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Anodyne Therapy System: Treatment of peripheral neuropathy in diabetic patients.

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PRIORITISING SUMMARY

REGISTER ID: **000099**

NAME OF TECHNOLOGY: **ANODYNE THERAPY SYSTEM**

PURPOSE AND TARGET GROUP: **TREATMENT OF PERIPHERAL NEUROPATHY IN DIABETIC PATIENTS**

STAGE OF DEVELOPMENT (IN AUSTRALIA AND/OR NEW ZEALAND):

- ☒ Yet to emerge
- ☐ Experimental
- ☐ Investigational
- ☐ Nearly established
- ☐ Established
- ☐ Established *but* changed indication or modification of technique
- ☐ Should be taken out of use

AUSTRALIAN THERAPEUTIC GOODS ADMINISTRATION APPROVAL

- ☐ Yes — ARTG number
- ☒ No
- ☐ Not applicable

INTERNATIONAL UTILISATION:

COUNTRY	LEVEL OF USE		
	Trials Underway or Completed	Limited Use	Widely Diffused
United States	✓		

IMPACT SUMMARY:

Anodyne Therapy LLC provides the Anodyne Therapy System (Model 480) for the treatment of diabetic peripheral neuropathy. The therapy is widely available in the United States in specialised centres. The technology is not new: it was first approved in the United States in 1994 for a different indication, for pain relief and to improve circulation in soft tissue injuries (Anodyne Therapy 2004).

BACKGROUND

Peripheral neuropathy is a frequent complication of diabetes, most commonly causing damage to the nerves in the feet. The sequelae of diabetic neuropathy include pain, digestive problems, muscle weakness, non-healing ulcers and lower extremity amputation, and are associated with reduced quality of life and increased mortality (AIHW 2002). Diabetic neuropathy is generally a result of chronically high blood glucose levels which affect the metabolism of nerves. This in turn causes the accumulation of toxins that damage nerve structure and function.

The Anodyne Therapy System, model 480, uses near-infrared light from an array of diodes on four small black pads that are strapped to the soles of the feet and above the ankles. The pads are wired to a control box and when the machine is turned on the diodes emit a form of infrared light, which have a penetrating, heating effect. The aim of the therapy is to provide symptom relief and improve sensation in the feet.

The device consists of the following: a 12-V DC power source, a control unit and eight flexible therapy pads on which are mounted 60 superluminous gallium-aluminium diodes connected to the power source (Figure 1). The diodes mounted on the flexible therapy pads emit photoenergy in the near-infrared spectrum (890 nm) that is pulsed 292 times per second, having a duty cycle (time on) of 50% (Prendergast et al 2004).

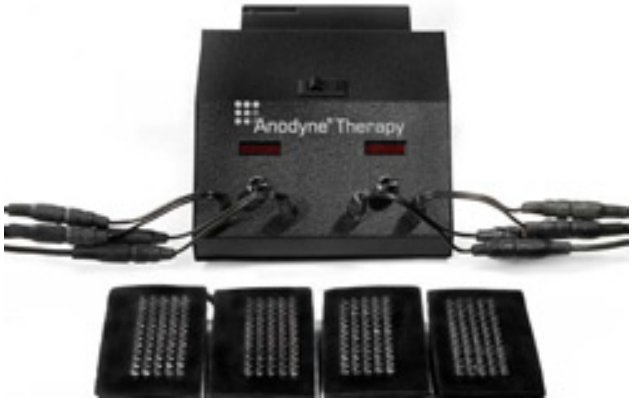

Figure 1: Printed with permission, Anodyne Therapy LLC

Anodyne treatment is reimbursed in the United States when it is delivered as part of a physical rehabilitation plan of care developed by a physician or a physical/occupational therapist. The reimbursement ranges from approximately US$5 to US$36 depending on the reimbursement agency (personal communication, Andoyne company representative).

CLINICAL NEED AND BURDEN OF DISEASE

The risk of developing neuropathy increases with the duration of diabetes, poor blood glucose control and age. Strict glycaemic control has been shown to reduce or prevent the development of neuropathy, and may alleviate neuropathic symptoms. Early identification is essential, especially in people with no obvious symptoms, to prevent the late sequelae of neuropathy. It has been estimated that peripheral neuropathy occurs in 60% of diabetics and results in greater risk of foot ulceration, recurrence of foot ulceration and foot amputation (Stillman 2004).

In the 2000 Australian National Diabetes Information and Benchmarking (ANDIAB) study, almost one quarter (24.2%) of adult patients were recorded as having peripheral neuropathy following clinical assessment (AIHW 2002). However, it should be noted that ANDIAB data are obtained from specialist diabetes clinics that are likely to see more patients with complications.

