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Potential factors associated with increased chance of erysipelas recurrence

Potenciais fatores associados a maior chance de recidiva de erisipela

Posibles factores asociados a mayor probabilidad de recidiva de erisipela

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Abstract

Objective: To analyze factors related to erysipelas recurrence in adults and older adults.

Methods: Retrospective cohort study with 235 adults and older adults admitted to a hospital diagnosed with erysipelas between 2012 and 2019. Sociodemographic and clinical factors related to a greater chance of erysipelas recurrence in the period were investigated through uni and bivariate analyses, with $p<0.05$ considered significant.

Results: The prevalence of erysipelas recurrence was 25.5% (n=60). Factors significantly associated with recurrence were venous insufficiency (p= 0.002; OR= 2.597; 95%CI= 1.4-4.7) and use of penicillin (p< 0.000; OR= 7.042; 95%CI= 2.5-19.7).

Conclusion: venous insufficiency is associated with a twice greater chance of erysipelas recurrence and the use of penicillin is associated with a seven times greater risk for its recurrence.

Resumo

Objetivo: Analisar os fatores relacionados à recidiva de erisipela em adultos e idosos.

Métodos: Estudo de coorte retrospectivo com 235 adultos e idosos admitidos em um hospital com diagnóstico de erisipela entre 2012 e 2019. Investigaram-se fatores sociodemográficos e clínicos relacionados a maior chance de recidiva de erisipela no período por meio de análises uni e bivariada, com $p<0,05$ considerado significativo.

Resultados: A prevalência de recidiva de erisipela foi de 25,5% (n=60). Os fatores significativamente associados à recidiva foram insuficiência venosa (p= 0,002; OR= 2,597; IC= 1,4-4,7) e uso de penicilina (p< 0,000; OR= 7,042; IC= 2,5-19,7).

Conclusão: a insuficiência venosa se associa a chance duas vezes maior de recidiva de erisipela e o uso de penicilina se associa a risco sete vezes maior para sua recidiva.

Resumen

Objetivo: Analizar los factores relacionados con la recidiva de erisipela en adultos y adultos mayores.

Métodos: Estudio de cohorte retrospectivo con 235 adultos y adultos mayores ingresados en un hospital con diagnóstico de erisipela entre 2012 y 2019. Se investigaron factores sociodemográficos y clínicos relacionados con una mayor probabilidad de recidiva de erisipela en el período mediante análisis uni y bivariados, con $p<0,05$ considerado significativo.

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Conflicts of interest: none to declare.

Resultados: La prevalencia de recidiva de erisipela fue del 25,5 % (n=60). Los factores significativamente asociados con la recidiva fueron insuficiencia venosa (p= 0,002; OR= 2,597; IC= 1,4-4,7) y uso de penicilina (p< 0,000; OR= 7,042; IC= 2,5-19,7).

Conclusión: La insuficiencia venosa está relacionada con una probabilidad dos veces mayor de recidiva de erisipela, y el uso de penicilina está relacionado con un riesgo siete veces mayor de recidiva.

Introduction

Erysipelas recurrence has unfavorable repercussions due to recurrent hospitalizations, prolonged antibiotic therapy and skin involvement. Most affected patients are older adults with comorbidities, in which the recurrence of erysipelas is aggravated by pre-existing diseases. For patients with problems such as venous insufficiency, due to compromised venous return, these wounds can lead to a large loss of tissue and serious complications, leading to the need for a surgical approach and even, in some cases, amputation of the affected limb.

