Adherence to Clinical Practice Guidelines for Treatment of Bell's Palsy

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ABSTRACT

Introduction: Bell's palsy is the most common cause of acute facial nerve paresis and paralysis with devastating disability yet high rate of spontaneous recovery. Patients who do not fully recover have functional disability that may require reconstructive surgery. The Clinical Practice Guideline: Bell's Palsy recommends treatment with high-dose steroids as it shows a higher likelihood of complete recovery. However, guideline adherence rates are inconsistent and unstudied.

Objective: To identify the frequency at which hospital-based clinicians at the University of Wisconsin-Madison follow recommended clinical guidelines and prescribe high-dose steroid medication.

Methods: Charts were reviewed from a single hospital (University Hospital) to evaluate Bell's palsy guideline adherence. All hospital-based encounters from 2008 through 2018 with primary diagnosis of Bell's palsy (ICD-9 351.0 and ICD-10 G51.0) were identified. Encounters were excluded if they had a diagnosis of Bell's palsy within 1 year prior (n=250) and did not have a medication list available (n=353). We examined patient demographics, common comorbidities, and any radiology and lab orders.

Results: We identified 565 patients with a primary diagnosis of Bell's palsy with available medication lists; 77.70% received the recommended treatment. The patients' median age was 47 (interquartile range 34-59), 52.16% were male, and 82.46% were treated by emergency medicine clinicians. Other treating clinicians were hospital-based primary care, otolaryngology and plastic surgery, and others. Multivariate analysis showed that treating clinician specialty was the only significant positive predictor.

Conclusions: A significant portion of clinicians followed treatment guidelines for Bell's palsy. Further and larger research is needed to better identify points of intervention to improve guideline adherence.

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INTRODUCTION

Bell's palsy is the most common cause of acute facial nerve paresis (weakness), and paralysis, which can lead to devastating disability and disfigurement. The incidence of Bell's palsy is 15 to 30 new cases per 100,000 people annually,[1,2] including approximately 875 to 1,750 cases in Wisconsin. Based on population estimates, Wisconsin clinicians will diagnose between 1,150 and 1,700 patients with Bell's palsy annually. Bell's palsy causes dysfunction of the facial nerve, which carries neurons to various muscles and salivary glands of the face, and it most often presents unilaterally. While 80% to 90% of patients will recover fully, this leaves a significant group with residual deficits for which patients may seek care, such as difficulty with eye closure, asymmetric smile, nasal breathing dysfunction, eyebrow droop, or trouble eating, Consequential facial disfigurement may impair interpersonal relationships, contribute to anxiety and depression, and require chronic therapy or complex reconstructive surgery.[1,3,4]

To increase the likelihood of improved facial function outcomes and decrease the need for therapy or surgical intervention, clinicians should prescribe steroids at the time of diagnosis.[5,6] The etiology of Bell's palsy is unknown, making it a diagnosis of exclusion. However, it is commonly thought to be due to inflammation of the facial nerve, potentially explaining the role of steroids to reduce inflammation and limit nerve damage. Madhok et al showed that patients with Bell's palsy who received steroids expe-

rienced less facial spasm, less motor synkinesis (unwanted facial movements), and less crocodile tears (watering eyes when eating or chewing) when compared to patients who received placebo alone.[2] A prospective randomized control trial by Sullivan et al found recovery at 3 months significantly higher following recommended steroid treatment versus placebo (83.0% vs 63.6%), with the number needed to treat to achieve 1 additional recovery of 6 (95% CI, 4-9).[5] Similarly, Engström et al found shorter times to recovery, as well as a significant increase in complete facial nerve recovery in patients treated with high-dose burst and taper prednisolone versus placebo.[6] The randomized control trials done by Sullivan et al and Engstrom et al are the 2 studies referenced in the American Academy of Otolaryngology-Head and Neck Surgery 2013 published Clinical Practice Guideline: Bell's Palsy (Guideline), which strongly recommends high-dose steroids within 72 hours of symptom onset to increase the likelihood of complete facial nerve recovery, with benefit of treatment after 72 hours less clear.[5,6] The Guideline recommends a 10-day course of oral steroids with at least 5 days at a high dose (either prednisolone 50 mg for 10 days or prednisone 60 mg for 5 days with a 5-day taper). Modifications are made for patients with diabetes, morbid obesity, previous steroid intolerance, and psychiatric disorders; pregnant patients should be treated on an individualized basis.[3] The Guideline lists an optional recommendation for prescribing antivirals as a supplement to steroids because of the possible role of herpes simplex virus type 1 in the etiology of Bell's palsy. However, in prospective control trials, the addition of the antiviral acyclovir to steroid treatment group showed no significant improvement in recovery rates above steroid treatment alone.[1]

