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BoNT-A Treatment Continuity and Patient- or Caregiver-Reported Reasons for Discontinuation or Irregular Continuation in Post-Stroke Spasticity: A Retrospective Cohort Study

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Abstract

Objective

This study aimed to evaluate botulinum neurotoxin type A (BoNT-A) treatment continuity in patients with post-stroke spasticity, to identify patient- or caregiver-reported reasons for treatment discontinuation or irregular continuation, and to examine the associations between available demographic/clinical variables and the number of injections.

Material and Methods

In this retrospective cohort study, medical records of patients who received at least one botulinum toxin injection for post-stroke spasticity between 2012 and 2024 were reviewed. A total of 81 patients included in the final analysis responded to questions regarding reasons for not maintaining regular BoNT-A treatment.

Results

A total of 157 injections were administered over the 12-year study period. The mean number of injections was 1.9 (range: 1–7), and the mean interval between consecutive injections was 13.3 months. Forty-seven patients (58%) received only one injection session. Reasons for treatment discontinuation or irregular continuation were analyzed among 74 patients after excluding 7 patients who continued treatment at another center. The most frequently reported reason was lack of awareness regarding the need for repeated BoNT-A injections (54.1%). Other reasons included perceived lack of benefit from the injection (24.3%), reduction in spasticity (10.8%), comorbidities or other health problems limiting follow-up (6.8%), fear of injections (4.1%), inability to take time off work (1.4%), and misconception regarding reimbursement coverage (1.4%).

Conclusion

BoNT-A treatment continuity was low among patients with post-stroke spasticity. The most frequently reported reason for treatment discontinuation or irregular continuation was patient- or caregiver-reported lack of awareness regarding the need for repeated treatment. These findings suggest that clearer and standardized patient/caregiver education, together with regular follow-up systems, may support treatment continuity in BoNT-A therapy.

Keywords: Botulinum toxin type A, Post-stroke spasticity, Treatment adherence, Treatment discontinuation, Patient education

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Introduction

Stroke remains the second leading cause of death and disability worldwide (1). It has been estimated that approximately one-third of stroke survivors may develop symptomatic spasticity (2). Spasticity is a sensorimotor control disorder resulting from an upper motor neuron lesion and is characterized by intermittent or sustained involuntary muscle activation. This condition may cause pain, distress, and substantial disability in patients with stroke (3, 4). The reported prevalence of disabling post-stroke spasticity ranges from 2% to 13% (5).

Botulinum neurotoxin type A (BoNT-A) is an internationally approved treatment option for upper and lower limb spasticity. It acts as a focal neuromodulator by inhibiting acetylcholine release at the neuromuscular junction, thereby inducing muscle relaxation (6). Botulinum toxin (BoNT), administered as a local intramuscular injection, is one of the main treatment options for post-stroke spasticity (6, 7). BoNT-A treatment has been shown to provide significant improvements in pain, functional limitations, and quality of life in patients with post-stroke spasticity (8).

The effectiveness of BoNT-A treatment depends not only on its pharmacological effects but also on sustained adherence to the treatment protocol. Studies from developed countries on adherence to botulinum toxin treatment have shown that patients commonly discontinue treatment because of logistical barriers, older age, comorbidities, perceived lack of effectiveness, treatment intervals of 15 weeks or longer, and improvement in spasticity (9-12). To the best of our knowledge, no study has evaluated long-term adherence to botulinum toxin treatment and related factors in Türkiye, a developing country.

This study aimed to evaluate BoNT-A treatment continuity in patients with post-stroke spasticity, to identify patient- or caregiver-reported reasons for treatment discontinuation or irregular continuation, and to examine the associations between available demographic/clinical variables and the number of injections.

Material and Method

In this retrospective cohort study, data from 119 patients diagnosed with post-stroke spasticity who had received at least one BoNT-A treatment between 2012 and 2024 were obtained from a local database. Patients were selected from the outpatient and inpatient clinics of the Department of Physical Medicine and Rehabilitation at a university hospital. The inclusion criteria were a history of ischemic or hemorrhagic stroke in the chronic phase and the presence of spasticity in the upper and/or lower limb. Patients younger than 18 years of age, deceased patients, and patients who could not be contacted by telephone were excluded.

