

Nasal carriage of meticillin-resistant *Staphylococcus aureus* in GPs in the West of Ireland

Joan Mulqueen, Fergus Cafferty, Martin Cormican, John D Keane and Angela Rossney

ABSTRACT

This point-prevalence study was conducted to establish rates of meticillin-resistant *Staphylococcus aureus* (MRSA) nasal carriage in GPs in three counties in the West of Ireland. One hundred and twenty GPs were randomly selected for the study and 78 participated. The prevalence rate of nasal carriage of MRSA in these participants was 7.7%. A number of GPs in the West of Ireland have nasal carriage of MRSA. The results emphasise the need for high standards of infection control in primary care.

Keywords

family physicians; Ireland; *Staphylococcus aureus*.

INTRODUCTION

Transmission of isolates of epidemic meticillin-resistant *Staphylococcus aureus* (MRSA) has traditionally been associated with hospital facilities.¹ In recent years dissemination of MRSA has been increasingly recognised in other healthcare settings, including primary care.² Acquisition of MRSA frequently brings about asymptomatic colonisation;¹ however it may be associated with infection resulting in significant morbidity and mortality^{3,4} particularly in vulnerable patients. The epidemiology of MRSA is further complicated by the emergence of strains of community-acquired MRSA that transmit efficiently in otherwise healthy people who do not have ongoing interaction with the healthcare system.^{5,6}

In Ireland comprehensive national data on the scale of the problem of MRSA colonisation are not available. The most up-to-date comprehensive national data on MRSA infection in Ireland come from the European Antimicrobial Resistance Surveillance System⁷ (EARSS). These data indicate that 42% of bloodstream isolates of *S. aureus* in Ireland reported through EARSS are meticillin-resistant. This proportion is similar to that in the UK but is much higher than the proportions reported in some northern European countries.⁷ The aim of this point-prevalence study was to determine the rate of nasal MRSA carriage in GPs in the Western region of the Health Service Executive (HSE West) in the counties of Mayo, Galway, and Roscommon, Ireland.

METHOD

A current list of GPs working in counties Mayo, Galway, and Roscommon with general medical service patients was obtained from the HSE West. This list provided data on GP age, sex, practice location, practice type (that is, single or group practice), and practice nurse status. There were 244 GPs in total, of whom 120 were randomly selected for the study using randomised tables.

The study took place in October and November 2005. An information package containing the following items was mailed to selected GPs:

J Mulqueen, MB BCH, BAO, GP registrar; **JD Keane**, BAO, MICGP, GP, Western Training Programme in General Practice, Western Health Service Executive. **M Cormican**, BAO, MD, MRCP, MRCPATH, head of department, Department of Bacteriology, National University of Ireland, Galway. **F Cafferty**, BAO, MRCSI, research fellow, Institute of Molecular Medicine, Trinity College. **A Rossney**, BA, PhD, FIBMS, FAMLS, chief medical scientist, National MRSA Reference Laboratory, St. James's Hospital, Dublin, Ireland.

Address for correspondence

Dr Joan Mulqueen, Western Training Programme in General Practice, The Nurses Home, University College Hospital, Galway, Ireland. E-mail: mulqueenjoan@hotmail.com

Submitted: 6 April 2007; **Editor's response:** 7 June 2007; **final acceptance:** 14 September 2007.

©British Journal of General Practice 2007; 57: 811–813.

How this fits in

In recent years dissemination of MRSA has been increasingly recognised as occurring in healthcare settings other than hospitals, including primary care settings. In Ireland comprehensive national data on the scale of the problem of MRSA colonisation are not available. This study set out to measure the rate of nasal carriage of MRSA in GPs in the West of Ireland. The results indicating that 7.7% of participants were nasal carriers for MRSA emphasise the need for high standards of infection control in primary care to prevent MRSA transmission in either direction between GPs and patients.

- a cover letter explaining the nature of the study and inviting the GPs to participate by taking their own nasal swabs;
- a consent form which was to be signed and returned to the investigator in a stamp-addressed envelope included;
- a sealed sterile swab with a coded label for attachment to the swab after swabbing was performed; and
- a pre-coded microbiology form.

Each participant was requested to send the swab and microbiology form directly to the Department of Bacteriology, National University of Ireland, Galway, in the stamp-addressed envelope provided. Each selected GP was assigned an anonymous code. No person other than the investigator had access to the anonymous-link system. Participants were specifically instructed not to put their name on either the swab or the laboratory form to ensure anonymity.

