

# High Prevalence of Methicillin-Resistant *Staphylococcus aureus* (MRSA) on Doctors' Neckties

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## SUMMARY

We set out to investigate whether neckties worn by doctors are more likely to be contaminated with Methicillin resistant *Staphylococcus aureus* (MRSA) compared to neckties worn by preclinical medical undergraduates who have never been exposed to a hospital environment. We discovered that more than half (52%) of neckties worn by doctors were contaminated with *Staphylococcus* and out of these, 62% of them were identified as MRSA. In contrast, none of the student's ties were contaminated with MRSA. Due to the high prevalence of *staphylococcus* detected on doctors' neckties, we recommend that health care workers do not wear neckties.

## KEY WORDS:

Doctors' neckties, *Staphylococcus aureus*, MRSA

## INTRODUCTION

Methicillin Resistant *Staphylococcus aureus* (MRSA) is a well known term used to describe *Staphylococcus aureus* that is resistant to commonly used antibiotics such as methicillin and oxacillin.

The injudicious use of broad spectrum antimicrobials as well as increase in improper hygiene in invasive medical techniques has been associated with the problem of increasing antibiotic resistance in hospitals<sup>1</sup>. Staphylococcal infection and its resistance to antibiotics is on the rise. In fact, it is presently the most common isolated organism among inpatients in Malaysian Hospitals. The rate of isolation ranges from 1.6 to 5.5 per 100 patients. Of the *S. aureus* isolated, 0.2 to 2.3 percent is resistant to methicillin and is commonly isolated in surgical, paediatrics, orthopaedics and intensive care units<sup>2</sup>.

Patients who are at highest risk of exposure to staphylococcal infection or MRSA are immunosuppressed patients who are mostly in intensive care units and cardiothoracic surgery wards. Patients infected with *S. aureus* have, on the average, 3 times the length of hospital stay and face 5 times the risk of hospital death compared to inpatients who are not infected by MRSA<sup>3</sup>. In addition, a death rate of 34% within 30 days have been observed among patients having MRSA infection compared to only 27% among Methicillin Sensitive *S. aureus* (MSSA) patients<sup>4</sup>. *S. aureus* and MRSA have been isolated from a variety of environmental surfaces such as

stethoscopes, floors, furniture, laboratory coats and neckties worn by doctors<sup>5</sup>.

A study in New York Hospital Medical Centre proved that potentially infectious organisms could be cultured from nearly half of the neckties worn by doctors and medical students<sup>6</sup>. This study has also prompted a request by the Malaysian Medical Association to the Ministry of Health Malaysia to abolish the practice of wearing neckties among doctors in Malaysian hospitals<sup>7</sup>. In the United Kingdom, the British Department of Health has banned the usage of neckties, long sleeve shirts and jewellery in effort to tackle the problem of spreading infectious microorganisms such as MRSA<sup>8</sup>. Recently, the Scottish government announced its intention to ban the wearing of white coats, including neckties, in a bid to stop the spread of infections<sup>9</sup>.

The objective of this study is to investigate whether neckties worn by doctors are more likely to be contaminated with *staphylococcus* and MRSA in comparison to neckties worn by preclinical medical undergraduates.

## MATERIALS AND METHODS

This was a cross sectional study. Fifty doctors comprising of house officers, medical officers, specialists and consultants from the departments of surgery, orthopaedics, paediatrics, obstetrics and gynaecology, high dependency unit (HDU), coronary care unit (CCU), intensive care unit (ICU) and neonatal intensive care unit (NICU) in a public teaching hospital were selected consecutively. The control group comprised of fifty pre-clinical medical students who have not been exposed to hospital environment.

After obtaining verbal consent, the neckties worn by both doctors and medical students in both cohorts were swept by gliding a mannitol salt agar plate three times from the neck of the tie until the triangular lower end of each tie while the tie is turned over. While performing the procedure, the edge of the plates is kept in contact with the tie surface. Aseptic techniques were used during which the mannitol salt agar was only exposed for less than 5 seconds.