Erysipelas is a skin infection with intense skin involvement that is usually associated with patients with other pathologies.[1,2] This skin infection is usually caused by the group A beta-hemolytic streptococcus bacterium, Streptococcus pyogenes, but it can also occur by other bacteria at a lower incidence.[2]

Erysipelas occurs through a window, usually a crack in the skin, which can occur due to several factors, such as trauma, mycosis, ulcer, in which the bacterial agent enters, affecting the skin tissue and the lymphatic system. The most commonly observed risk factors are advanced age, male gender, previous venous surgery, obesity, chronic use of legal drugs, lymphedema, diabetes, low immunity and venous insufficiency.[3]

Nursing has a fundamental role in the care of patients with wounds resulting from erysipelas, since in addition to identifying aspects that influence the involvement, they are responsible for evaluating, prescribing and implementing care, promoting comprehensive care. It is also noteworthy that nursing care for people with wounds is implicit in the nurse's duties.[4]

It should be noted that the main pharmacological treatment for erysipelas is antibiotic therapy. Depending on the microorganism involved, penicillin is the reference antibiotic, but other antibiotics can also be used, such as clindamycin, clarithromycin, cephalexin, flucloxacillin, moxifloxacin, among others.[3]

Complications due to erysipelas are rare, but they can occur mainly in cases not treated in a timely manner, including superficial and deep ulcerations, lymphedema, abscesses and vein thrombosis.[5]

Thus, it is important for the health team to understand the behavioral patterns of the disease, that is, the public affected by the disease, its course and outcome. This applies to patients affected by recurrence of erysipelas, mainly because it is a clinical condition found both in outpatient clinics, as well as in medical and surgical clinics and highly complex sectors. Thus, identifying risk factors for the recurrence of erysipelas, in addition to allowing preventive care, will make it possible to target the best treatment for it, since the antibiotic most used today for this pathology is penicillin, but many studies have questioned its use. Thus, there are counterpoints to be better discussed about erysipelas, justifying this study.

In addition, an integrative review carried out in 2016 points to the need for more studies on the subject.[6] Furthermore, there are few studies on erysipelas recurrence in Brazil, which has a great impact on the health of patients affected with previous comorbidities, especially older adults. The most relevant study found on erysipelas recurrence, specifically, was in Sweden in the Department of Infectious Diseases of the Skåne University Hospital, published in 2014, with a total of 502 patients of which 145 (28.9%) had recurrence.[1]

To confirm the aforementioned aspects, when we searched for the descriptor erysipelas in the MEDLINE database via Pubmed, 317 studies were found in the last 5 years. When crossing the term erysipelas and recurrence, only 32 articles were found, among which 4 address issues related to relapse of erysipelas and only 1 highlighted the association of clinical factors with recurrence of

erysipelas. Most of the studies found described the clinical characteristics of patients with recurrence, without making associations or just pointing out treatments, main causes and microorganisms in a descriptive way, justifying this study.

Therefore, based on these data, this study aims to analyze the risk factors related to erysipelas recurrence in adults and older adults.

Methods

This is a retrospective cohort study with 235 patients who had the diagnosis of erysipelas ICD A 46. The collection was performed through individual electronic medical records (IEMR) of the patients. The IEMR contains registration information, evolutions of the entire health team on patient care, medication prescriptions and the outpatient clinics where the patient was treated.

Inclusion criteria were adults (18 to 59 years old) and older adults (60 years old or more), diagnosed with erysipelas, treated at the hospital, who had a record in the patients' IEMR and had the diagnosis: ICD A46 – Erysipelas. Exclusion criteria were medical records that did not contain enough information.

The data collection instrument consisted of socioeconomic data and information on hospital admission, such as risk of falling, symptoms presented, disease entry point, comorbidities, disease recurrence, lifestyle, nutritional conditions, use of antibiotic therapy (used antibiotics in the first hospitalization for erysipelas and not in the recurrence) and other medications, laboratory tests and serious complications. Polypharmacy was defined as the continuous use of five or more medications.

