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ORIGINAL ARTICLE

Performance of instrumental activities of daily living in patients with haemophilic arthropathy. A cross-sectional cohort study

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Abstract

Background: The development of haemophilic arthropathy causes joint damage that leads to functional impairment that limits the performance of activities in patients with haemophilia. The aim was to identify the best predictive model for performing instrumental activities of daily living in adult patients with haemophilia arthropathy.

Methods: Cross-sectional cohort study. 102 patients were recruited. The dependent variable was the performance of instrumental activities of daily living (*Lawton and Brody* scale). The dependence on the performance of activities of daily living was the dependent endpoint (*Barthel scale*). The secondary variables were joint damage (*Hemophilia Joint Health Score*), pain intensity, and clinical, anthropometric, and sociodemographic variables.

Results: The degree of dependence, joint damage, pain intensity, and marital status (Cp = 5.60) were the variables that best explain the variability in the performance of instrumental activities of daily living ($R^2_{adj} = 0.51$). Loss of predictive capacity is acceptable with good mean internal (R^2 mean = 0.40) and external (R^2-$r^2 = 0.09$) validation. According to the predictive pattern obtained, patients with haemophilia, who were married, without joint pain or damage, and independent in their day-to-day lives, had a score of 7.91 points (95% CI: 7.42; 8.39) in the performance of instrumental activities of daily living.

Conclusions: The predictive model for the functional capacity of instrumental activities of daily living in haemophilia patients encompasses factors such as level of autonomy, joint impairment, pain severity, and marital status. Notably, despite the presence of joint damage, individuals with haemophilia exhibit a significant level of independence in carrying out both basic daily tasks and instrumental activities of daily living.

International registration number: Id NCT04715100.

KEYWORDS
activities of daily living, dependence, haemophilia, joint damage, joint pain

1 | INTRODUCTION

Haemophilia A and B are bleeding disorders caused by a deficiency or insufficiency of coagulation factor VIII (FVIII) or factor IX (FIX), respectively.[1] Standard therapy should be prophylactic treatment with FVIII/FIX replacement factor.[2] Prophylaxis is individualised based on criteria such as haemorrhagic phenotype, pharmacokinetics, or patient activity level.[3] The development of neutralizing antibodies (inhibitors) against FVIII or FIX is the most serious complication of haemophilia treatment.[1] These antibodies render replacement therapy ineffective, resulting in an increased risk of major bleeding and earlier onset of progressive arthropathy as well as increased treatment-related costs.[1] Haemophilic arthropathy presents with chronic pain, loss of joint range, muscle atrophy, and axial and proprioceptive alterations.[1,4] The treatment of choice in the prevention of bleeding and, therefore, arthropathy is the prophylactic administration of deficient coagulation factor.[2] Some of the most relevant implications of this pathology from a clinical point of view are related to the quality of life of patients, which include: problems related to mobility, hospitalisations, school or work absenteeism, and impact on psychological well-being.[1]

According to the *International Classification of Functioning, Disability and Health*, the concepts of health and disability are extended in a *continuum*, based on a comprehensive model of functioning, disability and health. The three essential components of this model are bodily functions and structures, activity and participation and contextual factors.[5] The structural and joint function damage characteristic of haemophilic arthropathy may restrict the participation of these patients in activities due to difficulties in performing socially expected roles due to disability.[6–8] Deficiencies in both the structure and function of the joints that produce a limitation of activity may or may not translate into a restriction in participation, It will depend on the existence of personal or social facilitators or barriers.[6]

The degree of morbidity and the level of activity impairment are related to a reduction in work productivity in patients with severe haemophilia.[9] In the same way, pain increases the limitation in the development of activities, affecting these patients' sleep and emotional states. Faced with this clinical situation, which goes beyond the tissue damage itself, a truly biopsychosocial approach is necessary for the approach to these patients.[10]

Occupational therapy is defined as the therapeutic use of activities of daily living, both individual and group. It aims to enhance or facilitate participation in roles, habits and routines at home, school, workplace, community and other settings.[11] Within this discipline, there are two groups of activities of daily living: basic and instrumental. Basic activities focus on caring for one's body and are fundamental to living in a social world, basic survival and well-being. In contrast, instrumental activities focus on the home and community, involving more complex interactions.[11]

A recent review has shown the absence of evidence of the efficacy of occupational therapy in the management of patients with haemophilia, providing lines of work for its implementation in the improvement of activities of daily living and the multidisciplinary treatment of these patients.[12]

The aim was to identify the best predictive model for performing instrumental activities of daily living in adult patients with haemophilic arthropathy.