The plates were then sealed and incubated for 48 hours at 37°C. The distinctive golden yellow halo of *S. aureus* was identified and the number of yellow colonies was noted. Agar plates with white colonies which are identified as *S. epidermidis* are discarded. The colonies of *S. aureus* were then

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Table I: Staphylococcal growth on neckties of doctors and students

Organisms	Doctors' ties (%)	Students' ties (%)	Total
No growth	8 (16)	17 (34)	25
<i>S. epidermidis</i>	16 (32)	19 (38)	35
<i>S. aureus</i>	6 (12)	5 (10)	11
<i>S. epidermidis</i> & <i>S. aureus</i>	20 (40)	9 (18)	29
<b>Total</b>	<b>50 (100)</b>	<b>50 (100)</b>	<b>100</b>

Table II: Coagulase positive *S. aureus* and MRSA on neckties of doctors and students

Organisms	Doctors' ties	Students' ties
Coagulase +ve <i>S. aureus</i>	26	4
MRSA	16	0

sub-cultured on mannitol salt agar with added oxacillin and incubated for another 48 hours at 37°C. The number of colonies that grow in mannitol salt with oxacillin was noted. These colonies are MRSA. Coagulase test was done to select out coagulase positive *S. aureus*.

Statistical analysis was done using the SPSS version 11.5 for Microsoft Windows. The Pearson Chi-square test was used to determine statistical significance with  $p < 0.05$  as being statistically significant.

## RESULTS

*Staphylococcus aureus* was isolated from 26 (52%) out of 50 doctors' neckties while only 4 (18%) out of 50 students' neckties had *S. aureus*. All the *S. aureus* isolates from the 26 neckties from the doctors' cohort were coagulase positive while only 4 out of the 14 neckties from the students' cohort were coagulase positive ( $\chi^2$  4.012;  $p = 0.045$ ). The summary of Staphylococcal growth on neck ties of doctors and students is given in Table I.

Of the 26 doctors' neckties with coagulase positive *S. aureus*, 16 (62%) were further identified to be MRSA. In contrast, none of the 4 coagulase positive *S. aureus* from the students' cohort were MRSA ( $\chi^2$  6.48;  $p = 0.011$ ). This is summarised in Table II.

## DISCUSSION

White coats and neckties have been worn by doctors for more than 100 years, although they have fallen out of favour in recent times. Neckties come into inadvertent contact with patients and may be cleaned infrequently. Mounting evidences suggest that these well recognised symbols of professionalism and authority in medicine may, themselves be agents through which infections and cross-contaminations occur.

This study was designed to examine in a scientific way whether the neckties worn by health care professionals, in this case doctors, may harbour potentially life-threatening microorganisms which may become a source of infection. A cohort of pre-clinical medical students with no exposure to the hospital environment was chosen as a control group.

We have decided to narrow the scope of this study to just growing and isolating *Staphylococcus aureus* from neckties for

two reasons; namely for the relative simplicity in isolating and differentiating the organism as well as the clinical significance of MRSA isolates.

The result in Table I show that doctor's neckties are more likely to be contaminated with *S. aureus* compared to neckties worn by pre-clinical medical students who were not involved in patient care. Furthermore, the *S. aureus* isolates from the former are all coagulase positive as opposed to only 4 out of 14 isolates from the latter. This is statistically significant ( $p = 0.045$ ). In day-to-day clinical practice, coagulase negative staphylococcus (*Staphylococcus epidermidis*) in culture and sensitivity reports are usually regarded as contaminant and are usually, barring a few exceptions such as in patients with indwelling prosthesis or prosthetic heart valves, left untreated. On the other hand, coagulase positive *S. aureus* are given more serious attention and are promptly treated with the appropriate antimicrobials.

Table II shows that out of the 26 neckties worn by doctors from which *S. aureus* were isolated, 16 (or 62%) of these isolates were MRSA. In contrast, all the *S. aureus* isolates from 4 neckties worn by medical students turned out to be non-MRSA. The MRSA on the doctor's ties are most likely hospital acquired and none of the student's ties seem to be contaminated with community acquired MRSA.

Traditionally, it is believed that the wearing of necktie by doctors may enhance patient's satisfaction and confidence in doctors. However, a study in Australia found that patients' confidence or satisfaction did not diminish when their doctors do not wear a necktie as long as they are neatly attired<sup>10</sup>. Another study showed that the level of contamination with bacteria was about the same in necktie and bow tie<sup>11</sup>.

Admittedly, the cohort size in this study is small; however, it cannot be denied that between the neckties worn by doctors and medical students, the former would appear to be more likely to harbour potentially life threatening coagulase positive *S. aureus* and MRSA. While it may be argued that contaminated neckties does not equate to direct transmission of infectious agents, nevertheless, this matter has prompted health authorities all over the world to ban the wearing of neckties among health care personnel in the interest of checking infection and cross transmission.

Perhaps, it is time to rethink again the proposal by the Malaysian Medical Association to relegate the wearing of ties to the archives of medicine.

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