The study worked with the total population[7-9] from data for the period from January 1, 2012 to January 1, 2019 of patients hospitalized in the medical clinic registered in the IEMR. The beginning of the collection from the year 2012 was defined as a function of the beginning of the nursing and internal medicine records in the hospital of the population under study. We chose to comply with the size recommended in the literature of at least 30 cases. The statistical and experimental literature emphasizes that whenever the size of sample is smaller than 30, statistical analysis may be difficult and the performance of statistical tests may be compromised.[10] A size greater than or equal to 30 is considered in statistics as large sample.[11] Large samples are those where the probability density can be verified in a defined way and are supported by the Central Limit Theorem.[12]

The analysis was performed using an electronic spreadsheet of the Microsoft Office Excel 2016 software and R 3.4.3 software and the Statistical Package for Social Sciences (SPSS) 21 software. It was considered a p-value lower than 0.05 and a 95% confidence interval. Univariate analysis was performed in order to describe the profile of patients with erysipelas who were admitted to the hospital. Then, a bivariate analysis was performed to analyze the relationships between recurrence and their respective risk factors. The Odds Ratio (OR) was also calculated to verify the chances of an individual having recurrence in relation to risk factors, and the chi-square test to verify the association between risk factors with the occurrence of relapse.

The study was submitted and registered at Plataforma Brasil under the Certificate of Presentation for Ethical Appreciation (CAEE) 20106819.2.0000.5285 and approved by the Research Ethics Committee of the Federal University of the State of Rio de Janeiro protocol #3.563.200. The Informed Consent Form (ICF) was signed by the participants. The study met national and international standards of ethics in research involving human beings, in accordance with resolution 466/12.

Results

In the period from 2012 to 2019, a total of 25952 people were identified as the total sample population in the medical clinic. For the population included in this study, 235 patients with erysipelas treated in the medical clinic in the period mentioned above were identified. The prevalence was men, with 51.1%. Of these, 40.1% were older adults, most

Table 1. Sociodemographic and clinical characterization of adults and older adults with erysipelas

Profile of patients with erysipelas	Total (n = 235) n(%)	Adults (n = 48) n(%)	Older adults (n = 187) n(%)
Age range			
Up to 29 years old	3(1.3)	3(6.2)	-
30 to 39 years old	4(1.7)	4(8.3)	-
40 to 49 years old	18(7.7)	18(37.5)	-
50 to 59 years old	23(9.8)	23(47.9)	-
60 to 69 years old	71(30.2)	-	71(38.0)
70 to 79 years old	75(31.9)	-	75(40.1)
80 years old or more	41(17.4)	-	41(21.9)
Gender			
Male	120(51.1)	24(50.0)	96(51.3)
Female	115(48.9)	24(50.0)	91(48.7)
Affected Site			
Left lower limb	93(39.6)	23(47.9)	70(37.4)
Right lower limb	91(38.7)	20(41.7)	71(38.0)
Both lower limbs	44(18.7)	4(8.3)	40(21.4)
Right upper limb	3(1.3)	1(2.1)	2(1.1)
Left upper limb	3(1.3)	-	3(1.6)
Both upper limbs	1(0.4)	-	1(0.5)
Entry			
No registry *	62(26.4)	14(29.2)	48(25.7)
Traumas	48(20.4)	9(18.8)	39(20.9)
Ulcers	38(16.2)	6(12.5)	32(17.1)
Wounds	34(14.5)	6(12.5)	28(15.0)
Ringworm	30(12.8)	9(18.8)	21(11.2)
Surgical wound	10(4.3)	2(4.2)	8(4.3)
Bug bite	5(2.1)	2(4.2)	3(1.6)
Others**	8(4.3)	-	8(4.3)
Life habits			
Active drinker	21(8.9)	4(8.3)	17(9.1)
Active smoker	14(6.0)	-	14(7.5)
Polypharmacy			
Yes	73(31.1)	13(27.1)	60(32.1)
Number of antibiotics used			
Mean (SD***)	3.0(SD= 1.501)	3.1(SD= 1.453)	3.0(SD = 1.515)
Median (25%, 75%)	3(2.4)	3(2.4)	3(2.4)
Number of days of antibiotic therapy			
Mean (SD)	16.8(SD = 10.008)	16.9(SD = 9.636)	16.8(SD = 10.127)
Median (25%, 75%)	14 (10.20)	16(10.22)	14(10.20)

*No entry registered in the medical record - no information about the entry in the medical and nursing evolutions of the electronic medical record was recorded during the entire hospitalization of the patient; **Others – other entries found were lymphedema, psoriasis, interdigital dermatofibrosis, skin rush and furuncle; ***SD – Standard deviation

were aged between 70 and 79 years old. The most affected sites were the lower limbs, totaling 97% of the general population of the study, being common the appearance in a single leg (Table 1).