In 2001-2 there were 440 and 1,468 hospital separations for principal diagnosis E10.4 ‘Insulin-dependent (Type 1) diabetes mellitus with neurological complication’ and E11.4 ‘Non-insulin dependent (Type 2) diabetes mellitus with neurological complication’ (AIHW 2004).

With an ageing population and an increasing incidence of diabetes in Australia it is likely that the incidence of diabetic co-morbidities, such as peripheral neuropathy, will also increase.

DIFFUSION

The system is widely used in the United States for other applications (Anodyne Therapy 2004) and receives reimbursement through American Medicare when it is delivered as part of a physical rehabilitation plan developed by a physician or occupational/physical therapist (personal

communication, Anodyne company spokesperson). There are nearly 1400 treatment centres across the United States.

It is likely to be well-received in Australia as an alternative or adjunct to costly pharmacotherapy treatment.

COMPARATORS

The standard treatments for diabetic neuropathy include maintaining normal glycaemic levels and, when not achievable, some patients require other forms of symptom relief. These involve anti-inflammatory medication, topical treatments, physical therapy and acupuncture (Boulton 2003).

COST IMPACT

Anodyne Therapy devices are currently US$4895.00 for a 4-array home system and US$6295.00 for a 6-array professional system for use in a clinical setting in the United States.

The cost of treating diabetic neuropathy with medications contributes significantly to the costs of managing diabetes in Australia. Although it is unclear as to the total cost, or whether the Anodyne would be any more cost effective.

If Anodyne Therapy is effective, there is the potential for cost savings in terms of the reduced need for primary care management of no-healing ulcers and reduced hospitalisation for amputation procedures.

EFFECTIVENESS AND SAFETY ISSUES

The highest level of evidence evaluating the Anodyne Therapy System was a randomised controlled trial (level II evidence) of 27 patients with either type 1 or 2 diabetes and a diagnosis of peripheral neuropathy (Leonard et al 2004). The patients were initially tested for insensitivity to the 6.65 Semmes Weinstein monofilament (SWM 6.65) to determine loss of sensation.

The patients were stratified into 2 groups. Group1 (n=18) was able to sense the SWM 6.65 at all sites and Group 2 (n=9) were unable to sense the SWM 6.65 at no less than one tested site. Other than level of sensory impairment, both groups were similar in age, sex and weight.

In the first two weeks of the study, patients received either Anodyne Therapy System or sham treatment three times per week for 40 minutes and then in the following two weeks all received active treatment three times per week for the same duration (Leonard et al 2004). Patients were randomised so that one lower limb received a sham treatment and the other an active treatment for the first six visits. Both clinical staff and patients were blinded to actual treatment received. Table 1 table below summarises the study findings.

Table 1. Number of sites on the plantar surface of the foot that were insensate to SWM 5.07 before (baseline) and after 6 and 12 ATS treatments (active diodes versus sham treatment)

Baseline	After 6 treatments	After 12 treatments
Group 1[a]		
3.5 ± 1.0	Active diodes 2.4 ± 1.5 (p<.02)	Active diodes 1.9 ± 1.7 (p< .001)
3.6 ± 1.1	Sham diodes 3.0 ± 1.5 (p< .09)	Active diodes 2.3 ± 1.8 (p<.002)

Group 2[b]		
4.7 ± 0.5	Active diodes	Active diodes
	4.0 ± 1.7 (p=.21)	3.7 ± 1.7 (p=.10)
4.4 ± 0.7	Sham diodes	Active diodes
	4.0 ± 1.7 (p=.27)	3.9 ± 1.7 (p=.28)

Data are means ± Standard Deviations. Five sites were tested on each foot.
[a] n = 18,sensate to 6.65 SWM, [b] n = 9, insensate to 6.65 SWM at one or more sites

The data above suggest that in the short-term the Anodyne Therapy System is effective for diabetic patients who are sensate to the 6.65 SWM but is not effective for those who are partially insensate. The results suggest that the treatment of patients who have not progressed to profound sensory loss may result in a temporary restoration of feeling.

Self-reported pain was reduced the greatest in Group 1. Pain decreased from 4.2±2.3 on a Visual Analogue Scale at baseline to 3.2± 1.9 after the first six treatments (p<.0001) and was still significantly lower after 12 treatments (2.3±1.7 p<.0001). Group 2 patients reported pain reduction but this was not statistically significant. Both groups reported an improvement in balance. At baseline, 16 (89%) patients in Group 1 reported balance impairment compared to 10 (39%) after six treatments and 3 (17%) after 12 treatments. In Group 2, 7 (78%) reported balance impairment at the start of treatment, and 4 (44%) after six treatments. No further improvement was noted after 12 treatments.