The following variables were recorded: age, sex, place of residence (urban/rural), use of medication for spasticity treatment, physical therapy status, injected limb region (upper limb, lower limb, or both), year of first BoNT-A injection, time from stroke onset to the first injection in years, total number of injections, intervals between injections, and the formulation/preparation used [Botox®, Allergan, Inc., USA; Dysport® abobotulinumtoxinA, Ipsen, France].

Treatment continuation status and injection intervals were determined by reviewing medical records, patient reports, and recorded injection dates. During the study period, there was no structured follow-up or reminder protocol specific to BoNT-A treatment. Patients who had no recorded BoNT-A injection within ≥3 months after their previous treatment session were contacted by telephone. Semi-structured interviews were conducted by the same clinician (HY) with patients who could be reached by telephone and agreed to participate. When the patient had difficulty communicating or providing sufficient information, the interview was conducted with a first-degree relative serving as a caregiver.

First, participants were asked an open-ended question about their reasons for irregular continuation or discontinuation of BoNT-A treatment. When the response was unclear, predefined probing questions were used to clarify possible reasons, including lack of awareness regarding the need for repeated injections, perceived lack of benefit, reduction in spasticity, continuation of treatment at another center, comorbidities, fear of injections, work-related barriers, and misconceptions regarding reimbursement coverage. The telephone interview guide is provided in Appendix 1. The interview guide was developed by the research team for the purpose of this retrospective study and was not a previously validated questionnaire; therefore, psychometric validation analysis was not performed. Because all interviews were conducted by a single clinician, inter-rater reliability could not be assessed. After the interview was completed, participants were informed that BoNT-A treatment may require repeated applications under regular follow-up according to clinical response and need.

This study was approved by the Süleyman Demi-

rel University Ethics Committee for Health Sciences (12.05.2025, 96/37) and was registered at ClinicalTrials.gov (NCT07422428). The study was conducted in accordance with the ethical principles of the Declaration of Helsinki. In routine clinical practice, written procedural consent was obtained from patients before BoNT-A injections. The retrospective review of medical records was conducted under ethics committee approval. Verbal informed consent was obtained before the telephone interview from the patients or, when the patient was unable to provide sufficient information, from their first-degree caregiver relatives.

Statistical Analysis

All statistical analyses were performed using IBM SPSS Statistics for Windows, Version 29.0 (IBM Corp., Armonk, NY, USA). Descriptive data were presented as mean ± standard deviation (SD), median [minimum–maximum], and frequency (percentage), as appropriate.

The distribution of variables was assessed using the Shapiro–Wilk test. Associations involving non-normally distributed continuous variables and ordinal/binary variables were analyzed using Spearman's rank correlation coefficient. The 95% confidence intervals for Spearman correlation coefficients were calculated using the bootstrap method. A p-value of <0.05 was considered statistically significant.

In addition, to partially control for potential confounding variables, a multivariable Poisson regression analysis was performed with the number of injections as the dependent variable. Age, sex, place of residence, physical therapy status, and use of oral antispastic medication were included in the model. Model overdispersion was assessed, and no substantial overdispersion was detected. To evaluate factors associated with the time from stroke onset to the first BoNT-A injection, multivariable linear regression analysis was performed using the log-transformed time variable.

Results

Eleven deceased patients and one patient younger than 18 years of age were excluded from the study. Twenty-six patients could not be contacted by telephone. The study flowchart is presented in Figure 1.

The mean age of the initial cohort of 119 patients was 53.5±16.87 years; 59.9% were male, and 71.02% lived in urban areas. The demographic characteristics of the 81 patients included in the final analysis were generally similar to those of the source cohort. At the initiation of BoNT-A treatment, the mean age was 53.58±14.06 years, 59.30% of the patients were male, and 70.40% lived in urban areas. All patients in the final analysis group were treatment-naïve with respect to their first Botox injection; in other words, they had not received Botox treatment before the first injection. The demographic data of the 81 patients are presented in Table 1.