Regarding the entry point for erysipelas, traumas were prevalent in 20.4% of cases. Alcoholism was the most frequently recorded lifestyle habit, 8.9% of cases. Polypharmacy was present in 31.1% of cases, with an average of 3 antibiotics used in the same hospitalization, for approximately 16.8 days of antibiotic therapy.

Table 1 presents the sociodemographic and clinical data of the adults and older adults included in the study.

Patients who had only one occurrence of erysipelas totaled 74.4% of the research population and 25.6% of patients had disease recurrence. No relation of erysipelas recurrence with comorbidities and age was identified, as shown below, hypertension (OR= 1.496; 95%CI= 0.7-3.1) and obesity (OR= 1.495; 95%CI 0.7-2) stand out. The age group revealed that older adults have a higher risk of recurrence (OR= 1.194; 95%CI= 0.5; 2.5). These data are shown in table 2. As for lifestyle habits, a cause-and-effect relationship was also not identified. Regarding signs and symptoms, no risk relationship was observed, that is, fever, local pain and edema (respectively OR= 1.353, 95%CI= 0.7-2.4; OR= 1.645, CI= 0.8 -3.3); OR= 1.399, 95%CI= 0.6-3.23) were not associated with a higher risk of erysipelas recurrence. The data are described in table 3.

Patients who continuously use medications (OR= 1.524; 95%CI= 0.6-3.5) and polypharmacy (OR= 1.714; 95%CI: 0.9-3.1) had no higher risk of recurrence. Regarding the antibiotic therapy used in the first hospitalization, the use of penicillin presented a seven times higher risk (p<0.000; OR 7.042; 95%CI= 2.5-19.7), demonstrating the relationship between its use and the recurrence of erysipelas. In addition, venous insufficiency presented a risk twice as high (p= 0.002; OR= 2.597; 95%CI= 1.4-4.7), these variables were statistically significant since the Confidence Interval value does not permeate number 1. These data are presented in table 3.

Discussion

In this study, most patients with erysipelas were older adults, which corroborates a study in Sweden, which showed the same prevalence.[13] It is worth noting that a study in Africa diverges in this sociodemographic data due to the characteristic of life expectancy in that country, presenting prevalence of

Table 2. Risk factors associated with erysipelas recurrence in adults and older adults with erysipelas

Variables	With recurrence (n= 60) n (%)	Without recurrence (n = 175) n (%)	Odds Ratio	95%CI		p-value*
				Inferior limit	Superior limit	
Comorbidities						
Systemic arterial hypertension	49(81.7)	131(74.9)	1.496	0.715	3.129	0.282
diabetes mellitus	28(46.7)	86(49.1)	0.906	0.503	1.629	0.741
Obesity	18(30.0)	39(22.3)	1.495	0.775	2.883	0.229
Venous insufficiency	33(55.0)	56(32.0)	2.597	1.426	4.731	0.002
Gender						
Male	30(50.0)	90(51.4)	0.944	0.525	1.698	0.849
Female	30(50.0)	85(48.6)	-	-	-	-
Age range						
Older adults	49(81.7)	138(78.9)	1.194	0.565	2.523	0.641
Adults	11(18.3)	37(21.1)	-	-	-	-
Life habits						
Drinker	5(8.3)	16(9.1)	0.903	0.316	2.581	0.850
Smoker	6(10.0)	8(4.6)	2.319	0.770	6.982	0.125
Using medication						
Yes	51(86.4)	138(80.7)	1.524	0.660	3.519	0.321
Polypharmacy						
Yes	24(40.0)	49(28.0)	1.714	0.929	3.164	0.083

* Chi-square test

Table 3. Variables on the diagnosis and treatment of erysipelas recurrence in adults and older adults with erysipelas

