Canadian Journal of Rural Medicine
CJRM CMR
Journal canadien de la médicine rurale

Descriptive Article
Article descriptif

The changing face of cellulitis and MRSA in rural Canada: a clinical update

Jill Muileboom
Sioux Lookout Meno Ya Win Health Centre, Sioux Lookout, Ont.

Marsha Hamilton, RN
Infection Control, Sioux Lookout Meno Ya Win Health Centre, Sioux Lookout, Ont.

Len Kelly, MD
Northern Ontario School of Medicine, Division of Clinical Sciences, Sioux Lookout, Ont.

Correspondence to: Len Kelly; lkelly@univmail.cis.mcmaster.ca

This article has been peer reviewed.

The empiric treatment of cellulitis in northwestern Ontario used to be relatively straightforward. The choice of antibiotic was typically cephalexin, which provided reasonable coverage for staphylococcus and streptococcus, if systemic treatment was required. However, several recent studies and regional bacterial surveillance have altered the options for empiric treatment.[1–5]

Because superinfections can affect even small rural hospitals, rural clinicians have to consider their role in antibiotic stewardship. For example, do good wound hygiene and follow-up suffice? Evidence now demonstrates that incision and drainage (I&D) of uncomplicated abscesses is sufficient without concomitant antibiotic coverage.[2–5] If antibiotics are needed, does our choice of medication cover for increasing rates of community-associated methicillin-resistant *Staphylococcus aureus* (CA-MRSA) seen in soft tissue infections?

COMMUNITY-ASSOCIATED MRSA

In the past 5 years, northwestern Ontario has experienced increasing rates of CA-MRSA. More than 56% of the staphylococcus isolates processed at the Sioux Lookout Meno Ya Win Health Centre were CA-MRSA in 2011; this was up from 38% in 2008.[1] This centre provides bacteriology services for a geographically dispersed population of 28 000 that mostly comprises First Nations people.

The incidence of CA-MRSA has traditionally been high in remote areas of northern Canada, particularly those with large Aboriginal populations.[6–8] A study in northern Saskatchewan found 51% of *S. aureus* infections to be CA-MRSA.[3] Risk factors for such high rates of CA-MRSA infections include poor housing, sanitation, overcrowding and recent antibiotic use.[9]

Our knowledge of CA-MRSA has dramatically evolved since it was first diagnosed in Canada in 1981.[10] The initial classification in the 1950s used the term "community-acquired." Since then, increasing rates of CA-MRSA are found in hospital settings, so the nomenclature now reflects less certainty about the location of the onset of infection.

COMMUNITY- VERSUS HEALTH CARE–ASSOCIATED MRSA

Community-associated MRSA differs from health care–associated (HA; previously called "hospital-acquired") MRSA in several important ways. Community-associated MRSA affects the young and previously healthy, and is susceptible to many common antibiotics (e.g., trimethoprim–sulfamethoxazole, clindamycin and doxycycline). Developments in epidemiology and genetic testing have identified CA-MRSA as molecularly distinct from HA-MRSA.[11] Community-associated MRSA did not "escape" from the hospital setting; rather, it developed in the antibiotic-rich environment that community

settings now have become. Both are resistant to methicillin and oxacillin, but HA-MRSA is highly resistant to most antibiotics, is found in intensive care units (ICUs) in tertiary care centres and may require vancomycin.

TREATING CA-MRSA

In northwestern Ontario, CA-MRSA is most commonly associated with soft tissue infections, but it occasionally presents as life-threatening sepsis or community-acquired pneumonia. Our regional antibiograms show that trimethoprim–sulfamethoxazole, clindamycin and doxycycline (or tetracycline) all have 99% susceptibility rates.[1] Erythromycin susceptibility is low, at 58%.[1] All MRSA strains are, by definition, resistant to all penicillins and cephalosporins.

ERADICATION THERAPY FOR CA-MRSA

Eradication (decolonization) of CA-MRSA is not recommended by the Canadian Infectious Disease Society; however, 25% of CA-MRSA infections in northwestern Ontario are reinfections.[1,12] The theoretical risk of eradication therapy is the development of resistant strains. First Nations communities in northern Ontario are known to have inadequate and overcrowded housing.[13] Possible regimens for initial infections might therefore include nasal mupirocin daily for 2 weeks for all household contacts.[14] The reinfected patient who requires repeat antibiotic treatment might, however, consider a 2-week course of doxycycline, together with rifampin, nasal mupirocin and daily chlorhexidine baths, as well as attention to household contacts.[14]

STAPHYLOCOCCUS VERSUS STREPTOCOCCUS

Along with regional changes of increasing CA-MRSA rates, several recent North American studies also contribute to the changing face of antibiotic stewardship. In 2010, Jenkins and colleagues[15] found that most (65%) soft tissue infections requiring hospital admission were commonly *S. aureus* and most of those were CA-MRSA. The remaining 35% were streptococcal. Jeng and colleagues[16] examined clinical presentations and culture results, and noted that nonpurulent cellulitis was typically streptococcal. Moran and colleagues[17] in 2006, and Talan and colleagues[18] in 2011 have statistically associated purulent cellulitis with staphylococcal MRSA infections.