Despite available evidence and the published Guideline, clinicians may fail to prescribe high-dose steroids for patients with newly diagnosed Bell's palsy. Clinical guidelines, in general, are often overlooked and may have poor adherence by clinicians across all medical conditions and specialties. Reasons may include lack of familiarity or agreement, self-efficacy to inquire or manage, and outcome expectancy. The presence of patient barriers like comorbidities and contraindications to guideline recommendations also may restrict clinician adherance.[7,8] These factors may result in clinicians prescribing too low of a steroid dose or no steroids at all. As a result, patients with Bell's palsy will have lower likelihood of complete recovery.

Proper treatment of Bell's palsy depends on accurate diagnosis. Because it presents similarly to Lyme disease, stroke, and other conditions, the diagnostic workup may include lab tests and imaging to exclude other causes. A study from New York suggests that in highly endemic areas, Lyme disease can account for 25% cases of Bell's palsy.[9] To cover for the possibility of Lyme disease, some clinicians may order a Lyme disease serology and prescribe antibiotics in addition to steroids. However, the Guideline recommends against labs, including Lyme testing, imaging, and antibiotics. It states that patients at risk of Lyme disease are better identified by history than Lyme disease serology test results, but there are circumstances where specific testing may be indicated.[3] Atypical presentations—such as a recurrent or bilateral facial paresis, slow or gradual onset—and concurrent neurological findings should be further evaluated with an urgent stroke evaluation and referral to neurology, neurosurgery, head and neck surgery, or otology.

At University Hospital in Madison, Wisconsin (part of UW Health), clinician adherence to the Bell's palsy Guideline is unknown. This study sought to quantify how often hospital-based clinicians prescribe steroids at the recommended dosage as a primary endpoint and to examine adherence to Guideline recommendations for proper diagnostic workup. We performed a chart review and discharge medication list review of hospital patients diagnosed with Bell's palsy from 2008 through 2018. The available data set did not include patients seen in UW Health community primary care clinics and included only hospital-based primary care clinicians. To identify associations with Guideline nonadherence, this study evaluated identifying patient factors including demographics and comorbidities and the treating clinicians' specialty. Imaging studies, lab orders, or additionally prescribed medications (antivirals, antibiotics) also were reviewed. By studying the rate at which clinicians follow the Bell's palsy Guideline and potential influencing factors, this study serves as a foundation for potential interventions that increase Guideline adherence, improve outcomes, and avoid the need for additional treatment, such as reconstructive surgery.

METHODS

Patient charts were reviewed retrospectively for those who received the primary diagnosis of Bell's palsy (ICD-9 351.0 and ICD-10 G51.0) at University Hospital during 2008-2018. Patients were excluded from the study cohort if they had a prior Bell's palsy diagnosis within the past year or did not have a discharge medication list available for review. Age, sex, comorbidities, and treating clinicians' specialty were reviewed. Per Guideline recommendations, patients were included if they were age 16 or older. Existing medication lists were pulled using Rx Drug Class Grouper (Thera Class) for 1001-Anti-Infective Agents, 1004-Endocrine and Metabolic Drugs, 1015-Miscellaneous Products. Qualifying patients were evaluated to find the frequency at which clinicians prescribed high-dose steroids. Due to the inability to reliably determine if each patient presented within the 72-hour window of symptom onset, all available medication lists were included in this study. Prescribed steroids must have met a dosage equal to or greater than 50 mg of prednisolone daily to meet Guideline recommendations.