2 | METHODS

2.1 | Study design

2.1.1 | Cross-sectional cohort study

Participants

Patients were recruited between January and June 2021 in five associations of patients with haemophilia.

The inclusion criteria for participation in the study were: (i) patients with haemophilia A and B; (ii) with severe phenotype; (iii) on prophylactic or on-demand treatment; and (iv) who have signed the informed consent. The exclusion criteria for the study were: (i) patients with neurological or cognitive disorders that prevented the understanding of the questionnaires; (ii) dependent patients who required the assistance of a third person to get around; and (iii) patients who had developed hemarthrosis in the 4 weeks before the study.

Measure instruments

The primary endpoint of the study was the performance of instrumental activities of daily living, with dependence on the performance of activities of daily living being the dependent variable. The secondary variables, estimated as modifying or confounding, were the perception of quality of life, the list of roles, joint damage, pain intensity, functional capacity and the main clinical, anthropometric and sociodemographic variables. The measurement instruments used to measure these variables were:

- The performance of instrumental activities of daily living will be assessed with the Spanish-validated version *of Lawton and Brody scale*.[13] This questionnaire measures the degree of independence that the patient maintains. It is composed of eight items with several response alternatives that could evaluate the ability to carry them out autonomously. Answer choices score 1 (the person makes them independently) or 0 (dependent). The total score is obtained by adding the values obtained in each item and ranges from 0 (totally dependent) to 8 (independence).
- Performance of activities of daily living was measured with the Spanish version of the *Barthel scale*.[14] This scale measures the person's ability to perform ten basic activities of daily living, obtaining a quantitative estimate of the subject's degree of dependence. The score ranges from 0 to 100 points (where the higher the score, the less difficulty it is in performing activities of daily living).
- Using the Spanish version[15] of the generic self-questionnaire *36-Item Short Form Health Survey* assessed the perception of quality of life of patients with haemophilia included in the study.[16] This self-administered scale consists of 36 items in 8 domains. The score range

of this scale is from 0 to 100 points, where a higher score indicates a higher perception of quality of life.

- The list of roles was measured with the *Oakley Role Listing*[17] using the Spanish version. This self-reported questionnaire is used to identify the roles that organise the individual's daily life. The definition of each role refers to the frequency of performance. Its coding is done in the present, past and future, it has a score range from 0 to 10, where the higher the score, the higher the frequency of performance.
- Joint damage was assessed using the *Hemophilia Joint Health Score*.[18] It has a score from 0 to 20 points (maximum joint damage) per joint. In the evaluation of total joint damage, a gait assessment is added to the 120 points (range 0–4 points), with the maximum assessment on this scale being 124 points.
- With Analog Visual Scale[19] the intensity of pain perceived was measured. This scale assesses patients' perception of pain with a range of 0–10 points. A score of 0 indicates that the patient does not perceive any pain, with the highest score corresponding to the maximum pain suffered or imaginable by the patient.
- Functional capacity was measured with the *6-Minute Walking test*.[20] This test is performance-based, measuring walking speed and submaximal ability to perform an exercise. This instrument has been used in children and adults with a variety of chronic conditions, including haemophilia.[21] Patients are instructed to walk a 30-m track for 6 min and try to cover as much distance as possible without running. The distance travelled, in meters.

The main sociodemographic, clinical and anthropometric variables were collected: weight, height and body mass index.

Sample size

A representative sample has been calculated using G*Power software (version 3.1.9.2; Heinrich-Heine-Universität Düsseldorf, Germany). The magnitude was judged based on a moderate effect size ($f^2 = 0.15$) to measure the performance of instrumental activities of daily living in patients with haemophilic arthropathy. With an alpha level (type I error) of 0.05, a statistical power of 95% (1-$\beta = 0.95$) and 12 predictors, a sample size of 107 patients with haemophilia was estimated.

2.2 | Statistical analysis

Statistical analysis was performed using version 17.0 of the STATA statistical package for Windows (Stata Corp LP).

