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Lower limb cellulitis: low diagnostic accuracy and underdiagnosis of risk factors

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Abstract

Accurate diagnosis and recognition of predisposing factors has been shown to be challenging in lower limb cellulitis. Assessment of 1746 consecutive cellulitis patients presenting to a UK university hospital showed increasing overdiagnosis with only 31.9% of referred patients with confirmed lower-limb cellulitis between 2015-2018. Recognition of at least one predisposing factor increased from 61% to 89% following introduction of more specific screening questions. This identified a need for better primary care dermatology education and the benefit of a proforma with specific screening questions for reversible predisposing factors for lower limb cellulitis.

Background

Lower limb cellulitis is common and costly but may be inaccurately diagnosed with 30.5-33% of referred patients having other conditions^{1,2}. This increases risk to patients and wastes resources by delayed diagnosis and prolonging inpatient treatment with unnecessary antibiotic use. Cellulitis inpatient costs in England (UK) were approximately £226m in 2017-18 for 88,664 inpatients (NHS reference costs Skin Disorders without Interventions £2,553)^{3,4}.

Lower limb cellulitis risk factors include lymphoedema/chronic oedema, venous eczema, tinea pedis, trauma, leg ulcers and BMI >30kg/m^{2,5,6}. Recurrence of lower-limb cellulitis is common, occurring in 37% within a year⁷ however the identification and treatment of modifiable risk factors may show promise in reducing recurrence rates.

Norfolk and Norwich University Hospital (NNUH), in the East of England, established an innovative dermatology outpatient-based cellulitis service in 2007 to improve diagnosis and management of lower limb cellulitis. Patients were referred from other clinicians in primary and secondary care and assessed by dermatology specialist nurses and doctors, prior to treatment as outpatients initially with once daily IV Ceftriaxone¹. Since set up eleven years ago, patients and specialist nurses completed a proforma to establish a database for audit purposes. This proforma was improved in January 2018 to include specific questions on cellulitis risk factors, rather than open questions. This is the world's largest reported series of 1746 consecutive patients referred from 2007 to July 2018 with possible lower limb cellulitis (as of 22/07/2018), with previous reported audits in 2010 and 2015^{1,8}.

In 2017, the Cellulitis Priority Setting Partnership prioritised research into the diagnosis and prevention of cellulitis⁹. Accurate diagnosis and identification of risk factors are essential for optimal patient care. Previous audits at NNUH identified inaccurate diagnosis and inadequate recognition of risk factors^{1,8}, so these were re-audited in July 2018.

Report

373 patients presenting between 2015-2018 were analysed with 53/373 patients seen after the introduction of specific predisposing factor questions to the proforma.

119 (31.9%) of the 373 patients referred to the service in 2015-18 were confirmed to have cellulitis.

Other diagnosis included 82 (22%) patients with venous eczema, 37 (10%) patients with chronic oedema and 34 (9%) patients with lymphoedema (9%) (fig 1).

In patients with confirmed cellulitis between 2015-2018, at least one risk factor was identified in 78 (66%) patients. With the introduction of the new questionnaire in 2018 the proportion of patients with identified predisposing factors increased from 61% (195/320) to 89% (47/53) (Chi^2 $p < 0.05$). The most common risk factors in those with confirmed cellulitis were chronic oedema/lymphoedema in 45 (38%) patients, trauma in 24 (20%) patients and tinea pedis in 15 (13%) patients (fig.2).

After introduction of the more specific questions for risk factors in 2018 the proportion of cellulitis patients identified with chronic oedema/lymphoedema rose from 34% (32/93) to 58% (15/26) (Chi^2 $p < 0.05$) and trauma/detectable entry point detection tripled from 15% (14/93) to 46% (12/26) (Chi^2 $p < 0.05$).

Discussion

After the introduction of specific questions regarding risk factors for lower-limb cellulitis, recognition, documentation and treatment of predisposing factors increased significantly. Because of the impact of lower limb cellulitis on patients and the financial resources, prevention should be a high priority for health service interventions.

Oral penicillin V 250mg twice daily for 12 months reduces the recurrence of cellulitis, although this protective effect is reduced to zero over three years after stopping antibiotics⁷. In patients with penicillin allergy Erythromycin 250mg BD could be used¹⁰. The treatment of predisposing dermatological conditions such as lymphoedema, venous eczema and tinea may also reduce the recurrence of cellulitis⁸. This analysis identified that most patients have known risk factors for cellulitis that are amenable to intervention.

The number of patients with confirmed cellulitis attending this service fell from 67% (2007-10)¹ to 57%. (2007-2015)⁸ to 32% in this analysis. This may be a real reduction in accurate diagnosis or represent increasing use of the service to gain a specialist opinion for patients presenting with red legs. The closure of the local community lymphoedema service for financial reasons in 2016 may also have contributed. This analysis identifies a need for targeted education, directed towards referring clinicians.

The impact of treating known risk factors on rates of lower limb cellulitis recurrence is unknown. Intervention studies in cellulitis are expensive and time consuming, so pending the outcomes of future studies, it is appropriate to seek out and treat effectively risk factors in all lower limb cellulitis. This analysis has shown that a proforma containing specific questions is more effective in identifying risk factors. Following this audit and a further literature review, the proforma has now been further updated (Figure 3).

Learning Points

- Outpatient based cellulitis services staffed by experienced dermatology nurses and doctors are an effective way of diagnosing and managing cellulitis.
- Inaccurate diagnosis of cellulitis is common in patients referred to secondary care and focused education for primary care clinicians should be prioritised.
- Risk factors for cellulitis such as chronic oedema/lymphoedema, trauma and tinea are very common and should be actively screened for and treated to reduce recurrent cellulitis.