A study of 49 patients with established diabetic peripheral neuropathy treated with Andonye Therapy reported that 98% of the patients had improved sensation after 6 treatments and 100% after 12 treatments (Kochman et al 2002). Prior to treatment, the ability to discriminate between hot and cold sensation was absent in 54% of the patients or was impaired in 46%. Although this study reports significant benefits, the study design was of low quality (level IV).

Another case series study (level IV) of 27 patients receiving Anodyne Therapy reported reductions in sensory impairment (Prendergast et al 2003). Patients enrolled in this study were tested for sensory impairment with a Neurometer Current Perception Threshold (CPT). The Neurometer CPT emits transcutaneous electrical stimuli via electrodes that when placed over the big toe, quantifies CPT of the peroneal nerve fibres (Prendergast et al 2004). The study group received 10 treatments of Anodyne Therapy for 40 minutes for 2 weeks and then underwent Neurometer testing to determine the extent of improvement. The authors report all patients obtained improvement in comparison to baseline.

	Baseline*	After Treatment
2000 Hz	657 ± 297	481 ± 195 (p<.001)
250 Hz	324 ± 289	221 ± 213 (p<.02)
5 Hz	193 ± 251	153 ± 246 (p<.4)

* CPT values represent 0.01mA of output intensity. (e.g. a CPT measure of 100 units denotes a stimulus output intensity of 1.0mA was needed to evoke a patient response).

Although this study reported significant changes in sensory perception, results may be biased as some of the patients (n=6) included were not diabetic and the study was not controlled.

All of these studies were limited by the lack of data for long-term outcomes.

ETHICAL, CULTURAL OR RELIGIOUS CONSIDERATIONS

No issues were identified/raised in the sources examined.

CONCLUSION:

There is currently limited, although good quality, evidence available on the safety and effectiveness of the Anodyne Therapy System. In addition, the prevalence of diabetic neuropathy may increase with the growing diabetic population.

HEALTHPACT ACTION:

It is unlikely that the Anodyne Therapy System will have significant policy or clinical impact on the Australian public health system, therefore it is recommended that this technology be archived.

SOURCES OF FURTHER INFORMATION:

Anodyne Therapy [Internet] Available from: http://www.anodynetherapy.com/ [Accessed May 13, 2004]

Australian Institute of Health and Welfare 2002. Diabetes: Australian facts 2002. AIHW Cat. No. CVD 20 (Diabetes Series No.3). Canberra: AIHW.

Australian Institute of Health and Welfare 2004 [Internet] Available from: http://www.aihw.gov.au/cognos/cgi-bin/ppdscgi.exe?DC=Q&E=/AHS/principaldiagnosis0102 [Accessed May 20, 2004].

Boulton, A. J. (2003). 'Treatment of symptomatic diabetic neuropathy', *Diabetes Metab Res Rev*, 19 Suppl 1, S16-21.

Frykberg, R. G., Lavery, L. A. et al (1998). 'Role of neuropathy and high foot pressures in diabetic foot ulceration', *Diabetes Care*, 21 (10), 1714-1719.

Kochman, A. B., Carnegie, D. H. & Burke, T. J. (2002). 'Symptomatic reversal of peripheral neuropathy in patients with diabetes', *J Am Podiatr Med Assoc*, 92 (3), 125-130.

Leonard, D. R., Farooqi, M. H. & Myers, S. (2004). 'Restoration of sensation, reduced pain, and improved balance in subjects with diabetic peripheral neuropathy: a double-blind, randomized, placebo-controlled study with monochromatic near-infrared treatment', *Diabetes Care*, 27 (1), 168-172.

Petit, W. A., Jr. & Upender, R. P. (2003). 'Medical evaluation and treatment of diabetic peripheral neuropathy', *Clin Podiatr Med Surg*, 20 (4), 671-688.

Prendergast, J. J., Miranda, G. & Sanchez, M. (2004). 'Improvement of sensory impairment in patients with peripheral neuropathy', *Endocr Pract*, 10 (1), 24-30.

Stillman, M. *'Diabetic Ulcers'* Emedicine online [Internet] Available from: http://www.emedicine.com/med/topic551.html [Accessed May 14, 2004].

SEARCH CRITERIA TO BE USED:

Blood Glucose/metabolism
Diabetic Neuropathies/blood/drug therapy/ therapy
Diabetic Neuropathies/ diagnosis/ drug therapy