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Factors predicting health-related quality of life following necrotizing fasciitis

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KEYWORDS

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Summary Background: Necrotizing fasciitis (NF) is a debilitating soft tissue infection that results in disfiguring scars and often amputations. While mortality rates have improved, long-term outcomes in survivors of NF are poorly understood.

Objectives: The objective of this study is to analyze the impact of NF on survivors' health-related quality of life (HRQoL) influenced by age, sex, comorbidities, %TBSA, and confidence with appearance.

Methods: We surveyed 56 adult patients with NF treated at either of two regional referral centers in Manitoba, Canada, between January 1, 2004, and December 31, 2014. Necrotizing soft tissue infections involving the fascial planes were identified during surgical debridement. HRQoL was measured by the Medical Outcomes Short Form-36. Derriford Appearance Scale-24, age, sex, comorbidities, and %TBSA were recorded, and group comparisons and stepwise regression models were developed for the mental and physical component scores separately.

Results: Mean Mental Component Score (MCS) was 44.5 ± 14.3 and mean Physical Component Score (PCS) was 36.5 ± 11.5 ; both means were lower than the Canadian population norm of 50. Although stepwise linear regression analyses with block entry indicated influence from age, sex, and comorbid conditions for the MCS and PCS, the only factors that were statistically significant in the final models were confidence with appearance for the MCS and %TBSA for the PCS.

Conclusions: NF has long-term impact on mental and physical health-related quality of life. Distress regarding confidence with appearance affects mental quality of life, whereas the size of the injured area impacted physical quality of life. These findings can help guide targeted interventions that could potentially improve recovery from NF.

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Introduction

Necrotizing fasciitis (NF) is a life-threatening and debilitating soft tissue infection. Within hours, the infection can progress from an inconspicuous skin lesion to an infection requiring emergent surgical intervention.^{1,2} Risk factors for developing complications include pre-existing health conditions such as diabetes mellitus, obesity, and a compromised immune system. In rare cases, NF can be a complication of an obstetrical surgical procedure.³

NF is initially treated with radical surgical debridement and multiple-staged operations¹ that may include free tissue transfer.⁴ Patients with NF are also at risk for amputation.⁵

Unfortunately, disfiguring scars with defects in body contour often result from management of NF. Changes in skin and underlying tissue impact outward appearance and self-perception and, therefore, can negatively affect patients.^{6,7} There is a growing body of literature on the assessment of HRQoL in similar populations.^{8,9} Burns, which also have similar reconstructive management and physical rehabilitation to NF, have been shown to adversely impact quality of life.^{7,10} Factors such as wound size, depth, location, healing time of the burn, body image, family support, and post-traumatic stress symptoms have been associated with quality of life in burn survivors.¹¹⁻¹³

Unlike burns, quality of life and other patient-reported outcomes in NF survivors is not well studied.¹⁴ Additionally, it is known that patients with NF require more hospital resources compared to patients with burns,¹⁵ which suggests that NF is a more severe disease and consequently may have more of a negative impact on quality of life.

The province of Manitoba in Canada has a disproportionately high incidence of NF, up to 35 cases annually for a population of 1.3 million individuals.¹⁶ This is five times the national rate, and some regions of the province are up to 15 times the national rate. Owing to the referral pattern in the province, all patients with NF are transferred to one of two hospitals in the capital city of Winnipeg for their definitive care. This high rate and concentration results in a unique ability to study this otherwise rare disease. This paper aims to examine the subjective appraisal of HRQoL and confidence with physical appearance in NF survivors.

Methods

The local Health Research Ethics Board approved this study (H2014-041). Patients ≥ 18 years in the NF registry at two regional referral centers were selected if they had a diagnosis of NF between January 1, 2004, and June 30, 2014. NF cases were identified from health records using the methodology previously reported by our group.¹⁶ Confirmation of NF diagnosis was based on evidence of fascial involvement as reported by the surgeon at the time of surgical debridement.

NF patient registry

The following deidentified patient data were recorded:

- 1) Demographic: age, sex, marital status
- 2) Surgical: number of operations

- 3) NF-specific: Percentage of total body surface (%TBSA) area affected; location of anatomical site(s); precipitating injury type; likely causative infectious organism based on positive cultures; physical comorbidities including history of tobacco smoking, diabetes, hypertension, and/or dyslipidemia (defined as prescribed lipid-lowering agent); alcohol and/or drug misuse (indicated in patient chart); and length of stay in hospital and intensive care unit. Duration of follow-up was calculated from the date of hospital admission for NF and date of survey completion.

Surveys

Patients with NF, who met inclusion criteria, were asked to complete a survey with two components. The first was the Derriford Appearance Scale (DAS-24), a 24-item survey that assesses the impact that dissatisfying features in a person's appearance have on their perception of their appearance and the ability to cope with it in social situations.¹⁷ A higher score represents more distress with physical appearance. The second was the Medical Outcomes Short Form-36 (SF-36). This is a 36-item survey, which provides a generic measure of perceived changes to health status, functional limitations in completing activities of daily living, and the patients' ability to successfully integrate themselves into the society.^{11,18} The SF-36 has been previously validated in patients with burns.¹⁸ A lower score indicates poorer function. The scale has two component scores: mental health score (MCS) and physical health score (PCS).

Study participants were surveyed by mail. If a reply was not received, attempts were made to contact participants by phone and ask them to complete the surveys. This information was linked to demographic and injury-specific information available in the NF patient registry.

Data analysis

Patient information was entered into a database created using FileMaker Pro 13 software (Apple, Cupertino, CA, USA), and statistical analysis was performed using SPSS version 23 software (IBM, Chicago, IL, USA). Descriptive statistics was obtained for all variables. The Student t test was used for continuous variables, and the χ^2 or two-sided exact tests were used to compare proportions. Pearson correlation or Spearman rank co-efficients were calculated to identify variables to include in the regression modeling. Length of follow-up since NF episode, ICU admission, and length of stay did not have a significant correlation with SF-36 and DAS-24; therefore, these variables were not included in the multivariate models. Comparisons between the sample SF-36 and Canadian normative means¹² was performed using an online calculator (GraphPad QuickCalcs, <https://www.graphpad.com/quickcalcs>).

In a linear forced-entry regression model, the variances in MCS and PCS were examined in consideration of the impact of age, sex, comorbidity count, %TBSA, and satisfaction with appearance (DAS-24). In Block 1, age, sex, and comorbidity count were added by the forced-entry method allowing each variable to contribute to the model. In Block 2, DAS-24 and %TBSA were added. Statistically significant differences were accepted at $P < .05$.

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