For the construction of the best predictive model, the estimation of all possible equations was used, using Mallows' Cp and the adjusted R^2 statistics selection criteria. This analysis method constructs all possible sub models by combining the terms of the maximum model, assessing for each model the degree of compliance with the established criteria: lower Mallows' Cp and higher adjusted R^2. With the variance inflation factor (VIF) the multicollinearity of the predictor variables was calculated. A cross-validation was performed, calculating the goodness-of-fit measure, to obtain the predictive capacity of the model. To calculate the distance values, the Mahalanobis distance was calculated, with the main indicator of influence being Cook's distance.

Normality was verified by applying the Shapiro–Wilk test to the gross residuals, while the homogeneity of variances was verified with the Breusch–Pagan test. To estimate the effect of the model, the modifying and confounding effect of the independent variables was assessed, with the degree of dependence being the adjustment variable. In this study, the significance level was $\alpha < 0.05$.

3 | RESULTS

The mean age of the 102 patients included in the study was 40.14 (SD = 9.39) years, with an average body mass index of 26.98 kg/m^2 (SD = 2.78). Most patients had haemophilia A (83.33%) and were on prophylactic treatment (79.41%). Only 17.65% of patients had developed antibodies to FVIII/FIX coagulation concentrates. Most of the patients were married (45.10%) and were working at the time of the study (50.98%). Table 1 shows the main descriptive characteristics of the patients included in the study. Table 2 shows the central tendency and dispersion statistics of the study variables.

The predictive model for the performance of instrumental activities of daily living was analysed. The best model included the variables: *degree of dependence*, *global joint damage*, *knee* and *elbow pain* and *marital status* (Cp = 5.60), explaining 47.22% of the variability in the performance of instrumental activities of daily living ($R^2_{adj} = 0.51$). When performing the multicollinearity analysis of the independent predictor variables, we observed how the variables are moderately correlated with each other (mean VIF = 1.28). The small VIF values corresponding to the variables show that there is no collinearity problem. In the analysis of external validity, the model appears to be quite reliable with a loss of predictive capacity of 9.7% (R^2-$r^2 = 0.097$). The internal validity of the model (R^2mean = 0.40) was calculated as the predictive capacity of the model when running on external samples. When calculating the loss of predictive capacity, we obtained a generalizable model (7.62% < 10%; Adj *R*-squared = 0.47). In the analysis of the performance of instrumental activities of daily living, only three subjects (2.94%) showed extreme residual values, and eleven patients also presented distant values (Lever > 0.15; Mahalanobis distance > 14.7). The assumption of normality ($p = .04$) was not met, with heterogeneity in the dispersion of residuals ($\chi^2_{(1)} = 7.67$; $p = .006$). It was observed that the perception of quality of life and functionality were not included in the predictive model for the performance of instrumental activities of daily living was analysed. Table 3 shows the results of the linear regression analysis of the best predictive model.

After selecting the best predictive model of the performance of instrumental activities of daily living in patients with haemophilia, the prediction was made for two subjects. To calculate this prediction, the effect of the different modulating sociodemographic states (*marital status*) was calculated, depending on the degree of dependency of the patients, assessing the possible influence of modulating factors (*global joint damage*, *knee* and *elbow* pain). Based on the selected predictive model, the performance of instrumental activities of daily living

TABLE 1 Descriptive analysis of the patients included in the study.

Variables	Mean (SD)	95% CI
Age (y)	40.14 (9.39)	38.30; 41.99
Anthropometric variables		
Weight (kg)	82.90 (8.81)	81.17; 84.63
Height (m)	1.75 (0.06)	1.74; 1.76
Bosy mass index (kg/m^2)	26.98 (2.78)	26.43; 27.52
	n	%
Clinical variables		
Type of haemophilia		
A	85	83.33
B	17	16.67
Treatment		
Prophylaxis	81	79.41
On-demand	21	20.59
Inhibitor development		
Yes	18	17.65
No	84	82.35
Marital status		
Married	46	45.10
Single	43	42.16
Divorced	7	6.86
Widower	6	5.88
Employment situation		
Employed	52	50.98
Unemployed	11	10.78
Work disability/retired	39	38.24
Academic training		
Primary studies	47	46.08
Secondary studies	19	18.63
University studies	36	35.29

Abbreviations: SD, standard deviation; 95% CI, confidence interval 95%; *n*, number of patients; %, percentage.

in married, independent patients with haemophilia without joint pain or damage would reach 7.61 (95% CI: 7.33–7.89) points. Similarly, the performance of instrumental activities of daily living predicted for a single patient with haemophilia, with a mild degree of dependence, the average pain intensity in knees (6.1) and elbows (10.1) observed in the study, and the global joint damage observed (HJHS = 53.40) would reach 7.43 (95% CI: 7.32–7.54) points. Table 4 shows the results of the prediction analysis for these two patients with haemophilia.

