Factors Associated with Rehospitalisation for Cellulitis and How to Mitigate Against Them

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Summary

Gavin Barlow, Hull York Medical School, UK, spoke with the EMJ about risk factors for the bacterial infection cellulitis, including prior history of the condition, older age, and a number of comorbidities ranging from diabetes to athlete's foot. Following hospitalisation, readmission for cellulitis, which occurs in around 12% of patients in the first month, may be due to such risk factors, as well as socioeconomic conditions. Readmission can greatly impact healthcare utilisation in economic and infection control terms and the use of sparse facilities, such as side-room beds. It can also impact a patient's quality of life (QoL). Mitigating against readmission for cellulitis necessitates an understanding of the reasons for such, including risk factors, and how best to control them by, for instance, giving proper healthcare provision for comorbidities and educating patients to raise awareness of the recurrence of cellulitis.

INTRODUCTION

Cellulitis is an acute bacterial skin and skin structure infection that is most often caused by β-haemolytic streptococci and *Staphylococcus aureus.* It presents with acute onset of redness, swelling, pain, tenderness, and warmth, most commonly of a lower limb.[1] Risk factors for cellulitis include: a prior history of the condition; older age; intravenous drug use; presence of lymphoedema or an active wound; fungal foot infection; skin conditions; previous limb surgery; obesity; and venous insufficiency.[1-3] Treatment most often involves oral antibiotics for 5 days or longer, as needed in the community, but hospital admission is required when progression occurs despite oral antibiotics.[1]

The EMJ discussed with Barlow the main reasons and risk factors for cellulitis readmissions; the economic, infection control, and QoL factors associated with readmission; and how readmission risk could be mitigated.

REASONS FOR HOSPITAL READMISSION FOLLOWING CELLULITIS

According to Barlow, patients with early readmission following a hospital stay for cellulitis are generally older and may have one or more of the comorbidities associated with cellulitis such as an active wound or leg ulcer, diabetes, heart failure, or uncontrolled skin conditions. Both admission and readmission may also be impacted by socioeconomic factors. "If you've got an older patient in poor social circumstances who's got a lot of comorbidities," Barlow suggested, "then you want to look carefully at them before discharging to ensure you've done everything to mitigate readmission and recurrence."

Barlow stressed that it is key to understand why someone has been readmitted; one point of assessment is to determine whether the readmission is due to a new episode of infection or the persistence of an initial infection as a result of misdiagnosis, sequelae, or the destabilisation of comorbidities. Readmission could also be due to undertreatment. The DANCE trial showed that 24% out of 73 patients hospitalised for cellulitis who were receiving 6 days of antibiotic treatment relapsed within 90 days; however, this figure was only 6% for 76 patients who had received 12 days of treatment.[4] A further reason could be due to non-adherence to oral antibiotic therapy.[5]

Readmission for a new infection tends to occur after a period of at least a few months of improvement or a resolution of symptoms and signs following the initial episode. This, Barlow stressed, was an important distinction, as clinical and preventative management for a new infection compared to a continuing infection or sequelae may differ, and noted that "there's good evidence that the strongest risk factor for recurrent cellulitis is previous cellulitis."

In regard to other bacterial skin and skin structure infections, Barlow reported that "it's very likely that some of the cellulitis risk factors may also be important, particularly older age, socioeconomic status, and comorbidities."

ECONOMIC FACTORS ASSOCIATED WITH HOSPITAL READMISSIONS

A key economic problem identified by Barlow following readmission for cellulitis was hospitalisation costs: "Patients over 70 years of age form about two-thirds of those admitted with major skin infections locally and they often spend several days in hospital." Indeed, analysis of data from the National Health Service (NHS) England Hospital Episode Statistics[6] showed that around 90,000 people per year are admitted into hospital for cellulitis. Of these, approximately 12% are readmitted in the first month, with 21% admitted within 12 months. These readmissions last for an average of 2.8 bed days and are at a mean cost of £1,560 per patient.[6]

While hospitalisation time may be dropping with the use of outpatient parenteral antibiotic therapy in the UK, Barlow added that "sometimes it's difficult for older patients to access outpatient parenteral antibiotic therapy, so they can spend considerable time in hospital." This has particularly been an issue during the COVID-19 pandemic wherever bed occupancy has been high, and there is an ongoing problem due to long waiting lists for elective surgeries. "If a readmission due to cellulitis becomes a medical outlier on a surgical ward," explained Barlow, "then that will potentially have a negative knock-on effect to a patient due to come in for elective surgery."

Also discussed with Barlow were indirect costs: "If the patient is working, there's potentially the cost to that individual and their employer. There are also costs to the family if they have to come and visit or take care of children or a pet."