Next, we evaluated antiviral and antibiotic prescriptions and imaging and lab orders—specifically Lyme disease testing. We also reviewed and ranked the most common patient comorbidi-

Table 1. Demographics and Treating Clinician Specialty for Patients With Primary Bell's Palsy Diagnosis and No Previous Bell's Palsy Diagnosis Within 1 Year Prior, N = 918

Variable	No Medication List Available n (%)	Medication List Available n (%)	*P* value
Number of patients	353 (38.45)	565 (61.55)	
Age	Median 47, IQR 29 – 61	Median 49, IQR 33 – 60	0.194
Sex[a]			0.025
Male	146 (41.36)	277 (46.03)	
Female	207 (58.64)	288 (50.97)	
Specialty of treating clinician[a]			< 0.001
Emergency medicine	34 (9.63)	419 (74.15)	
Primary care (hospital-based)	53 (15.01)	58 (10.27)	
Otolaryngology and plastic surgery	122 (34.56)	23 (4.07)	
Neurology	69 (19.55)	48 (8.50)	
Neurosurgery	7 (1.98)	3 (0.53)	
Eye	61 (17.28)	11 (1.95)	
Medicine specialties	7 (1.98)	3 (0.53)	

Abbreviations: IQR, interquartile range.

[a]Significant difference at $\alpha = 0.05$ level. The testing done to measure association between specialty of treating clinician and presence of medication list was done excluding the specialties neurosurgery, medicine specialties, and advanced practice provider. Stata/SE software could not find statistical power for these categories because their N values were too small in value for Fisher exact test.

Table 2. Most Frequent Comorbidity Diagnoses Found in Patients With Primary Bell's Palsy Diagnosis and Existing Medication List, N=565

Common Secondary Comorbidity Diagnoses	ICD-10 Codes	N (%)
Long-term use of steroids and other medications	Z79	80 (14.01)
Tobacco use	Z72.0	57 (9.98)
Hypertension	I10	53 (9.28)
Diabetes mellitus	E08-E13	37 (6.48)
Hyperlipidemia	E78	31 (5.43)
Headache	R51	29 (5.08)
Disturbance of skin sensation	R20	16 (2.63)

Common secondary comorbidities given an ICD-9 code was cross walked to ICD-10 and similar comorbidities were group together. Synonyms of facial paresis and paralysis were excluded.

ties to evaluate potential influences they may have had on steroid prescription; comorbidities that were shared between more than 2 patients were considered. The most common comorbidities included long-term use of steroids and other medications, tobacco use, hypertension, diabetes mellitus, hyperlipidemia, headache, and disturbance of skin sensation.

We compared patients who had an existing medication list and those who did not by age, sex, common comorbidities, treating clinician specialty, imaging, and lab orders to determine if these 2 groups were significantly different. Age was examined using Mann-Whitney U test for median, and the remaining variables were examined using Fisher exact test. Comparison testing was performed to compare patients who received high-dose steroids and those who did not; analysis of additional antiviral or antibiotic prescriptions was included in this comparison. In doing statistical analyses, specialties were separated for univariate analysis and then reorganized into emergency medicine and nonemergency medicine groups for multivariate analysis. This was performed to identify any trends or associations between subspecialties. However, as there were significantly more emergency medicine clinicians than the other subspecialties combined, it was decided to compare clinicians this way to identify larger associations. The nonemergency medicine group included clinicians from primary care, otolaryngology, plastic surgery, neurology, neurosurgery, eye specialties, and medicine specialties (hematology, infectious disease, medical oncology). All statistical tests were done with the Stata/SE software, version 16.0 and assessed at the $\alpha = 0.05$ level.

RESULTS

We found 1168 distinct patient encounters with the primary diagnosis of Bell's palsy from 2008-2018. After removing 250 patients who had an encounter with a primary diagnosis of Bell's palsy within the previous year, 918 patients remained: 495 females and 423 males. However, no medication list was available for review for 353 patients. There was a significant difference between the patients with a medication list (n = 565) and those without (n = 353) regarding sex and clinician specialty; those with a medication list were more often female and more often treated by emergency medicine clinicians.