Variables	With recurrence (n= 60) n(%)	Without recurrence (n= 175) n(%)	Odds Ratio	95%CI		p-value*
				Inferior limit	Superior limit	
Signs and symptoms						
Fever	34(56.7)	86(49.1)	1.353	0.750	2.442	0.314
Local pain	48(80.0)	124(70.9)	1.645	0.807	3.352	0.168
Edema	52(86.7)	144(82.3)	1.399	0.604	3.239	0.431
Hyperemia	47(78.3)	146(83.4)	0.718	0.670	2.896	0.374
Bubbles	19(31.7)	76(43.4)	0.604	0.325	1.123	0.109
Affected site						
Both lower limbs	12(20.0)	32(19.0)	1.063	0.507	2.228	0.873
One lower limb	48(80.0)	136(81.0)	-	-	-	-
Number of antibiotics						
2 or more	52(86.7)	152(86.9)	0.984	0.415	2.333	0.970
1	8(13.3)	23(13.1)	-	-	-	-
Number of days antibiotic therapy						
15 or more	29(48.3)	86(49.1)	0.968	0.538	1.741	0.914
Up to 14	31(51.7)	89(50.9)				
Antibiotics used						
Ciprofloxacin	14(23.3)	41(23.4)	0.995	0.497	1.989	0.998
Clindamycin	23(38.3)	54(30.9)	1.393	0.756	2.567	0.287
Amoxicillin + clavulanate	29(48.3)	74(42.3)	1.277	0.709	2.300	0.415
Moxifloxacin	20(33.3)	55(31.4)	1.091	0.584	2.037	0.785
Penicillin	12(20.0)	6(3.4)	7.042	2.511	19.745	< 0.000
Trimethoprim + sulfamethoxazole	18(30.0)	57(32.6)	0.887	0.470	1.676	0.712

*Chi-square test

cases of erysipelas in adults.[14] Advanced age is directly related to greater frailty and greater propensity to comorbidities that contribute to the recurrence of erysipelas.[15] Thus, in this study, being an older adult did not mean a higher risk of recurrence of erysipelas.

Regarding gender, in this study there was a slight predominance of men, 51.1% of the participants. The evidence corroborates data from other studies that there was a prevalence of more than 58% of patients with relapse being male.[1,13] However, studies from Slovenia, Africa, and also from Brazil had a female prevalence in patients with diagnosis of erysipelas.[14,16,17] Epidemiological studies show a higher frequency of venous diseases in the lower limbs

in women compared to men, mainly related to female hormonal issues.[18] Researchers ensure that the women are predisposed to the development of venous insufficiency due to the action of estrogens, use of contraceptives and pregnancy.

The predominant site of erysipelas was observed in the lower limbs, corroborating German studies that showed that the legs are the most affected sites, followed by the arms and face.[13] In the results of this research, the main entry point was through trauma, followed by ulcers, wounds and mycoses. A study in Brazil indicates that mycosis was the main entry point, followed by fissures in the feet, ulcers in the lower limbs and inflammatory intertrigo.[17] Although mycoses are not the most prevalent entry point, higher temperatures predispose to the development of lesions fungal infections in the skin and increase venous and lymphatic stasis, favoring skin fissures as entry points.[16]

Thus, smokers did not present a higher risk of developing erysipelas. Despite this, it is known that smoking influences venous stasis and arteriosclerosis of the vessels. Studies show that smoking is a predisposing factor for other diseases, such as venous insufficiency, which can influence the course of erysipelas in adults and older adults.[19] In this study, patients with venous insufficiency were twice as likely to develop erysipelas.

Brazilian scholars emphasize that, among the clinical factors causing erysipelas, obesity is considered an important risk factor.[17] When addressing the obesity factor, it is interesting to note that the disease is commonly associated with other disorders, such as hypertension, venous insufficiency , heart disease and diabetes, which are also associated with erysipelas. In a study in Sweden, effect estimates indicated a four times greater risk of relapse recurrence for people with severe obesity.[1] These data diverge from this study, in which obesity was not revealed to be an important risk factor for erysipelas and relapse in both adults and older adults.