4 | DISCUSSION

The aim of this study was to identify the best predictive model of the factors influencing the performance of instrumental activities of daily living in adult patients with haemophilic arthropathy. The degree of dependence in the performance of basic activities of daily living, global joint damage, pain intensity, and marital status are the variables that best explain the performance of instrumental activities of daily living in these patients.

The performance of basic activities and instrumental activities of daily living in the patients with haemophilia observed in this study correspond to a very high degree of independence, despite the joint damage they present. Despite these severe joint sequelae, these patients are able to carry out their activities of daily living with minimal limitations.[22] The adaptation and compensation models developed by haemophilia patients themselves are similar to those developed by arthritis patients. In this way, these models favour the development of the independence of these patients for the development of their activities.[23] A direct correlation between functional independence and quality of life in patients with knee osteoarthritis has been previously described.[22] The lesions and their progression cause a negative association where the higher the degree of injury, the less independence in the development of activities of daily living, and the worse the results of the treatment performed. The patients with haemophilia included in the study had a high degree of independence in both basic activities of daily living and instrumental activities. Similarly, in patients with knee osteoarthritis, whose clinical symptoms and evolution are similar to haemophilic arthropathy, greater dependence is associated with a low perception of quality of life.[22]

The severity of joint damage, together with a high body mass index, is associated with low functional capacity. Similarly, joint status, activity limitations and obesity are associated with greater impairment in patients with haemophilia. Likewise, there are differences between the limitations observed in the performance of activities in the upper and lower limbs using the specific haemophilia instrument on the *Hemophilia Activities List*.[24] Given the similarities in the pathophysiology and clinical aspects of osteoarthritis and haemophilic arthropathy, it should be noted that they share most of the potentially relevant factors. However, the involvement of psychological and environmental factors should be analysed.[24]

Cruz-Montecinos et al.[25] observed differences in age, pain intensity and overall joint damage when assessing function in the lower extremities. Patients with severe haemophilia have lower functional capacity in the lower limbs, although there is no significant association between pain and functional tests.[25] Joint damage manifests through pain and decreased range of motion and muscle strength. As this degenerative deterioration progresses, it limits the performance of instrumental activities of daily living. However, only overall joint deterioration significantly influences functional development; the deterioration of individual joints, such as the knee, ankle and elbow, does not have a significant influence on its own.

In patients with rheumatoid arthritis, where joint impairment may be comparable to that of haemophilic arthropathy, the performance activities of daily living activities such as 'bathing' and 'grooming' are seriously affected depending on the functional independence of these patients.[26] Similarly, in individuals with rheumatoid arthritis, factors such as overall well-being, proximity to the treatment center, late disease diagnosis and non-adaptability of their living conditions are

TABLE 2 Descriptive statistics of central tendency (mean) and dispersion (standard deviation) of the dependent variables evaluated in the study.

Measurement instruments	Variables	Mean (SD)	95% CI
Lawton and Brody scale	Instrumental activities of daily living (1–8)	7.73 (0.44)	7.64; 7.82
Barthel scale	Basic activities of daily living (0–100)	96.37 (4.62)	95.46; 97.28
Oakley Role Listing	Roles		
	Past (0–10)	6.40 (2.04)	6.00; 6.80
	Present (0–10)	5.37 (1.32)	5.11; 5.63
	Future (0–10)	3.52 (0.98)	3.33; 3.72
36-Item Short Form Health Survey	Quality of life		
	Physical component (0–100)	37.99 (7.93)	36.46; 39.55
	Mental component (0–100)	47.88 (5.95)	46.71; 49.05
6-Minute Walking Test	Functionality capacity (m)	159.05 (37.59)	151.66; 166.43
Hemophilia Joint Health Score	Joint damage		
	Elbows (0–40)	16.58 (3.77)	15.84; 17.33
	Knees (0–40)	16.28 (5.62)	15.17; 17.38
	Ankles (0–40)	19.27 (5.07)	18.27; 20.27
	Total joint damage (0–124)	53.40 (10.61)	51.31; 55.48
Analog Visual Scale	Joint pain		
	Elbow (0–20)	10.09 (2.55)	9.59; 10.60
	Knee (0–20)	6.07 (3.52)	5.37; 6.76
	Ankle (0–20)	8.01 (4.16)	7.18; 8.82

Abbreviations: SD, standard deviation; 95% CI, confidence interval 95%.