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Figure Legends

Figure 1: The confirmed diagnoses of patients attending the cellulitis service

Figure 2: The proportion of lower limb cellulitis patients with identified risk factors

Figure 3: Risk Factors specifically asked for in lower limb cellulitis proforma

Figures

Figure 1

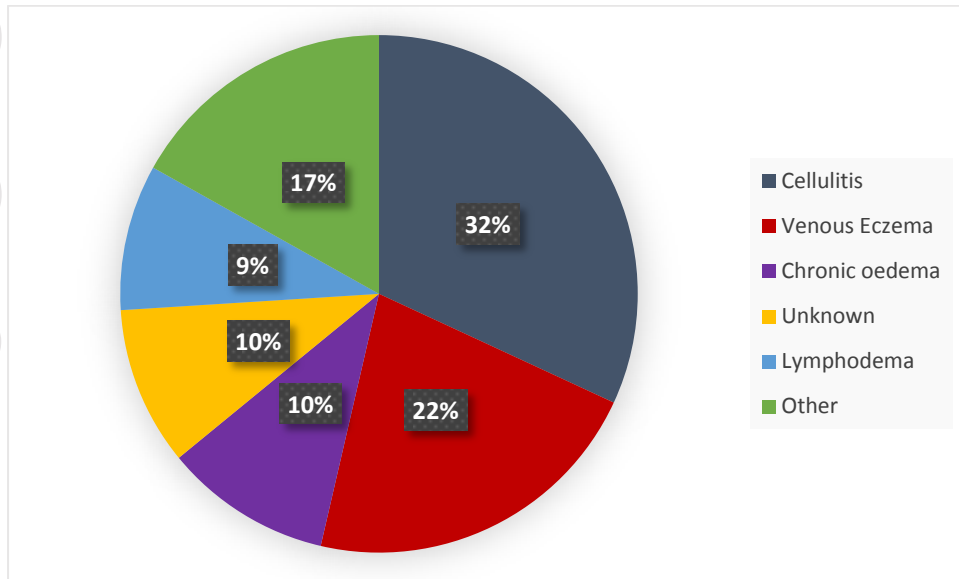


Figure 2

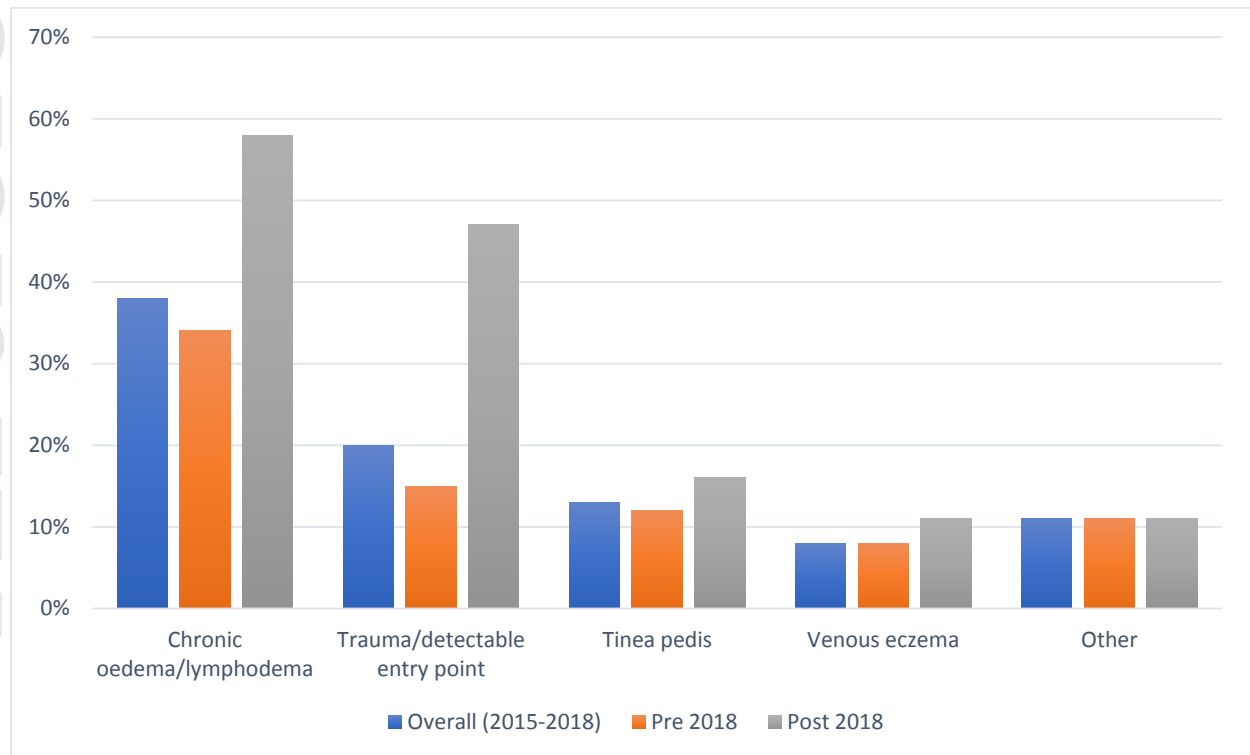


Figure 3

Risk Factor	Specific questions in old proforma (2007-2017)	Specific questions in updated proforma (January 2018)	Specific questions in Current Proforma
Chronic oedema/Lymphoedema ⁵	✓	✓	✓
Trauma/detectable entry point ⁵	✗	✓	✓
Tinea pedis ⁵	✗	✓	✓
Venous eczema ⁵	✗	✓	✓
Insect bites ⁵	✗	✓	✓
Other risk factors	✗	✓	✓
Other relevant diagnoses	✓	✓	✓
BMI >30kg/m ² ⁵	✗	✗	✓
Smoking ⁵	✗	✗	✓