MITIGATING THE RISK FOR READMISSION

There is a need for knowledge about who is at risk for both readmission and recurrence of cellulitis, and how one might mitigate that. "Early readmission mitigation is more around ensuring the diagnosis is correct, adequate initial therapy, and stabilising social situations and comorbidities," Barlow explained, "recurrence is more about addressing individual risk factors." As having an episode of cellulitis is one of the primary risk factors for a further episode,[2]

patients should be warned to present to a healthcare professional as soon as they feel that they may be experiencing cellulitis recurrence.

"Clearly for early readmission," Barlow highlighted, "it's really important to think of social circumstances that can sometimes contribute and the need for physiotherapy and occupational therapy. That aspect of patient care is important to remember, as well as asking about comorbidities, are they stable, and if not, can their condition be optimised?" This may especially be the case for patients with lymphoedema; there is also evidence that recurrence is less common following compressive therapy.[7]

With these factors in mind, Barlow emphasised the need for ongoing care for cellulitis combined with managing comorbidities. In both primary and secondary care, he explained that "patient and healthcare professional awareness is really important as some of these things are modifiable risk factors for readmission and recurrence. Athlete's foot is relatively easy to treat, but is sometimes overlooked as a risk factor."

A further issue that Barlow underscored was that, generally, most infections are not managed by infection experts. Inexperience in identifying cellulitis may, in some cases, lead to misdiagnosis; for example, confusing deep vein thrombosis or heart failure for cellulitis.[1] Where cellulitis is confirmed, resolving symptoms and signs may also be confused with persisting infection or recrudescence, which can lead to unnecessary readmission and antibiotic therapy.

Also important is the need for general foot and limb hygiene and for professional chiropody and podiatry for patients with nail and foot problems, respectively. Patients with dry skin need to be advised to moisturise and if a patient is known to be colonised with methicillin-resistant *S. aureus* and cellulitis is recurrent. Barlow advised how he would usually try to decolonise them. "Although," said Barlow, "evidence for the success of this is open to debate."

Another potential way to mitigate against rehospitalisation for cellulitis is long-term, low-dose antibiotic use, as it was shown in a meta-analysis by Dalal et al.[8] that 6–18 months of antibiotic prophylaxis can reduce cellulitis recurrence.[8] However, Barlow stressed that "in the context of antibiotic resistance, I don't give long-term antibiotics to all patients with cellulitis, but if you've got someone who's had two or more recurrent episodes within a relatively short period of time, then it's worth discussing with them the pros and cons of antibiotic therapy for 12 months using a shared decision making approach." Barlow also described other interventions, such as using a longer initial course of antibiotics for selected patients at risk of readmission, as suggested by the results of the DANCE trial,[4] and the role of stand-by antibiotics. Another alternative is the use of long-acting injectable antibiotics.[9]

For patients coming into hospital for surgery, Barlow discussed how "pre-operative assessment and stabilisation of comorbidities are important for more complex patients. If they have a particular comorbidity, or they're known to be *S. aureus* skin-colonised, then it's important to decolonise them, depending on the surgery they're undergoing." Care and attention is also required at the time of surgery and with post-operative wound care.

QUALITY OF LIFE FACTORS ASSOCIATED WITH HOSPITAL STAYS

"In my experience, most patients prefer to be at home," relayed Barlow, "as there's a negative effect on QoL for patients in hospital. It's probably much more important than we recognise. For instance, many patients will be in an open bay area, so there may be a knock-on effect on sleep."

Furthermore, this could potentially have a negative effect on mental health, and older patients in particular can become disorientated in hospital. This can lead to a cycle of decline, necessitating more medical interventions. "Patients who stay in hospital for quite a few days can get down," Barlow explained, "and those that stay in hospital for weeks can get very low and depressed." This can especially occur in patients who have two or three admissions for cellulitis in 12 months, or those who suffer sequelae such as lymphoedema.

An additional problem that Barlow highlighted was that "for older patients especially, for every day they spend in hospital they lose a bit of their muscle mass, and strength is really important for health."

INFECTION CONTROL FACTORS ASSOCIATED WITH CELLULITIS

In general, Barlow claimed, patients with cellulitis are not admitted to an infectious disease ward or to a side room in the UK National Health Service (NHS): "In our hospital, 90% of those with cellulitis are managed on general medical wards in open bay areas." As such, Barlow went on to say that "infection control always has to be a consideration and we always make a risk assessment when a patient is admitted with infection." He particularly pointed out the risk of Lancefield Group A *Streptococcus* in a patient with an open or leaking wound, which would be especially worrying for a patient who may not understand the need for contact precautions.

With this in mind, such patients, or those with methicillin-resistant *S. aureus*, may need to be cared for in a side-room. However, this can be problematic as most hospitals have a limited number of side-rooms that may also be needed for other patients, including those with behavioural problems and those receiving end of life care.

CONCLUSION

Around 12% of hospitalised patients with cellulitis will be readmitted within the first month following discharge. This can have a considerable impact on patient QoL, healthcare economics, and infection control. Understanding and addressing the underlying reasons for readmission due to cellulitis may help to reduce such consequences. Further research is needed to understand and mitigate associated risk factors.

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