The swabs were plated on selective chromogenic agar. Suspect MRSA colonies were identified as *S. aureus* by conventional means. Meticillin resistance was determined by testing susceptibility to cefoxitin by the Clinical and Laboratory Standards Institute disk-diffusion method.⁸

The laboratory emailed the coded results to the investigator, who contacted those GPs with positive results by telephone and sent them copies of the

relevant pages from the Irish national guidelines for the control and prevention of MRSA in hospitals and in the community.⁹ Participants with negative results were informed in writing.

Results were analysed with SPSS (version 14). The χ^2 test was used for analysis of nominal data. The Student's *t*-test was used to investigate for possible significance in age gap.

MRSA isolates were sent to the Irish National MRSA Reference Laboratory for epidemiological typing by antibiogram-resistogram (AR) typing and DNA macrorestriction analysis using the restriction endonuclease *Sma*I and pulsed-field gel electrophoresis (PFGE) as described previously.¹⁰

RESULTS

A total of 78 GPs participated in the study, giving a response rate of 65% (78/120). The average age of participants was 49.9 years (+/-8.5 years). Participants and their practices were representative of the overall diversity of GP practices in the region (Table 1).

Six GPs carried MRSA, giving a point-prevalence rate of 7.7%. As the number of positive GPs was small it was not possible to reliably compare MRSA positive and negative participants for statistical differences based on their demographics.

Four of the six MRSA isolates exhibited AR type AR06 and pulsed-field group (PFG)-01. Two isolates exhibited AR patterns to which no AR type was assigned pending the results of PFGE.¹⁰ One isolate belonged to PFG-01 and the other exhibited a sporadically-occurring PFGE pattern. Earlier studies investigating multilocus sequence typing and staphylococcal chromosome cassette *mec* (SCC*mec*) types of MRSA from Ireland have shown that isolates exhibiting the AR-PFG 06-01 correspond to sequence type (ST) 22 and SCC*mec* type IV^{10,11}. The isolates from the present study are closely related to the predominant healthcare-associated MRSA strain in Ireland.¹⁰ Their inferred genotype of ST22-MRSA-IV confirms their similarity to the UK epidemic nosocomial strain EMRSA-15.¹⁰

DISCUSSION

This study detected a nasal carriage rate of MRSA of 7.7% in the GPs studied. The study had a relatively high response rate of 65%. The result indicating that 7.7% of participants were nasal carriers of MRSA is an important reference for future studies in this area. A limitation of the study is that the sample size was relatively small and that carriage was investigated at a single point in time. To ensure that data would be applicable on a national level, a greater number of GPs would need to participate.

Table 1. Demographic details of GPs in the Health Service Executive West and of GPs who participated in the study.

Demographics	GPs in HSE West (n = 244), %	Study participants (n = 78), %
Male	72	73
Female	28	27
Urban location	80	74
Rural location	20	26
Single-handed	53	54
Group practice	47	46
With practice nurse	49	62
Without practice nurse	51	38

A number of studies examining nasal carriage rates of MRSA in adults in the community have been carried out in other countries and have detected rates ranging from 0.8 to 3%.¹²⁻¹⁴ Nasal carriage of MRSA in healthcare workers internationally has also been studied in the hospital setting and carriage rates in these studies range from 6 to 17.8%.¹⁵⁻¹⁷

The results of the present research show that the prevalence rates of MRSA nasal carriage in GPs in the West of Ireland are comparable to rates reported in some hospital-based studies carried out in other countries.¹⁵⁻¹⁷ This is understandable as GPs, like other healthcare workers, are exposed to patients with MRSA infection and/or colonisation in the course of their work.

Future research in this area should ideally include a larger number of GPs across a wider geographical area and over a longer period of time in order to collect comprehensive national data. It should also seek to correlate MRSA carriage with a more detailed description of practice setting, with particular emphasis on access to and use of hand-hygiene facilities and implementation of other infection control practices. It would be appropriate to ask GPs to provide specimens at a number of time points to ensure that intermittent carriage would be detected.

The significance of MRSA colonisation in healthcare workers in transmission of MRSA to patients and the community is not entirely clear and further research in this area is needed. The results of the present study emphasise the need for high standards of infection control in primary care to prevent MRSA transmission in either direction between GPs and patients.