TABLE 3 Multiple linear regression analysis of the best predictive model for performing instrumental activities of daily living in patients with haemophilia.

Instrumental activities of daily living	Coef.	SE	*t*	*p*-value	95% CI	VIF
Basic activities of daily living	0.43	0.07	5.79	.000	.28; .57	1.36
Knee joint pain	0.01	0.01	1.47	.14	0.00; 0.03	1.25
Elbow joint pain	0.03	0.01	2.85	.01	0.01; 0.06	1.12
Total joint damage	−0.01	0.003	−2.65	.01	−0.02; 0.002	1.65
Marital status	−0.07	0.04	−1.97	.05	−0.15; 0.0001	1.04
_constant	6.01	0.51	11.87	.00	5.00; 7.01	

Abbreviations: Coef., regression coefficient; SE, standard error; 95% CI, 95% confidence interval; VIF, variance inflation factor.

significant. However, none of the sociodemographic or clinical variables evaluated were found to be significant predictors for patients with haemophilia. The differences observed between haemophilia and rheumatoid arthritis patients may stem from joint haemorrhages and disabling sequelae that haemophilia patients face from an early age. This ongoing experience of bleeding and physical limitations likely promotes the development of adaptive and compensatory mechanisms, allowing them to perform daily activities more independently.

As a limiting aspect of our study, unlike other studies[27–30] which propose the following specific scales as assessment tools: *Functional Independence Score in Hemophilia* (FISH), *Haemophilia Activities List* (HAL) y *Disabilities of the Arm, Shoulder and Hand* (DASH), to describe physical limitations and activity performance in haemophilia, it is crucial to compare specific scales that emphasize joint damage as the most influential variable.

Pain secondary to haemophilic arthropathy and its management is a fundamental aspect in the management of patients with haemophilia. However, the available information on pain coping strategies in these patients is scarce and heterogeneous, highlighting the need for a correct assessment of pain with specific standardized tools with biopsychosocial and multidisciplinary management.[31–33]

Different authors[10,34] have classified the pain from the most to the least sensation according to the joint involvement, with the most intense being the elbow, followed by the knee and finally, the ankle.

TABLE 4 Analysis of a predictive model for two patients with haemophilia.

*5*BasicActivitiesDailyLiving + 0*KneeJointPain + 0*ElbowJointPain + 0*TotalJointDamage + 1*MaritalStatus + _cons*					
Instrumental activities of daily living	**Coef.**	**SE**	***t***	***p*-Value**	**95% CI**
(1)	7.61	0.24	32.62	.000	7.33; 7.89
*4*BasicActivitiesDailyLiving + 6.1*KneeJointPain + 10.1*ElbowJointPain + 53.4*TotalJointDamage + 2*MaritalStatus + _cons*					
Instrumental activities of daily living	**Coef.**	**SE**	**t**	***p*-Value**	**95% CI**
(1)	7.43	.05	131.51	.000	7.32; 7.54

Abbreviations: Coef., regression coefficient; SE, standard error; 95% CI, 95% confidence interval.

According to these studies, a patient with more knee and elbow pain has more limitations in the performance of instrumental activities, coinciding with the predictive model of our study.

Pain is related to interference in the development of activities of daily living, and others such as mood, walking, working, relationships with others, sleep and even enjoyment.[10] Pain has a relevant psychosocial relationship with the person, closely related to emotions such as anxiety and depression[10] and the influence of the social and cultural values of the environment.[35] These aspects are complemented by the patient's personal beliefs and attitudes.[36]

