

Methicillin-resistant *Staphylococcus aureus* in health-care workers with cystic fibrosis in Sydney

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Abstract

Cystic Fibrosis (CF), the most common lethal inherited disorder in Australia, is associated with increased respiratory tract colonization/infection. Given that many adults with CF work as health-care workers (HCW), which has been associated with an increased risk of methicillin-resistant *Staphylococcus aureus* (MRSA) colonization/infection, we examined these risks in 252 adults with CF at our centre between 2001–2015. Demographic and clinical characteristics, including pathogens, were compared for HCW and non-HCW groups. MRSA colonization/infection was found in 20 subjects, comprising 2/19 HCW, and 18/233 non-HCW ($p = 0.66$). Sixteen of these 20 subjects undertook eradication therapy, with success in 2/2 HCW and 5/14 non-HCW. This study showed that the rate of MRSA colonization/infection did not differ between adults with CF who work in the health-care setting versus other areas. This suggests that choosing a health-care profession does not necessarily result in an increased risk of MRSA colonization/infection for an adult with CF.

Introduction

Cystic fibrosis (CF) is the most common lethal inherited disorder in Australia. With improvements in multidisciplinary care, survival has increased dramatically to current values of 45–50 years. As a result, many people with CF are completing school and university and starting careers. Recent surveys from the UK show that approximately 7% of adults with CF work in the health-care profession [1]. Recently, the group from Brisbane, Australia determined that health-care workers (HCW) with CF managed at the Prince Charles Centre had an increased risk of methicillin-resistant *Staphylococcus aureus* (MRSA) compared with non-health-care workers (non-HCW) [2]. They found that 10 of 21 HCW acquired MRSA compared with 40 of 255 non-HCW. Given this, we performed a retrospective audit of the data from our clinic in Sydney to compare and contrast the Sydney experience with that of Brisbane.

Case Series

Method

We examined the Australian CF Data Registry entries for our clinic, examining all adults with CF (≥ 18 years) who attended the Westmead Adult CF Centre between 2001 and 2015. Approval for the CF Data Registry was granted by the local ethics committee, and all patients gave written informed consent; this subgroup analysis was also approved separately.

In this study, a HCW was defined as a student or worker in a medical practice, hospital, pharmacy, or allied health practice. Given that the Brisbane group also included veterinarians, we also included one subject with this occupation in our analysis.

Clinical Data

Demographics, including age, gender, forced expiratory volume in 1 second (FEV_1) percent predicted, and sputum

colonization/infections, were collected. Adults with CF who had two or more cultures of the same organism within a year had this recorded as colonization/infection. Furthermore, those positive for methicillin-sensitive *Staphylococcus aureus* (MSSA), MRSA, and *Pseudomonas aeruginosa* were subcategorized as intermittently colonized or chronically colonized using the “Leeds criteria.” [3] Clinical data of the HCW and non-HCW groups were compared using two-tailed Fisher’s exact test or t-test as appropriate. Univariate data analysis was performed using SPSS (v22) IBM Corporation, Armonk, NY, USA.

Results

During the study period, 252 patients were cared for at Westmead, with 19 self-reported as HCW, including doctors ($n = 2$), nurses ($n = 3$), physiotherapist ($n = 1$), psychologist ($n = 7$), paramedic ($n = 1$), electrophysiology technician ($n = 1$), social worker ($n = 2$), pharmacy assistant ($n = 1$), and veterinarian ($n = 1$). There was a predominance of women in the HCW group (13 females, six males), but both groups had similar ages: HCW 29.9 years (range 21–48), non-HCW 30.1 years (range 18–80); similar FEV₁ (HCW: 70% (range 34–115), non-HCW 66%, (range 12–120); and similar colonization with *P. aeruginosa* (HCW: 63%, non-HCW 58%) and MSSA (HCW 21%, non-HCW 27%).

During the enrolment period, two or more positive sputum cultures for MRSA were found in 20 adults with CF, comprising two HCW and 18 non-HCW. The proportion of HCW who were colonized with MRSA (2/19, 11%) was not different from that of the non-HCW (18/233, 8%) [$P = 0.66$].

Chronicity of Colonization/Infection

Breaking down the intermittent (7/20) versus chronically (13/20) colonized groups did not change the comparative values. There were no statistically significant differences in rates of chronic MRSA between the HCW versus non-HCW.

Eradication Therapy

Treatment of colonization/infection with MRSA may influence the overall prevalence of this organism and is often undertaken with oral rifampicin and oral fucidin, together with intravenous vancomycin as necessary. Overall, 16 patients colonized with MRSA chronically or intermittently were given eradication therapy; 7 (44%) patients successfully eradicated the organism following this therapy, including all two (100%) HCW with CF and five of 14 (36%) non-HCW with CF. At the end of the study

period, the point prevalence of MRSA colonization/infection was 4.8%.

Discussion

This study did not demonstrate a difference in MRSA colonization between HCW and non-HCW in our CF clinic as adults with CF who worked or studied in health care had a similar prevalence of MRSA colonization/infection compared with the non-HCW adults with CF. The point prevalence at the end of the study was in keeping with the overall CF population in Australia [4]—which remains well below the incidence of MRSA reported in 2015 [5] in the US centres.

There are several differences between the current study and that from Brisbane [2]. First, Brisbane’s CF clinic was established earlier, with a larger overall population and a larger geographical spread, including some adults living in tropical conditions. The prevalence of MRSA colonization/infection in the Prince Charles clinic was 8.3% in 2001, reducing to 3.8% in 2012. The Westmead Clinic, established in 1996, did not have an excessive burden of MRSA colonization at the start of the study period in 2001. Overall, the prevalence of MRSA has remained relatively stable at Westmead, likely related to strict segregation and infection prevention and the use of eradication therapy. Limitations for this study include the low overall incidence of MRSA, with small numbers of subjects involved, such that the analysis may be underpowered with the odds ratio of HCW: non-HCW having wide confidence intervals, 1.4 (95% confidence interval, 0.30–6.56). Our study included 19 HCW, with more than a third working as psychologists, so the lack of increased risk of MRSA may reflect less close contact with patients in their day-to-day practice.

The continued low prevalence of MRSA is heartening to the Australian CF community overall and reinforces the utility of specific eradication therapy and cross-infection prevention controls in limiting the exposure of adults with CF to this organism.

Given the recent development of consensus documents concerning HCW with CF [6], the low prevalence of MRSA colonization in our clinic suggests that appropriate interventions may prevent colonization/infection of adults with CF irrespective of their chosen profession. This study highlights that adults with CF can indeed choose a health-care profession without necessarily increasing their risk of MRSA colonization/infection and that advice to adults with CF who are considering a career in health care should be tailored to that individual.

Disclosure Statement

This study was approved by Western Sydney Local Health District Ethics Committee.

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