Ethics committee

Irish College of General Practitioners

Competing interests

The authors have stated that there are none

Acknowledgements

The authors would like to thank the GPs who participated in the study; the staff of the National MRSA Reference Laboratory, St James Hospital; Victoria Buckley, senior technician, Department of Bacteriology, National University of Ireland, Galway and Bernie Lydon, lecturer in IT Marketing & Research, Dublin Business School.

REFERENCES

1. Thompson RL, Cabezedo I, Wenzel RP. Epidemiology of nosocomial infections caused by methicillin-resistant *Staphylococcus aureus*. *Ann Intern Med* 1982; **97**(3): 309-317.
2. Kollef MH, Micek ST. Methicillin-resistant *Staphylococcus aureus*: a new community-acquired pathogen? *Curr Opin Infect Dis* 2006; **19**(2): 161-168.
3. Cosgrove SE, Sakoulas G, Perencevich EN, et al. Comparison of mortality associated with methicillin-resistant and methicillin-susceptible *Staphylococcus aureus* bacteremia: a meta-analysis. *Clin Infect Dis* 2003; **36**(1): 53-59.
4. Crowcroft NS, Catchpole M. Mortality from methicillin-resistant *Staphylococcus aureus* in England and Wales: analysis of death certificates. *BMJ* 2002; **325**(7377): 1390-1391.
5. Adcock PM, Pastor P, Medley F, et al. Methicillin-resistant *Staphylococcus aureus* in two child care centers. *J Infect Dis* 1998; **178**(2): 577-580.
6. Herold BC, Immergluck LC, Maranan MC, et al. Community-acquired methicillin-resistant *Staphylococcus aureus* in children with no identified predisposing risk. *JAMA* 1998; **279**(8): 593-598.
7. European Antimicrobial Resistance Surveillance System (EARSS) Annual Report 2005. Bilthoven, The Netherlands: EARSS, 2006. <http://www.rivm.nl/earss/news/index.jsp> (accessed 17 Sep 2007).
8. Clinical and Laboratory Standards Institute. *Performance standards for antimicrobial disk susceptibility tests; approved standard*. 9th edn. Clinical and Laboratory Standards Institute document M2-A9. Pennsylvania, US: Clinical and Laboratory Standards Institute, 2006.
9. A Strategy for the Control of Antimicrobial Resistance in Ireland (SARI) Infection Control Subcommittee. *The control and prevention of MRSA in hospitals and in the community*. Ireland: Health Service Executive Health Promotion Surveillance Centre, 2004.
10. Rossney AS, Lawrence MJ, Morgan PM, et al. Epidemiological typing of MRSA isolates from blood cultures taken in Irish hospitals participating in the European Antimicrobial Resistance Surveillance System (1999-2003). *Eur J Clin Microbiol Infect Dis* 2006; **25**(2): 79-89.
11. Shore A, Rossney AS, Keane CT, et al. Seven novel variants of the staphylococcal chromosomal cassette mec in methicillin-resistant *Staphylococcus aureus* isolates from Ireland. *Antimicrob Agents Chemother* 2005; **49**(5): 2070-2083.
12. Abudu L, Blair I, Fraise A, Cheng KK. Methicillin-resistant *Staphylococcus aureus* (MRSA): a community-based prevalence survey. *Epidemiol Infect* 2001; **126**(3): 351-356.
13. Grundman H, Tami A, Hori S, et al. Nottingham *Staphylococcus aureus* population study: prevalence of MRSA among elderly people in the community. *BMJ* 2002; **324**(7350): 1365-1366.
14. Jernigan JA, Pullen AL, Partin C, Jarvis WR. Prevalence of and risk factors for colonization with methicillin-resistant *Staphylococcus aureus* in an outpatient clinic population. *Infect Control Hosp Epidemiol* 2003; **24**(6): 445-450.
15. Eveillard M, Martin Y, Hidri N, et al. Carriage of methicillin-resistant *Staphylococcus aureus* among hospital employees: prevalence, duration, and transmission to households. *Infect Control Hosp Epidemiol* 2004; **25**(2): 114-120.
16. Akoua Koffi C, Dje K, Toure R, et al. [Nasal carriage of methicillin-resistant *Staphylococcus aureus* among health care personnel in Abidjan (Cote d'Ivoire)]. *Dakar Med* 2004; **49**(1): 70-74.
17. Cesur S, Cokca F. Nasal carriage of methicillin-resistant *Staphylococcus aureus* among hospital staff and outpatients. *Infect Control Hosp Epidemiol* 2004; **25**(2): 169-171.