The 565-patient cohort had a median age of 49 (interquartile range [IQR] 33-60), 50.97% patients were female, and 74.15% of patients were treated by emergency medicine clinicians. In descending order of frequency, the remaining patients were treated by primary care, otolaryngology and plastic surgery, neurology, neurosurgery, eye specialties, and other medicine specialties (Table 1). As noted, the available data set did not include patients seen in community primary care clinics and included only hospital-based primary care clinicians. The most common comorbidities were organized by frequency, and if more than 1 patient shared the same comorbidity, it was included. These comorbidities are long-term use of steroids and other medications, tobacco use, hypertension, diabetes mellitus, hyperlipidemia, headache, and disturbance of skin sensation (Table 2). From the group with an existing medication list, 180 patients had 1 of the identified common comorbidities. From the same group, 380 patients additionally received antivirals, 216 received imaging, and 306 received lab orders.

Most of the 565-patient cohort (77.70%) received high-dose steroids; however, 22.30% received low-dose steroids or none. Patients who received high-dose steroids had an older median age than those who did not (49 years; IQR, 34.00-59.00 vs 46 years;

IQR, 23.75-62.75, respectively), were more often male (52.16% vs 38.10%), were more often treated by emergency medicine clinicians (82.46% vs 45.24%), and more often received antivirals (73.35% vs 46.03%), imaging (41.16% vs 26.98%), and lab orders (58.77% vs 38.10%) (Table 3). These differences were found to be significant. However, there was no significant difference when the presence of comorbidities was compared.

Table 3. Demographic and Clinical Data for Patient Cohort With a Primary Diagnosis of Bell's Palsy (N = 565), Divided Into Two Groups: Those Who Received High-Dose Steroids per Guideline Recommendation (N=439), and Those Who Did Not Receive Sufficient/Any Steroids (N=126)

Variable n (%)	Received High-Dose Steroids n (%)	Did Not Receive High-Dose Steroids	*P* value
Number of Patients	439 (77.70)	126 (22.30)	
Age	Median 49, IQR 34 – 59	Median 46, IQR 23.75 – 62.75	0.367
Sex[a]			0.004
Male	229 (52.16)	48 (38.10)	
Female	210 (47.84)	78 (61.90)	
Specialty of treating clinician[a]			< 0.001
Emergency medicine	362/419 (86.40)	57/419 (13.60)	
Primary care	33/58 (56.90)	25/58 (43.10)	
Otolaryngology, plastic surgery	5/23 (21.74)	18/23 (78.26)	
Neurology	34/48 (70.83)	14/48 (29.17)	
Neurosurgery	1/3 (33.33)	2/3 (66.67)	
Eye	3/11 (27.27)	8/11 (72.73)	
Medicine specialties	1/3 (33.33)	2/3 (66.67)	
Received antivirals[a]	322 (73.35)	58 (46.03)	< 0.001
Received antibiotics[a]	42 (9.59)	42 (33.33)	< 0.001
Received imaging[a]	182 (41.46)	34 (26.98)	< 0.001
Received lab orders[a]	258 (58.77)	48 (38.10)	< 0.001
Received lyme testing[a]	103 (23.46)	18 (14.29)	0.029
Presence of common comorbidities	139 (31.7)	41 (32.54)	1.00

Abbreviations: IQR, interquartile range.
*Significant difference at $\alpha = 0.05$ level.
The "specialty of treating clinician" row reflects what portion of patients treated by the specific specialty received high-dose steroids and what portion did not.

Univariate analyses were used to find associations with prescription for high-dose steroid medication. Males were 1.77 times more likely than females to receive high-dose steroids ($P = 0.006$). Patients treated by emergency medicine clinicians were 5.56 times more likely to receive high-dose steroids than other treating specialties ($P < 0.001$). Patients who received antivirals were 3.23 times more likely to receive steroids ($P < 0.001$) than those who did not. Patients who received imaging were 1.92 times more likely to receive steroids ($P = 0.004$). Those who had lab orders were 2.32 times more likely to receive steroids ($P < 0.001$). Those who received antibiotics were less likely to receive steroids (OR, 0.21; 95% CI, 0.13-0.35) (Table 4).