Few studies have evaluated the relationship between marital status and the perceived quality of life of people with haemophilia.[37] Their social status and their impact on work, school, and community activities influence their daily routines, social interactions, and occupational success.[38] Thanks to the new era of care, people with haemophilia avoid having a negative social status and being isolated. Beyond doubt, they achieve a 'good social status' as it is commonly known, which includes secure employment, rewarding social relationships, marriage, and children, among others.[38] However, in our study, neither the social situation of the patients nor their role developments were predictive factors in the development of instrumental activities of daily living, but it does the marital status. These findings do not diminish the importance of the social and family situation, which has previously been recognised for its role in providing emotional stability, assistance, and support, serving as a protective factor in patients with haemophilia.[39,40] Marital status, having children, educational attainment, and employment status are all determinants of the social status of patients with haemophilia.[41] The link that exists between the proposed predictive model and the review carried out is consistent. Hartl et al.[41] highlight the relationship between marital status and one's personal feeling of well-being; generating a very positive response, specifically a protective factor, that counteracts the negative effects of the disease for the person with haemophilia.[41] Reciprocal social support is desired by people with haemophilia in order to be able to help others. In this way, these patients can shift their focus away from their illness to the opportunity to help as they are helped. This involvement can help them cope with their illness, making them feel more valued and useful.[39] According to the results of our study, the marital status of people with haemophilia is a protective factor for the development of instrumental activities of daily living. This protective factor derives from the effect that marital status has on the well-being of the person, consequently generating a positive impact on the rest of the areas.

Finally, from the predictive model obtained, some improvements could be seen in the development of instrumental activities of daily living for patients with haemophilic arthropathy. It could be said that most of the changes are closely related to the attitude that the patient has towards the disease, and the tools available to address the difficulties that arise. Some of the changes in factors could be the following: (i) To reduce joint damage, it is advisable to maintain an adequate mass index, prevent weight gain, control pain, and increase range of motion and strength; (ii) Promote compensatory mechanisms to carry out activities of daily living and opt for an adaptive model; (iii) It is advisable to manage pain from a multidisciplinary approach and encourage using psychosocial models. Emphasise the importance of the main joints due to their connection with the level of autonomy and those activities that may be significant for the patient; (iv) Promote a healthy personal and social environment where the person is valued in all their social spheres, taking into account the environment and context in which the person's occupational performance takes place; and (v) To analyse the roles that the person has played and that are important to the client can help plan a more client-centred treatment and achieve greater adherence to treatment.

4.1 | Limitations of the study

This study has several limitations that should be considered for its accurate interpretation. First, it lacks an assessment of psychosocial variables. Previous research[10,24,32] has highlighted the importance of biopsychosocial factors such as self-efficacy, kinesiophobia, catastrophizing, mood, interpersonal relationships, enjoyment, anxious traits and others in understanding the level of participation and perceived pain in individuals. These variables could provide valuable insights into the comprehensive impact of haemophilic arthropathy on patients' lives.

The heterogeneity of responses may be due to the different models of hospital haemophilia centres (national, regional or local referral centres) where patients are routinely treated. Another aspect that may be relevant, and which has not been evaluated in this study, is the development of activities through specific haemophilia questionnaires (FISH or HAL). This aspect may limit the comparison of the sample recruited in the present study with other populations of patients with haemophilia. The justification for using generic scales in this study is to facilitate the comparison of results regarding the development of activities of

patients with haemophilia with patients with other pathologies that present with similar joint degenerative processes such as osteoarthritis or arthritis.

Finally, the present study is not exempt from a possible selection bias because the selected cohort presents a high level of independence with minimal difficulty in carrying out activities of daily living, limiting the conclusions that can be drawn from the model. prediction. Therefore, a more heterogeneous study cohort would be necessary that included patients with less independence and greater difficulty performing activities of daily living.

5 | CONCLUSIONS

The degree of independence, joint damage, pain intensity and marital status are the variables that best explain the performance of instrumental activities of daily living in patients with haemophilic arthropathy.

Despite joint damage, the performance of daily basic activities and instrumental activities of daily living in patients with haemophilia corresponds to a high degree of independence.

It is necessary to analyse the variables that influence occupational performance in order to implement more person-centred interventions, taking into account the context in which the person lives, the significant occupations and the roles that he or she plays or has played. All these aspects can be key from the Occupational Therapy perspective and can enrich the multidisciplinary approach in patients with haemophilia.

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CONFLICT OF INTEREST STATEMENT

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

This study complied with the regulations, following the Helsinki regulations. Prior to recruiting the patients, the Ethics Committee of the Provincial Research of Malaga, of the Andalusian Health Service (ID: 28/01/2021) approved the study. The study was also registered in the *Protocol Registration and Results System* (www.clinicaltrials.gov; NCT04715100).

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