Over the 12-year study period, a total of 157 injections were administered to 81 patients with post-stroke spasticity, and onabotulinumtoxinA (onaBoNT-A) was used in all injections. The mean time from stroke onset to the first BoNT-A treatment was 2.88±4.42 years, ranging from 0.17 to 23.97 years. The mean

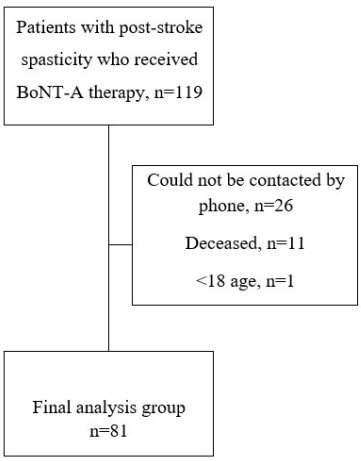


Figure 1
Flow chart for selecting patients for data collection and analysis

Table 1 Demographic and clinical characteristics of the final analysis group

	n=81
Age (mean±SD), years	53.58±14.06 (20–82)
Sex (F/M) (n, %)	33 (40.7) / 48 (59.30)
Stroke type (n, %)	
Ischemic	70 (86.41)
Hemorrhagic	11 (13.59)
Place of residence (n, %)	
Urban	57 (70.40)
Rural	24 (29.60)
Injection site distribution, %*	
Upper extremity only	30.57
Lower extremity only	19.75
Both upper and lower extremities	49.68
Medication use for spasticity, n (%)	41 (50.6)
Received physical therapy, n (%)	68 (84.0)

*Injection site percentages were calculated based on the total number of BoNT-A injections (n=157), not the number of patients.

treatment duration was 4.90±3.14 years, ranging from 1 to 13 years. Of all injections, 30.57% were administered to the upper limb only, 19.75% to the lower limb only, and 49.68% to both the upper and lower limbs. Forty-one patients (50.6%) were using medication for spasticity treatment, and 68 patients (84.0%) had received physical therapy.

Forty-seven patients (58.02%) received only one injection session. The number of patients continuing injection treatment gradually decreased over time (Figure 2).

The mean number of injections was 1.93±1.45, ranging from 1 to 7. The overall mean interval between consecutive injections was 13.30±9.08 months, ranging from 2.50 to 41.00 months. Injection intervals were summarized descriptively only; because more than one interval could be obtained from the same patient, these intervals were not considered statistically independent observations. The intervals between consecutive injections are presented in Table 2.

The associations between the number of injections and age, sex, place of residence, physical therapy status, and medication use were evaluated using Spearman correlation analysis. A weak positive and statistically significant correlation was found only between the number of injections and medication use. No significant correlations were observed between the number of injections and age, sex, place of residence, or physical therapy status. Correlation coefficients, 95% confidence intervals, and p-values are presented in Table 3.

To control for potential confounding variables, a multivariable Poisson regression analysis was performed with the number of injections as the dependent variable. Model overdispersion was assessed, and no substantial overdispersion was detected. Age, sex, place of residence, physical therapy status, and medication use were included in the model. Medication use was independently associated with the number of injections. Patients using medication had a significantly higher number of injections than those not using medication (adjusted IRR=1.616; 95% CI: 1.153–2.265; p=0.005). Age, sex, place of residence, and physical therapy status were not independently associated with the number of injections (Table 4).