It was shown that diabetic patients did not have a higher risk of developing recurrence, contrary to studies in Sweden, in which the disease significantly increased the complicated course of erysipelas.[1,13] Furthermore, in this study, lymphedema was not shown to be a factor in risk for recurrence of erysipelas, although other studies consider this pathology of clinical importance as a risk factor to be considered.[1,14,20]

Polypharmacy, which is characterized by the continuous use of five or more medications, was present in 31.1% (73) of the cases, and was not correlated with recurrences.[8] The older adults group showed a greater tendency to polypharmacy, which can be justified as this population generally has more comorbidities and has developed more risk factors for erysipelas than young people.

As for the treatment used in the first hospitalization, patients who had antibiotic therapy with penicillin had a seven times greater risk of recurrence. According to international guidelines, penicillin G is the antibiotic of reference.[2] A brief reflection on pharmacological therapies and some relevant factors such as population and health habits, the indiscriminate use of antibiotics such as first-group penicillin, could be associated with resistance, reducing its therapeutic effect, enabling the occurrence of new cases.

Nurses' actions are extremely important in the course of the disease, mainly through the systematization of nursing care, and more specifically the nursing process, which enables nurses to determine nursing diagnoses and carry out appropriate interventions for care and treatment of erysipelas. Furthermore, it is necessary, during interventions in the nursing process, for nurses to be aware of issues such as: skin integrity and risk of infection, performing visual and olfactory inspection of the dressing; patient complaints of pain, administering analgesia; assisting in impaired walking, minimizing the risk of falling; evaluating capillary filling; and improving the quality of life, contributing positively to the treatment.[5]

The nursing team needs to have knowledge to identify risk factors and aggravating factors for erysipelas through anamnesis performed correctly. In addition, they need to know the possibilities of effective pharmacological and non-pharmacological treatments to work with the multidisciplinary team, associating pertinent information, for the resolution of the case and prevention of relapses.

As for the role of nursing in the discharge of all patients, especially those with venous insufficiency, follow-up with return appointments, nursing education for self-care with the skin and lifestyle change such as daily rest, care with injuries, identification of warning signs such as phlogiston signs and prevention of entrance doors are important nursing cares to prevent erysipelas recurrence.

Explaining to the patient the need for frequent surveillance for signs of disease reappearance are characterized by symptoms such as pain at the site, edema, redness in the affected limb, usually the lower limbs, and may also present increased body temperature, chills, emesis, nausea and malaise be, being essential that this patient seek specialized care for early initiation of correct treatment.[1]

In the case of patients with penicillin antibiotic therapy, in case of disease recurrence, what is currently recommended by guidelines is the collection of blood cultures to determine sensitivity, in order to guide the treatment more effectively, as a study shows that only 4.6% of strains are sensitive to penicillin. Needle-aspirated cultures or inflamed skin biopsies are still little used and do not represent proven effectiveness.[13]

As a limitation, data that could not be collected are pointed out, such as the nutritional issue, post-discharge treatment, readmissions to other hospitals, and the evolution of the wound after hospitalization, as they were not included in the professionals' records in the computerized medical record. In addition, logistic regression was not performed, so the statistical results were carefully analyzed.

Conclusion

This retrospective cohort study allowed us to identify the association between risk factors and the occurrence of cases of erysipelas recurrence in adults and older adults. The risk factors for the recurrence of erysipelas with statistical significance were: patient with venous insufficiency and who had antibiotic therapy with penicillin. Thus, it is important to identify the risk factors associated with erysipelas recurrence, so that it is possible to improve the care of patients with this involvement, as well as to provide quality care, in order to reduce the cases of recurrence and consequently the constant hospitalizations for erysipelas.

Collaborations

Madeira ES, Figueredo LN, Pires BMFB, Souza SR, Souza PA contributed to the conception, design, analysis and interpretation of data, article writing, relevant critical review of the intellectual content and final approval of the version to be published.

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