

Research Article

Trends in Electric Stimulation for Facial Paralysis: Electronic Survey of Physical Therapists in Oregon

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Abstract

The purpose of this study was to examine current views of physical therapists (PTs) and physical therapist assistants (PTAs) in Oregon towards electric stimulation (ES) therapy for facial paralysis through an electronic survey, and to compare these results to current medical evidence from identified human clinical trials. One hundred ninety-three therapists responded to the survey. Fifty-two of the respondents (27%) treat facial paralysis,

of whom 21 (60%) use ES as a mode of treatment. Common reasons for using ES were personal success with it (20/21, 90%), current scientific evidence (6/21, 30%), and referring physician and patients' request (6/21, 29%). Reasons for avoiding ES therapy included research showing it to be ineffective (6/12, 50%), risks outweighing potential benefits (4/12, 33%), and lack of equipment or training (5/12, 40%). Review of current

literature identified six human trials examining the use of ES for facial paralysis with mixed results. In conclusion, rehabilitation service providers in Oregon have a divided opinion on the effectiveness and safety of ES in the treatment of facial paralysis. Additional clinical trials and practice guidelines would improve care for patients with facial paralysis.

Keywords: Bell's Palsy; Facial Paralysis; Electric Stimulation; Physical Therapy

Abbreviations: ES: Electric stimulation; PT: Physical therapist; PTA: physical therapist assistant

1. Introduction

Facial paralysis is the loss of voluntary motor control of one or both sides of the face. Facial paralysis results in drooping of the face and difficulty with speech, eating, and facial expressions. Patients experience incomplete eye closure and eye dryness that increase the risk of permanent vision loss. Psychosocially, facial paralysis can lead to frustration, anxiety, and social isolation [1]. The most common etiology of facial paralysis is idiopathic peripheral nerve palsy, termed Bell's palsy, with an incidence rate estimated to be 1 in 60 persons per lifetime [2]. Other etiologies include tumors such as acoustic neuromas and parotid tumors, infection such as Lyme disease, stroke, and trauma. While complete recovery within three months is expected in two-thirds of patients with Bell's palsy, one-third will have longer sequelae or may never fully recover [3]. Those with delayed or poor recovery may experience facial muscle atrophy from denervation and loss of specificity during reinnervation, resulting in decreased muscle control, twitches, spasms, or involuntary movements [4]. The

benefit of physical therapy in the rehabilitation of patients with facial paralysis is widely accepted, although approaches vary and efficacy is not well quantified. The effectiveness of electric stimulation (ES) for facial paralysis remains controversial. ES is believed to increase muscle use through targeted contraction and to enhance specificity of nerve regeneration pathways to regain optimal fine-motor control [5]. However, the clinical community is divided over the benefits and risks of ES, with some providers advocating it for improved recovery, while others strongly discourage it with concerns for reinforcement of abnormal movement patterns [6, 7]. Individual trials have suggested weak benefit of ES in facial paralysis [8, 9]. Some clinicians discouraging ES cite concern for worse outcomes based on their experience and animal trials [7, 10, 11]. While available clinical trials do not indicate harm, a 2011 Cochrane review suggested higher quality studies need to be performed to make further recommendations on the effectiveness of ES in the treatment of facial paralysis [4]. To further investigate current views and practices regarding the use of ES for facial paralysis, an electronic survey was distributed to Physical Therapists (PT) and Physical Therapist Assistants (PTA) in the state of Oregon. Reported practices are described and compared to published clinical trials assessing ES for the treatment of facial paralysis.

2. Materials and Methods

2.1 Electronic survey

An electronic survey was designed to examine current PT and PTA practices in Oregon regarding ES therapy for facial paralysis. The study was exempt from Institutional Review Board review under the survey,

interview, educational test and public observation category. The survey first asked if the respondent treats patients with facial paralysis, and if so, whether or not they use ES. Therapists treating facial paralysis with ES were asked to record their reasons for using ES and their typical settings for stimulation including waveform, and the pulse frequency and duration if applicable. Those not using ES were asked their reasons for not doing so.

A mailing list of 4,398 licensed PTs and 1,216 licensed PTAs was obtained from the Oregon Physical Therapy Licensing Board. The survey was sent to the 5,135 of those with available email contact information through Survey Monkey (Survey Monkey®, San Mateo, CA) on behalf of the Oregon Health & Science University (OHSU) Otolaryngology - Head and Neck Surgery department. Chi² was used to evaluate the frequency of responses to the electronic survey by subgroups. P<0.05 was considered significant. Statistical testing was performed using SPSS statistical software, version 22.0 (SPSS Inc).