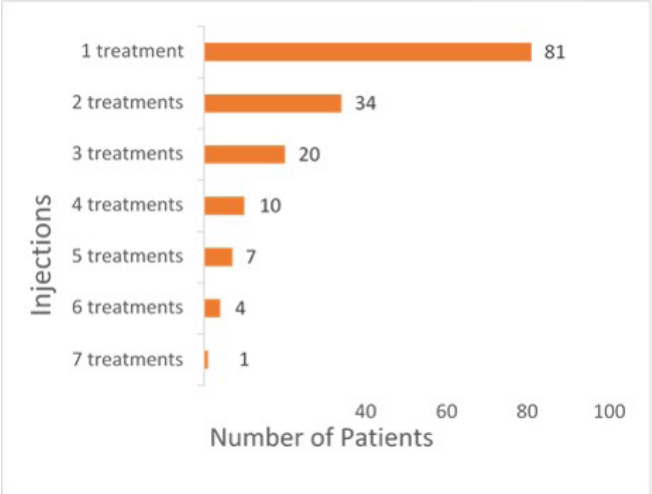


Figure 2
Number of patients reaching each BoNT-A injection session

Table 2 Descriptive summary of intervals between consecutive BoNT-A injections

Consecutive injection interval	Number of intervals (n)	Duration, months, mean±SD (min–max)
Time from the 1st to the 2nd injection	34	14.29±10.10 (3.26–41.00)
Time from the 2nd to the 3rd injection	20	13.76±8.84 (5.25–32.00)
Time from the 3rd to the 4th injection	10	11.10±5.70 (2.50–20.00)
Time from the 4th to the 5th injection	7	13.64±11.85 (7.25–39.75)
Time from the 5th to the 6th injection	4	10.37±6.18 (6.00–14.75)
Time from the 6th to the 7th injection	1	8.00 (8.00–8.00)
All consecutive injection intervals	76	13.30±9.08 (2.50–41.00)

Note: Values are presented descriptively. Because more than one consecutive injection interval could be obtained from the same patient, these intervals were not considered statistically independent observations. Therefore, no inferential statistical comparison was performed between injection intervals. SD: standard deviation; min: minimum; max: maximum.

Table 3 Spearman correlation analysis between the number of injections and clinical/demographic variables

Variable	n	Spearman's rho	95% CI	p-value
Age	81	-0.170	-0.388 to 0.049	0.129
Sex	81	-0.111	-0.327 to 0.108	0.325
Place of residence	81	-0.064	-0.272 to 0.152	0.570
Physical therapy status	81	0.042	-0.175 to 0.239	0.710
Medication use	81	0.242	0.027 to 0.443	0.029

CI: Confidence interval.

The associations between the time from diagnosis to the first injection and age, sex, place of residence, physical therapy status, and medication use were evaluated using Spearman correlation analysis. No statistically significant correlation was found between the time from diagnosis to the first injection and age (rho=-0.068; 95% CI: -0.277 to 0.161; p=0.545), sex (rho=-0.079; 95% CI: -0.292 to 0.135; p=0.483), place of residence (rho=0.125; 95% CI: -0.085 to 0.327; p=0.264), physical therapy status (rho=-0.090; 95% CI: -0.319 to 0.159; p=0.425), or medication use (rho=0.033; 95% CI: -0.187 to 0.245; p=0.768).

In the multivariable linear regression analysis performed using the log-transformed variable for time from diagnosis to first injection, no significant independent association was found with age, sex, place of residence, physical therapy status, or medication use. In the model, the adjusted geometric mean ratio (aGMR) was 0.990 for age (95% CI: 0.970–1.011; p=0.353), 0.940 for male sex (95% CI: 0.537–1.645; p=0.826), 1.292 for rural residence (95% CI: 0.710–2.348; p=0.396), 0.673 for physical therapy status (95% CI: 0.335–1.354; p=0.263), and 1.024 for medication use (95% CI: 0.601–1.745; p=0.929).

Among the 81 patients evaluated by telephone, 7 patients (8.6%) reported that they had continued BoNT-A treatment at another center. These patients were not considered to have discontinued treatment or continued it irregularly; instead, they were evaluated separately as patients who did not continue treatment at the study center. In the remaining 74 patients, patient- or caregiver-reported reasons for BoNT-A treatment discontinuation or irregular continuation were assessed. The most frequently reported reason was lack of awareness regarding the need for repeated BoNT-A injections (40/74, 54.1%). Other reasons included perceived lack of benefit from the injection (18/74, 24.3%), reduction in spasticity (8/74, 10.8%), comorbidities or other health problems limiting follow-up (5/74, 6.8%), fear of injections (3/74, 4.1%), inability to take time off work (1/74, 1.4%), and misconception regarding reimbursement coverage (1/74, 1.4%) (Table 5).