Variables that were found to have significant odds ratios following univariate analysis were then used for multivariable logistic regression analysis. Thus, sex, treating specialty, antibiotic and antiviral prescriptions, and lab order groups were evaluated. Treatment by an emergency medicine physician, not receiving an antibiotic prescription, and receiving lab orders were significant positive predictors of Guideline adherence. When controlling for other variables, patients treated in the emergency department were 4.00 times more likely to receive steroids (95% CI, 3.90-4.16); patients with lab orders were 2.32 times more likely to receive steroids (95% CI, 1.13-4.15); and patients who received antibiotics were 0.25 less likely to receive steroids (OR, 0.25; 95% CI, 0.14-0.44) (Table 5). Sex and antiviral prescription were not significant predictors for prescription of high-dose steroids.

DISCUSSION

The primary purpose of the latest Bell's palsy clinical practice guideline is to improve the care and outcomes for patients and to reduce the harmful consequences that come with delayed treatment. However, adherence to Guideline recommendations should be measured. While the majority of University Hospital clinicians followed the Guideline treatment recommendation for Bell's palsy, there should be an ongoing process of improving adherence to fully realize the Guideline's potential.

In this study, clinician specialty, additional antibiotic prescription, and imaging orders were significant predictors of whether a patient received steroids. These findings warrant further investigation and future intervention to avoid long-term consequences and more complex interventions.

Extensive research has been done to identify barriers to guideline adherence. A systematic review done by Cabana et al grouped barriers based on whether they were attributable to physician knowledge, physician attitude, or restriction of a physician's ability.[8] Physician knowledge includes lack of familiarity to guidelines due to volume of information, the time needed to stay informed, and guideline accessibility. For physician attitude, barriers include lack of outcome expectancy and lack of motivation to change practice habits. Clinicians' ability to follow guideline recommendations may be limited by patient factors; patients may be resistant to guideline recommendations or have comorbidities that contraindicate them to the recommended treatment. In our study, comorbidities obtained from the medical record diagnosis co-coding did not have a significant influence on proper steroid prescription, but other patient-centered barriers may have influenced inconsistencies in Bell's palsy treatment, such as patient demographics and specialty of treating clinician.

Bell's palsy presents acutely; therefore, emergency medicine cli-

nicians are more likely to see these patients than medicine subspecialists. Emergency medicine clinicians' higher rates of Guideline adherence can be explained by their higher rates of exposure to Bell's palsy, helping them become more comfortable with its diagnosis and treatment. Exposing medicine subspecialists to Bell's palsy is a potential intervention that could improve Guideline adherence. Patients evaluated in community primary care clinics or urgent care were not included in this study, such that rate of Guideline adherence by community-based primary care clinicians were not studied.

Patients who received antibiotics were less likely to receive steroids. This suggests that treating clinicians were confident that the cause of the patient's facial disfigurement was bacterial in origin. Historically, there has been support for a nonviral cause of Bell's which led many clinicians to prescribe antibiotics.[10] Clinician lack of outcome expectancy and poor motivation to change historical practices is a well-studied barrier to guideline adherence, which may explain why providers are prescribing antibiotics over steroids.

Clinicians who diagnosed Bell's palsy after ordering labs were more likely to prescribe steroids. The Guideline recommends against lab orders due to the lack of specific findings. However, Bell's palsy may mimic other diagnoses such as stroke, multiple sclerosis, Guillain-Barre syndrome, meningitis, Lyme disease, sarcoidosis, or different neoplasms.[11] Therefore, many clinicians may order labs to exclude other diagnoses with more confidence. The reassurance provided by normal lab results may explain how lack of self-efficacy serves as a barrier to Guideline adherence. Additionally, this may explain why patients who were prescribed steroids also received imaging; the additional but unnecessary imaging orders provide clinicians with the confidence that they are not missing a different, more life-threatening diagnosis.

Despite barriers to Bell's palsy guideline adherence, University Hospital clinicians had high rates of Guideline adherence. Efforts can be made to further identify areas of intervention to improve the overall care and experience for patients with Bell's palsy. A manuscript discussing primary care clinicians' adherence to the otitis media with effusion clinical practice guideline adopted by the American Academy of Otolaryngology—Head and Neck Surgery Foundation had a statistically significant increase in guideline adherence after presenting mock cases and diagnosis and management were taught with simulation.[11] Clinicians who may care for patients with Bell's palsy may benefit from workshops with case-based learning, where they can practice applying the Bell's palsy Guideline to different scenarios involving patients presenting with facial paresis. By implementing case-based learnings, several of the barriers to guideline adherence can be addressed simultaneously.