3. Results

3.1 Electronic survey

Of the 5,135 PTs and PTAs who received the survey, 193 responded (3.75%). One hundred and fifty five respondents completed the survey entirely, with 44 (22%) only partially completing the survey. Demographic information and practice setting for the survey respondents is shown in Table 1. Fifty-two of the respondents (27%) treat facial paralysis, of whom 21 (60%) use ES. Ninety percent (19/21) of respondents who treat facial paralysis with ES completed the entire survey, while thirty-nine percent (12/31) of those who

did not use ES completed the entire survey. Those using ES tended to have more years in practice than those not using ES, although the difference was not statistically significant. There were no significant differences in practice settings between therapists using ES and therapists not using ES. The majority of those treating patients with facial paralysis see fewer than two patients a month with facial paralysis (42/52, 91%), while some see more (4/52, 8%).

Table 2 shows participants' recommended frequency and duration for ES treatments. The majority of respondents recommended two to three sessions per week with a duration of one to three months. Of those who specified the type of current, eight therapists recommended biphasic current stimulation and five recommended monophasic current stimulation. Six therapists recommended motor stimulation and two recommended subsensory stimulation. Reasons given to support using ES included having experienced previous success in patient treatment (13/21, 65%), mixed results with some success in the past (7/21, 35%), current evidence to support its use (6/21, 30%), physician recommendation (4/21, 20%), and patients' requests (2/21, 10%). Among respondents who treat patients with facial paralysis but choose not to use ES, less than half provided reasons to support this choice (12 of 28, 43%). These reasons included the perception that research has shown ES to be ineffective (6/12, 50%), considering the risks outweigh the potential benefits (4/12, 33%), lack of equipment (3/12, 25%), lack of training (2/12, 17%), and the length of time spent in treatment (1/12, 8%).

Characteristics	ALL RESPONDENTS N=155	RESPONDENTS TREATING FACIAL PARALYSIS (52 TOTAL, 31 COMPLETED ENTIRE SURVEY):	
		Not using ES (N=12)	Using ES (N=19)
AGE			
>50 years	68(44%)	5 (42%)	13 (68%)
41-50 years	26 (17%)	2 (17%)	3 (16%)
31-40 years	41 (26%)	2 (17%)	2 (11%)
25-30 years	20(13%)	3 (25%)	1 (5%)
YEARS IN PRACTICE:			
>10	98 (63%)	7 (58%)	16 (84%)
5-10	31 (20%)	2 (17%)	2 (11%)
<5	26 (17%)	3 (25%)	1 (5%)
TYPE OF PRACTICE:			
Outpatient Clinic	96 (62%)	11 (92%)	16 (84%)
Acute Care Hospital	19 (12%)	-	-
Skilled Nursing Home	17 (10%)	-	2 (11%)
Home Health Center	13 (9%)	1 (8%)	-
Rehabilitation Center	5 (3%)	-	-
Other*	21(16%)	1 (8%)	-
Not Answered	6 (4%)	-	1 (5%)
HOURS WORKED/WEEK:			
Full time (>30)	112 (72%)	10 (83%)	17 (89%)
Part-time (≤ 30)	37 (24%)	2 (17%)	1 (5.5%)
No answer	6 (4%)	-	1 (5.5%)

*Other types of practice included hospice, athletic training/wellness center, and retired.

Table 1: Demographic and practice information of respondents taking the electronic survey.

RECOMMENDATIONS	RESPONDENTS (N=19)
LENGTH OF PARALYSIS INDICATED FOR THERAPY	
Acute only	10 (50%)
Chronic only	0
Both Acute and Chronic	8 (40%)
No response	2 (10.5%)
FREQUENCY:	
1 session/week	1 (5%)
2-3 sessions/week	14 (74%)
4-5 sessions/week	2 (10.5%)
6-7 sessions/week	2 (10.5%)
DURATION OF THERAPY (MONTHS):	
1	5 (26%)
2	7 (37%)
3	4 (21%)
4	-
5	-
6	1 (5%)
7	-
8	2 (10.5%)
≥ 9	-
HOME THERAPY EQUIPMENT PROVIDED:	
Yes	4 (21%)
No	12 (63%)
Occasionally	3 (16%)

Table 2: Summary of recommendations for electric stimulation for the treatment of facial paralysis by survey respondents.