Table 4 Multivariable Poisson regression analysis of factors associated with the number of injections

Variable	Adjusted IRR	95% CI	p-value
Age	0.995	0.983–1.007	0.404
Male sex	0.880	0.628–1.233	0.459
Rural residence	0.809	0.557–1.174	0.264
Receiving physical therapy	1.238	0.786–1.949	0.357
Medication use	1.616	1.153–2.265	0.005

IRR: Incidence rate ratio; CI: Confidence interval.

Table 5 Patient- or caregiver-reported reasons for discontinuation or irregular continuation of BoNT-A treatment

Patient- or Caregiver-Reported Reason	n (%)
Lack of awareness regarding the need for repeated BoNT-A injections	40 (54.1)
Perceived lack of benefit from the injection	18 (24.3)
Reported reduction in spasticity	8 (10.8)
Comorbidities or other health problems limiting follow-up	5 (6.8)
Fear of injections	3 (4.1)
Inability to take time off work	1 (1.4)
Misconception regarding reimbursement coverage	1 (1.4)

Note: Values are presented as n (%). Percentages were calculated among 74 patients after excluding 7 patients who reported continuing BoNT-A treatment at another center. Multiple responses were allowed; therefore, percentages may exceed 100%.

Among the patients who were contacted by telephone and informed about BoNT-A treatment, 7 patients (8.60%) presented to our hospital for injection within one month after the interview.

Discussion

The main finding of this study was that BoNT-A treatment continuity was low among patients with post-stroke spasticity, and a substantial proportion of patients received only a single injection session. Among the patients evaluated by telephone, the most frequently reported reason for treatment discontinuation or irregular continuation was lack of awareness regarding the need for repeated injections. This finding suggests that BoNT-A treatment should not be considered solely as a pharmacological intervention, but rather as a long-term treatment process requiring regular follow-up, realistic treatment goals, and clear information provided to patients and caregivers. However, this result should not be interpreted as definitive evidence that physicians failed to provide sufficient information; rather, it should be understood within the framework of patient- or caregiver-reported lack of awareness.

The second most frequently reported reason for treatment discontinuation or irregular continuation was perceived lack of benefit from the injection. Among the 18 patients who stated that they did not experience any improvement after treatment, 16 reported that they had expected spasticity to disappear completely after the injection. It has been reported that patients may have difficulty accepting functional outcomes in the early stages of the disease and may have high expectations regarding BoNT-A treatment (10). When these expectations are not met, motivation may decrease, which may lead to treatment discontinuation. Unmet expectations have been reported to be an important barrier to long-term BoNT treatment continuity (11). Providing patients with clear information about realistic treatment goals may help reduce unrealistic functional expectations. In addition, loss of interest in BoNT treatment that does not provide sufficient symptom relief may result in treatment discontinuation among patients with spasticity, including those with post-stroke spasticity (11).

The effect of BoNT-A treatment is temporary, and repeat administration is generally planned after the clinical effect of the previous injection has diminished. It has been reported that most patients with spasticity require repeated BoNT-A injections every 3–4 months (13, 14). Therefore, it is important to inform patients that BoNT-A treatment is not a one-time intervention and that repeated injections may be required under regular follow-up according to clinical need.

The optimal therapeutic response to BoNT-A generally becomes more evident after several treatment sessions, and complete satisfaction should not be expected immediately after the first injection (15-17). Patients starting treatment should be informed that effectiveness may develop over time.

Five patients did not continue BoNT-A injections because comorbidities reduced their focus on spasticity treatment. It has been reported that additional comorbidities may prolong the interval between BoNT injections (10).

No association was found between treatment continuity and living in an urban or rural area. Only one patient reported being unable to attend treatment because of inability to take time off work. Logistical barriers, such as access to healthcare services, play an important role in treatment adherence (18). However, this did not emerge as a prominent problem among our patients. The fact that 70% of our patients lived in urban areas may have contributed to this finding.

Medication use was independently associated with the number of injections. The higher number of injections among patients using medication may suggest that these patients had greater treatment needs or were followed more closely for spasticity management. However, because the number of injections is not a direct indicator of treatment discontinuation, this finding should not be interpreted as an independent determinant of treatment non-adherence.