Three randomized controlled trials and a 2012 meta-analysis verified that uncomplicated abscesses requiring I&D had equivalent healing and fewer recurrences if no antibiotic administration accompanied the I&D.[2–5]

ANTIBIOTIC STEWARDSHIP

Antibiotic stewardship is a developing awareness in rural and urban hospitals. We have just initiated a hospital committee to address it in our rural setting. With the possible exception of repatriated patients from tertiary care centre ICUs, most of the MRSA we encounter will be CA-MRSA. These can be distinguished by the resistance pattern and do not need genetic testing. Other than the rare patient with severe infection or sepsis, patients with CA-MRSA will not need vancomycin and can be safely treated with common antibiotics (e.g., trimethoprim–sulfamethoxazole, clindamycin and doxycycline). Overuse of vancomycin raises the spectre of establishing vancomycin-resistant enterococcus in rural hospitals. Infections that require antibiotics, whether staphylococcus and streptococcus, will likely respond to clindamycin. Uncomplicated abscesses requiring I&D need no antibiotic coverage.

CONCLUSION

Antibiotic stewardship and public education will be required to counter the public's expectation that effective treatment of benign upper respiratory infections and otitis media require systemic antibiotics. Treatment of infectious diseases will always be a moving target, and regional laboratory susceptibility information will be useful in guiding the use of antibiotics.

Competing interests: None declared.

REFERENCES

1. Muileboom J, Hamilton M, Parent K, et al. Community-associated methicillin resistant Staphylococcus aureus in northwest Ontario: a 5 year report of incidence and susceptibility. *Can J Infect Dis Med Microbiol*. In press.

2. Rajendran P, Young D, Maurer I, et al. Randomized, double blinded placebo controlled trial of cephalexin for treatment of uncomplicated skin abscesses in a population at risk for community-acquired methicillin-resistant Staphyloccus aureus infection. *Antimicrob Agents Chemother* 2007;51:4044-8.

3. Schmitz G, Bruner D, Pitotti R, et al. Randomized controlled trial of trimethoprim-sulfamethoxazole for uncomplicated skin abcesses in

patients at risk for community-associated methicillin resistant Staphylococcal aureus. *Ann Emerg Med* 2010;56:283-7.

4. Duong M, Markwell S, Peter J, et al. Randomized controlled trial of antibiotics in the management of community-acquired skin abscesses in the pediatric patient. *Ann Emerg Med* 2010;55:401-7.

5. Forcade N, Wiederhold N, Ryan L, et al. Antibacterials as adjunct to incision and drainage for adults with purulent methicillin-resistant Staphylococcus aureus (MRSA) skin infections. *Drugs* 2012;72:339-51.

6. Ofner-Agostini M, Simor A, Bryce E, et al. Methicillin-resistant Staphylococcus aureus in Canadian Aboriginal people. *Infect Control Hosp Epidemiol* 2006;27:204-7.

7. Golding G, Levett P, McDonald R, et al. High rates of Staphylococcus aureus USA400 infection in northern Canada. *Emerg Infect Dis* 2011;17:722-5.

8. Taylor G, Kirkland T, Kowaleswa-Grochowska K, et al. A multi-strain cluster of methicillin-resistant Staphylococcus aureus based in a native community. *Can J Infect Dis* 1990;1:121-6.

9. Golding G, Levett P, McDonald R, et al. A comparison of risk factors associated with community-associated methicillin resistant and susceptible Staphylococcus aureus infections in remote communities. *Epidemiol Infect* 2010;138:730-7.

10. Simor AE, Augustin A, Ng J, et al. Control of MRSA in a long-term care facility. *Infect Control Hosp Epidemiol* 1994;15:69-70.

11. Gould I, David M, Esposito S, et al. New insights into methicillin-resistant Staphylococcus aureus (MRSA) pathogenesis, treatment and resistance. *Int J Antimicrob Agents* 2012;39:96-104.

12. Barton M, Hawkes M, Moore D, et al. Guidelines for the prevention and management of community-associated methicillin resistant Staphylococcus aureus: a perspective for Canadian healthcare practitioners. *Can J Infect Dis Med Microbiol* 2006;17(supplement C):4C-24C.

13. *Fact sheet: the reality for First Nations in Canada.* Ottawa (ON): Assembly of First Nations; 2005. Available: http://64.26.129.156/cmslib/general/RFNC.pdf (accessed 2011 Nov. 1).

14. Simor A, Phillips E, McGeer A, et al. A randomized controlled trial of chlorhexadinefro washing, intranasal mupirocin and rifampin and doxucycline versus no treatment for the eradication of methicillin resistant Staphylococcus aureus colonization. *Clin Infect Dis* 2007;44:178-85.

15. Jenkins T, Knepper B, Sabel A. Decreased antibiotic utilization. *Clin Infect Dis* 2010;51:895-903.

16. Jeng A, Beheshti M, Li J, et al. The role of beta-hemolytic streptococci in causing diffuse, non-culturable cellulitis: a prospective investigation. *Medicine* 2010;89:217-26.

17. Moran G, Krishnadasan A, Gorwitz R, et al. Methicillin-resistant S. aureus infections among patients in the emergency department. *N Engl J Med* 2006;355:666-74.

18. Talan D, Krishnadasan A, Gorwitz R, et al. Comparison of Staphylococcus aureus from skin and soft-tissue infections in US emergency department patients, 2004 and 2008. *Clin Infect Dis* 2011;53:144-9.