4. Discussion

This survey indicates the physical therapy community in Oregon is divided in its opinions and practices regarding the use of ES for facial paralysis. Of those respondents who treat facial paralysis and indicated their treatment

method, 60% (21 of 35) chose to use ES. Six human intervention trials comparing electric stimulation to a control intervention for treatment of acute Bell's palsy have been published [8, 9, 12-15]. Four of these six trials show weak benefit [8, 9, 12, 15] and two of six

show no benefit but also no clear harm [13, 14]. Only the Manikandan 2007 trial suggested the possibility of harm, with a trend to worse synkinesis in the ES group, but the rate of synkinesis was low and did not reach a statistically significant difference compared to control [15]. Interpretation of the results of the studies on ES for facial paralysis is limited by their quality. The trials are small and thus likely underpowered to detect a significant difference between treatment and control in therapeutic benefit, with sample size ranging from 16 to 149 patients for a total of 427. Similarly, the average follow-up for the trials was 3 months, however further recovery and complications such as muscle spasms, twitches, and synkinesis typically presents later than this. The studies only included patients with Bell's palsy, thus their findings may not apply to other causes of facial paralysis. An additional limitation is the measurement of outcomes. The most commonly utilized outcome scale was the House Brackman (HB) scale. This scale identifies six facial function categories that range from normal to complete paralysis based on clinician-grading, and this scale has been shown to have low inter-rater reliability [16]. In addition, only Tuncay *et al.* [8] blinded the evaluators in the research team, and none of the studies attempted to blind the participants to group allocation. Furthermore, Tuncay *et al.* [8] was the only trial that included patient-reported outcomes using the facial disability index score (FDI). Additional trials may consider using validated global quality of life questionnaires and facial paralysis-specific questionnaires such as the synkinesis assessment questionnaire (SAQ) and the facial clinimetric evaluation (FaCE) instrument to more fully measure outcome [17]. Published trials also had a high risk for selective reporting drop-out rates, tolerability,

and adverse effects were not consistently reported. Kim and Choi [12] were the only group to report adverse effects in their study, with 2 of 60 participants reporting mild pain with incorrect settings and 4 cases of contact dermatitis, likely from the electrode adhesive [12].

The impact of the inconclusive published results of studies on ES for facial paralysis is reflected in the divided responses received from the electronic survey of clinicians, demonstrating that concerns about effectiveness and potential adverse effects of ES limit its clinical use. Although the published clinical trials do not clearly support increased adverse effects with ES, reporting is inconsistent. Survey respondents who report using ES for facial paralysis used a similar mix of stimulation settings as those reported in the current literature. The specific ES parameters identified in published clinical trials included biphasic [9, 14, 15] and monophasic waveforms [8, 12, 13, 15] with most using motor level stimulation; [8, 9, 13-15] although one study used subsensory stimulation [12]. Survey respondents use biphasic and monophasic waveforms and motor and subsensory stimulation. However, preferences differed in frequency and total duration of therapy when compared to published research. While the most recent studies showing success with ES for facial paralysis treated 5 to 7 times per week, [8, 12] the majority of survey respondents (74%), recommended only 2 to 3 sessions of ES per week. Similarly, while clinical studies utilized treatment durations of at least 2-3 months and up to 6 months, [8, 12, 18] the majority of survey respondents recommended treating for only 1 to 3 months (84%). Among those who did not use ES, in addition to believing ES to be ineffective for facial paralysis, lack of training, inconvenience due to the time

involved, or lack of access were other reasons to not offer ES. Furthermore, there is currently very little research examining the cost-effectiveness of ES for facial paralysis, and the cost of this therapy may limit its use [6, 13, 19]. Clinical practitioners are more likely to implement therapies with clear supporting evidence, a strong community of professional support, and collaborative work settings [20]. Without these, practitioners are less likely to implement practices, especially when they require new investments. This study was limited by a low response rate of 3.75%, although the total number of respondents was substantial (193). Not all PTs and PTAs on the list of contacts generated from the Oregon Physical Therapy Licensing Board are currently in practice, which may have affected the response rate. Furthermore, facial paralysis is a relatively uncommon condition presenting for physical therapy, which could lead to low interest and participation in the survey.