Three patients did not return for treatment because of fear of injections. In post-stroke spasticity, multiple injections are administered into different muscles. It has been reported that the complexity of injection patterns used in post-stroke spasticity may contribute to adherence problems (11). One patient did not return for treatment because of the misconception that the injection would incur personal costs, although the national health insurance system in Türkiye covers the full cost of BoNT-A treatment.

In our study, no association was found between the number of injections and age or sex. Similarly, no significant association between long-term treatment adherence and age or sex has been reported in patients with post-stroke spasticity (9). In contrast to our findings, however, older age has been reported to interfere with adherence to BoNT-A treatment because of pathophysiological factors, such as reduced muscle

strength, recurrent strokes, or comorbidities, as well as behavioral factors, such as lower perceived need for treatment or lower perceived effectiveness (11, 12). The relatively small sample size may have limited our ability to detect such associations.

In our patients with post-stroke spasticity, the mean time from stroke onset to the first BoNT-A injection was approximately three years. Previous studies have reported that this interval may range from 92 days to 4.5 years (9, 10, 14). Delays in botulinum toxin treatment have been attributed to late diagnosis of spasticity and logistical difficulties (10, 14). In addition, patients often undergo physical therapy or occupational therapy and oral medication trials before BoNT-A treatment, which may lead to additional delays (19). Post-stroke spasticity is common and affects 4–27% of patients in the acute phase, defined as 1–4 weeks after stroke; 19–26.70% in the subacute phase, defined as 1–3 months; and 17–42.60% in the chronic phase, defined as after 3 months (5). Therefore, avoiding delays in treatment may be more appropriate, as early intervention for spasticity may minimize musculoskeletal complications and improve the effectiveness of rehabilitation. Initiation of abobotulinumtoxinA treatment within three months after stroke has been reported to be beneficial in reducing muscle tone at one and three months after treatment (20, 21).

The strengths of this study include its evaluation of long-term BoNT-A treatment continuity in post-stroke spasticity using real-world data and its assessment of reasons for treatment discontinuation through patient- or caregiver-reported information. The 12-year study period is important because it reflects BoNT-A treatment continuity in routine clinical practice. In addition, the assessment of the number of injections and injection intervals using medical records and patient reports ensured that findings related to treatment continuity were not based solely on patient statements. By highlighting the reported lack of awareness regarding the need for repeated BoNT-A applications, this study emphasizes the possible role of modifiable factors, such as patient education and regular follow-up planning, in treatment continuity.

This study has several limitations. First, its single-center and retrospective design limits the generalizability of the findings. In addition, the exclusion of deceased patients, patients younger than 18 years of age, and patients who could not be contacted by telephone may have introduced selection bias. Of the initial 119 patients, 11 were deceased, 26 could not be contacted by telephone, and one patient was younger than 18 years of age. Although the general age, sex, and residence distribution of the source cohort appeared to be similar to that of the final sample, individual baseline data for excluded patients were limited; therefore, no statistical comparison could be performed between included and excluded patients. Second, the reasons for treatment discontinuation or irregular continuation were obtained through semi-structured telephone interviews and were based on patient or caregiver self-report. Although obtaining responses from first-degree caregiver relatives when patients were unable to provide sufficient information facilitated data collection, the inability to analyze patient and caregiver responses separately increases the possibility of proxy response bias. In addition, some patients or caregivers reported treatment-related information long after the last injection, which may have introduced recall bias.

Third, awareness regarding the need for repeated BoNT-A treatment could not be independently verified through standardized patient education documents, clinician counseling notes, or an institutional education protocol. Although written procedural consent was obtained before BoNT-A injections in routine clinical practice, these forms do not constitute standardized education or counseling records regarding the need for repeated treatment. Therefore, although the findings suggest that patient- or caregiver-reported lack of awareness regarding the need for repeated BoNT-A treatment may have contributed to treatment discontinuation or irregular continuation, they should not be interpreted as definitive evidence that physicians did not provide sufficient information. Fourth, although spasticity severity, muscle-based injection patterns, and dose-related factors were available in medical records, they were not included in the present analysis because the primary aim of this study was to evaluate treatment continuity and reasons for treatment discontinuation. In addition, individualized functional goals, disease course, and post-injection clinical outcomes were not consistently available in the retrospective records. Therefore, information-related barriers could not be fully distinguished from clinical, therapeutic, or disease-related reasons for treatment discontinuation. This limits the interpretation of the findings because of the possibility of uncontrolled confounding. Finally, the interview guide was developed by the researchers for this study and was not a validated questionnaire. Therefore, information bias, social desirability bias, and interviewer bias cannot be excluded. Because there was no separate control group consisting of patients who continued regular BoNT-A treatment, causal inference cannot be made. The lack of a structured follow-up protocol specific to BoNT-A treatment also suggests that the findings may

have been influenced by the clinical workflow specific to our center.

