaedic, Great Ormond, Moorefield Eye Hospital, Birmingham Children’s Hospital, Heart of England NHS Foundation, Birmingham women’s NHS foundation Trust and Sandwell and West Birmingham Hospital NHS Trust, and Royal Free Hampstead NHS Trust). Between 2010 and 2014 there were a total of 320 Acute Care Trusts, of which complete data existed for 201. It was not possible to track data over time in 119 Trusts because they changed identification codes during mergers. Of the 201, 140 report MRSA rates for the entire period. To avoid potential confounding from mixed service providers and switching (and numbers were too small to permit difference-in-difference analysis), we exclude a further four Trusts that use a combination of in-house and outsourced services and another four that changed from in-house to outsourcing (2) or vice-versa (2). Another four Trusts were removed because of small numbers or because they reported very high numbers (e.g. 7-fold higher than the median that indicated major outbreaks likely to have specific causes). Thus, our final analytical sample includes 126 acute Trusts. Of these 51 outsourced cleaning and 75 retained it in-house. Web appendix Fig. 1 further documents the sample inclusion criteria.

It is important to ascertain whether there were any pre-existing differences between hospitals that outsourced cleaning and those retaining it in-house, which might bias results, for example if hospitals with a worse cleaning record selectively outsourced it. Unfortunately, there are few sources of data that would allow such a comparison. One that does provide some insight is the dataset on hospital cleanliness, as assessed by the Healthcare Commission, from between three and five years prior to the data used in the main analysis, which start in 2010. We use these data to explore whether our results are consistent after adjusting for pre-existing differences in hospital sites, as measured by this indicator many years before the differences in out-sourcing (see web appendix Fig. 2 for more details).

### 2.2. Statistical modelling

We used multi-variate regression models to assess the association of outsourcing with MRSA incidence rates, as follows:

$$MRSA_{it} = \alpha + \beta Outsourc_{it} + \gamma Trust_{it} + \mu_i + n_t + \varepsilon_{it} \quad (1)$$

Here  $i$  is Trust and  $t$  is year.  $MRSA$  is the MRSA incidence rate per 100,000 hospital beds;  $Outsource$  is a dummy for whether the Trust outsourced cleaning services or retained them in-house;  $Trust$  is a series of variables controlling for Trust differences, including the number of beds in the Trusts and the average length of stay in the

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