5. Conclusion

Rehabilitation clinicians in Oregon have a divided opinion about the effectiveness and safety of ES in the treatment of facial paralysis. The widely varied opinions on ES use, stemming from limited quality research, encourage further exploration into the efficacy and appropriate application of ES in patients with facial paralysis. This survey and review of the available studies suggest stronger evidence is needed to support practice guidelines on the use of ES in the treatment of facial paralysis to improve the care given to these patients.

References

1. Macgregor FC. Facial disfigurement: problems and management of social interaction and implications for mental health. *Aesthetic Plast Surg* 14 (1990): 249-257.
2. Holland NJ, Weiner GM. Clinical review Recent developments in Bell ' s palsy. *Br Med J* 329 (2004): 553-557.
3. Peitersen E. Bell's Palsy: The Spontaneous Course of 2,500 Peripheral Facial Nerve Palsies of Different Etiologies. *Acta Otolaryngol* 549 (2002): 4-30.
4. Teixeira LJ, Valbuza J, Prado GF. Physical therapy for Bell s palsy (idiopathic facial paralysis). *Cochrane Database Syst Rev* (2008): CD006283.
5. Gordon T, Chan KM, Sulaiman OAR, Udina E, Amirjani N, Brushart TM. Accelerating axon growth to overcome limitations in functional recovery after peripheral nerve injury. *Neurosurgery* 65 (2009): 132-144.
6. Shafshak TS. The treatment of facial palsy from the point of view of physical and rehabilitation medicine. *Eura Medicophys* 42 (2006): 41-47.
7. Diels HJ. Facial paralysis: Is there a role for a therapist? *Facial Plast Surg* 16 (2001): 361-364.
8. Tuncay F, Borman P, Taşer B, et al. Role of Electrical Stimulation Added to Conventional Therapy in Patients with Idiopathic Facial (Bell) Palsy. *Am J Phys Med Rehabil* 94 (2015): 222-228.

9. Flores PF, Medina RZ, Haro LG. Idiopathic peripheral facial paralysis treatment physiotherapy versus prednisone [Tratamiento de la parálisis facial periférica idiopática: terapia física versus prednisona]. *Revista médica del Instituto Mexicano del Seguro Social* 36 (1998): 217-221
10. Skouras E, Merkel D, Grosheva M, et al. Manual stimulation, but not acute electrical stimulation prior to reconstructive surgery, improves functional recovery after facial nerve injury in rats. *Restorative Neurology and Neuroscience* 27 (2009): 237-251.
11. Cohan CS, Kater SB. *Suppression of Neurite Elongation and Growth Cone Motility by Electrical Activity* Published by: American Association for the Advancement of Science. Stable URL: <http://www.jstor.org/stable/1697267>
REFERENCES Linked references are available on JSTOR for t 232 (2017): 1638-1640.
12. Kim J, Choi JY. The effect of subthreshold continuous electrical stimulation on the facial function of patients with Bell's palsy. *Acta Otolaryngol* 136 (2016): 100-105.
13. Mosforth J, Taverner D. Physiotherapy for Bell's Palsy. *British Medical Journal* 2 (1958): 675-677.
14. Alakram P, Puckree T. Effects of electrical stimulation on house-brackmann scores in early bells palsy. *Physiother Theory Pract* 26 (2010): 160-166.
15. Manikandan N. Effect of facial neuromuscular re-education on facial symmetry in patients with Bell's palsy: a randomized controlled trial. *Clin Rehabil* 21 (2007): 338-343.
16. Kanerva M, Poussa T, Pitkäranta A. Sunnybrook and House-Brackmann Facial Grading Systems: Intrarater repeatability and interrater agreement. *Otolaryngol - Head Neck Surg* 135 (2006): 865-871.
17. Kahn JB, Gliklich RE, Boyev KP, et al. Validation of a Patient-Graded Instrument for Facial Nerve Paralysis: The FaCE Scale. *Laryngoscope* 111 (2001): 387-398.
18. Targan, RS Alon, G Kay S. Effect of long-term electrical stimulation on motor recovery and improvement of clinical residuals in patients with unresolved facial nerve palsy. *Otolaryngol Head Neck Surg* 122 (2000): 246.
19. Taverner DD. Treatment of facial palsy. *Arch Otolaryngol* 81 (1965): 489-493.
20. Sheldon TA. What's the evidence that NICE guidance has been implemented? Results from a national evaluation using time series analysis, audit of patients' notes, and interviews. *Bmj* 329 (2004): 999.



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