In conclusion, BoNT-A treatment continuity was low among patients with post-stroke spasticity, and a substantial proportion of patients received only one BoNT-A injection during the 12-year study period. The most frequently reported reason for treatment discontinuation or irregular continuation was patient- or caregiver-reported lack of awareness regarding the need for repeated treatment. These findings suggest that clearer and standardized patient/caregiver education may support treatment adherence and continuity in BoNT-A therapy. Structuring BoNT-A treatment within specialized spasticity clinics may strengthen information sharing and facilitate regular patient follow-up.

Acknowledgment
We thank all patient participants who contributed to the conduct of this study.

Conflict of Interest Statement
The authors have no competing interests to declare that are relevant to the content of this article.

Ethical Approval
This study was approved by the Süleyman Demirel University Ethics Committee for Health Sciences (12.05.2025, approval no: 96/37). The research was conducted in accordance with the ethical principles of the Declaration of Helsinki.

Consent to Participate and Publish
In routine clinical practice, written procedural consent was obtained before BoNT-A injections. The retrospective review of medical records was conducted under ethics committee approval. Verbal informed consent was obtained before the telephone interview from patients or, when patients were unable to provide sufficient information, from their first-degree caregiver relatives.

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Availability of Data and Materials
Data are available on request due to privacy or other restrictions.

Artificial Intelligence Statement
The authors declare that they have not used any type of generative artificial intelligence for the writing of this manuscript, nor for the creation of images, graphics, tables, or their corresponding captions.

Authors Contributions
HY: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Validation; Visualization; Writing-original draft.

SS: Conceptualization; Formal analysis; Investigation; Methodology; Project administration; Resources; Supervision; Validation; Writing-review & editing.

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Appendix 1. Telephone Interview Guide

Reasons for Discontinuation or Irregular Continuation of BoNT-A Treatment

Purpose of the interview: This interview was conducted to identify patient- or caregiver-reported reasons for not continuing BoNT-A treatment regularly, continuing it irregularly, or not maintaining treatment at the study center among patients who received BoNT-A treatment for post-stroke spasticity.

Mode of administration: The interview was conducted in a semi-structured format. First, the main open-ended question was asked; when the response was unclear, the follow-up questions below were used.

No.	Question / Interview Item	Question Type	Response / Note
1	Why did you not continue BoNT-A treatment regularly?	Main open-ended question	The participant's own statement was recorded.
2	Had you previously been informed that BoNT-A treatment could be repeated according to clinical need?	Follow-up question	Yes / No / Does not remember
3	Did you benefit from the injection?	Follow-up question	Yes / No / Partially / Unclear
4	Did you not continue treatment because you thought your spasticity had decreased?	Follow-up question	Yes / No / Unclear
5	Did you continue BoNT-A treatment at another center?	Follow-up question	Yes / No / Unclear
6	Were you unable to attend follow-up visits because of a comorbidity or another health problem?	Follow-up question	Yes / No / Unclear
7	Did you not continue treatment because of fear of injection?	Follow-up question	Yes / No / Unclear
8	Were you unable to attend follow-up visits because you could not obtain leave from work or due to similar work-related reasons?	Follow-up question	Yes / No / Unclear
9	Did you have misinformation or concerns about reimbursement coverage or treatment cost?	Follow-up question	Yes / No / Unclear

Note: Because more than one reason could be reported, the responses should not be considered mutually exclusive categories. When the patient was unable to provide sufficient information, responses were obtained from the caregiver, who was a first-degree relative.

Abbreviation: BoNT-A, botulinum toxin A.