Raising Guideline awareness among Wisconsin clinicians and planning for interventions to improve adherence can increase the rates of complete recovery for Bell's palsy patients and reduce the need for more complex interventions, such as therapy and reconstructive surgery.

Table 4. Univariate Analysis with Odds Ratios Showing How Patient Demographics and Clinical Workup May Have Influenced Receiving Appropriate Treatment

Variable	Odds Ratio	95% CI	*P* value
Male (Baseline: female)	1.77	1.18 – 2.66	0.006
Emergency medicine (Baseline: nonemergency medicine)	5.56	5.49 – 5.65	< 0.001
Received antivirals (Baseline: did not)	3.23	2.14 – 4.86	< 0.001
Received antibiotics (Baseline: did not)	0.21	0.13 – 0.35	< 0.001
Received imaging (Baseline: did not)	1.92	1.24 – 2.97	0.004
Received lab orders (Baseline: did not)	2.32	1.54 – 3.48	< 0.001
Received lyme testing (Baseline: did not)	1.84	1.07 – 3.17	0.029
Presence of common comorbidities (Baseline: no comorbidities present)	0.96	0.63 – 1.47	0.852

Univariate analysis odds ratios were calculated using patient demographic and clinical data to determine the associations they have with receiving high-dose steroids. When examining specialty of treating physician, we specifically looked only at emergency medicine because they made up the dominant specialty of treating clinician that did prescribe high-dose steroids.

Table 5. Multivariable Logistic Regression Predicting Receiving High-Dose Steroids Among Patients Who Had an Available Medication List

Variable	Odds Ratio	95% CI	*P* value
Male (Baseline: female)	1.57	0.99 – 2.5	0.056
Emergency medicine (Baseline: nonemergency medicine)	4.00	3.90 – 4.16	< 0.001
Received antivirals (Baseline: did not)	1.50	0.92 – 2.44	0.100
Received antibiotics (Baseline: did not)	0.25	0.14 – 0.44	< 0.001
Received imaging (Baseline: did not)	1.30	0.72 – 2.37	0.385
Received lab orders (Baseline: did not)	2.16	1.13 – 4.15	0.02
Received lyme testing (Baseline: did not)	1.22	0.59 – 2.49	0.591

A significant limitation of this study is that 353 (38.4%) of the 918 distinct patient encounters did not have an available medication list for review. This decrease in the cohort size may be due to errors in data entry or data pull. While this study pulled primary diagnosis, it could have been inadvertently coded, even after an alternate clinical diagnosis was made. Age, sex, and treating clinician specialty were compared and found to have no significant difference between the group that had an available medication list and the group that did not. This suggests that while our final cohort was smaller than expected, it was still representative of

the group as a whole. Another study limitation is that data were extracted from a large academic institution and, therefore, it may be not representative of the state of Wisconsin. Clinicians at larger centers may or may not be more familiar with current practice guidelines than clinicians in smaller hospitals. These findings may not be generalized to all large institutions nationally.

A future direction of this study would seek to study patients seen in UW Health community primary care clinics and other Wisconsin populations. Additionally, the influence of Lyme disease in endemic areas like Wisconsin could be further explored by examining the trend of Lyme testing in patients with facial paralysis.

CONCLUSIONS

Wisconsin clinicians and their patients may benefit from further education regarding Bell's palsy management. High-dose steroids have been shown to accelerate recovery time and increase complete recovery rates. By increasing clinician awareness and comfort with the Bell's palsy clinical practice guideline, patients will receive better care with reduced long-term consequences. Interventions can be done at the institutional and national levels to increase Guideline visibility by taking advantage of hospital communication methods, providing hands-on learning opportunities, and hosting lectures and workshops. If these educational interventions are successful, we may see decreased rates for further complex management, surgical intervention, and, ultimately, higher rates of complete recovery.

Acknowledgements: The authors wish to acknowledge Nicholas A. Marka, MS, Department of Biostatistics, University of Wisconsin School of Medicine and Public Health.

Funding/Support: None declared.

Financial Disclosures: None declared.

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