COST-EFFECTIVENESS AND BUDGET IMPACT OF BOTULINUM TOXIN TYPE A (BoNTA) TREATMENT FOR SEVERE PRIMARY AXILLARY HYPERHIDROSIS INADEQUATELY MANAGED WITH TOPICAL AGENTS

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REVISED ABSTRACT

OBJECTIVE: The cost-effectiveness and budget impact of BoNTA treatment for severe primary axillary hyperhidrosis inadequately managed with topical agents in US managed care populations was assessed using an interactive economic model.

METHODS: An Excel®-based model was developed to estimate the cost-effectiveness and budget impact of an evidence-based treatment algorithm for severe primary axillary hyperhidrosis with BoNTA (50 Units per axilla) treatment following failure of topical aluminum chloride (TAC) and prior to surgery, compared to the treatment algorithm without BoNTA. User-modifiable elements included baseline prevalence from a 150,000 US household survey; population treatment characteristics from retrospective medical and pharmacy claims analyses; and pharmacy and medical unit costs for TAC, BoNTA, and surgery. The baseline perspective was that of a 1 million-member US managed care plan over a 1-year period. Baseline effectiveness rates, defined as the proportion of successfully treated patients, were based on reviews of published studies and the US pivotal phase III registration study for BoNTA.

RESULTS: Based on the incremental proportion of successfully treated patients (68% vs. 50%) and the incremental costs ($20K) to treat 75 patients with severe primary axillary hyperhidrosis, the estimated incremental cost per successfully treated patient for the treatment algorithm with BoNTA compared to the algorithm without BoNTA is approximately $1,400. The incremental per member per month total (pharmacy and medical) cost for the treatment algorithm with BoNTA is approximately $0.002.

CONCLUSION: BoNTA treatment for severe primary axillary hyperhidrosis inadequately managed with topical agents is cost-effective and provides meaningful benefit to plan members for a relatively small incremental cost to the plan.

INTRODUCTION

- Primary focal hyperhidrosis is a disorder of excessive, bilateral, and relatively symmetric sweating occurring in the axillae, palms, soles, or craniofacial region, and can result in occupational, psychological, and physical impairment, and potential social stigmatization.
- Severe primary axillary hyperhidrosis has been reported to be similar to moderate to severe psoriasis in terms of its effect on patients' dermatology-specific quality of life.[1,2,3] In addition, the magnitude of benefit in dermatology-specific quality of life following BoNTA treatment for severe primary axillary hyperhidrosis has been reported to be similar or greater than that for etanercept 50mg twice weekly in patients with moderate to severe psoriasis.[3]
- Published guidelines for the treatment of primary axillary hyperhidrosis recommend:[4]
  - Intradermal injections of BoNTA to patients who fail to respond to initial treatment with over-the-counter antiperspirants and 10% – 35% topical aluminum chloride hexahydrate (TAC).
  - Surgery, such as removal of sweat glands or endoscopic transthoracic sympathectomy (ETS), after failure to respond or intolerance to other treatments. (Figure 1)

FIGURE 1. Treatment Guidelines for Primary Axillary Hyperhidrosis[1]

Educate regarding proper use of over-the-counter antiperspirants versus deodorants

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10-35% Aluminum Chloride hexahydrate using proper technique to avoid irritation[a]

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Intradermal injections of botulinum toxin A

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Surgery: local sweat gland resection[b,c] or endoscopic thoracic sympathectomy[c]

a. Apply to dry axilla at bedtime, wash off in 6-8 hours. Use 3-7 times/week until euhidrotic. Maintenance treatment every 1-3 weeks.
b. Curettage, liposuction, or limited excision.
c. Patient should be seen by both the surgeon and a dermatologist, and be informed of local success and complication rates.

- Thus, BoNTA fulfills the unmet medical need for a safe and effective treatment following failure on TAC but prior to surgery.
- This report assesses the cost-effectiveness and budget impact of the evidence-based treatment algorithm for severe primary axillary hyperhidrosis with BoNTA treatment following failure of TAC and prior to surgery, compared to the treatment algorithm without BoNTA. (Figure 2)

FIGURE 2. Cost-effectiveness analysis: Comparison of the treatment algorithm with BoNTA compared to treatment algorithm without BoNTA

Topical Aluminum Chloride (TAC) ⟶ Botulinum Toxin Type A (BoNTA) ⟶ Surgery

Vs.

Topical Aluminum Chloride (TAC) ⟶ Surgery

METHODS

- An interactive Excel®-based decision analysis model was developed to estimate the incremental cost-effectiveness and potential payer budget impact of bilateral BoNTA treatment (50U per axilla) for severe primary axillary hyperhidrosis when patients are inadequately managed with prescription topical agents (Figure 3).
  - The perspective was that of a 1 million-member US managed care plan over a time horizon of 1 year.
  - User-modifiable elements and key model probabilities are described in Table 1.
  - Treatment and medical (office visits and procedure) costs were included and are presented in Table 2.
- Effectiveness for the various treatments was defined as the proportion of successfully treated patients.
  - The definitions of treatment success for TAC, ETS, and surgical excision of sweat glands were based on a range of endpoints reported in the literature.[5]
  - The definition of treatment success for BoNTA was based on improvement in interference with daily activities due to hyperhidrosis, i.e., a 2-point improvement on the Hyperhidrosis Disease Severity Scale (HDSS) as assessed at 4 weeks post-treatment in a US phase III clinical study.[6]
- Incremental cost-effectiveness, or the cost for each additional successfully treated patient in the treatment algorithm with BoNTA compared to the algorithm without BoNTA, was calculated using the following equation:

$$\frac{\text{Cost}_{\text{Treatment Algorithm with BoNTA}} - \text{Cost}_{\text{Treatment Algorithm without BoNTA}}}{\text{Number of Successful Patients}_{\text{Treatment Algorithm with BoNTA}} - \text{Number of Successful Patients}_{\text{Treatment Algorithm without BoNTA}}}$$

- Budget impact was calculated from the total medical and pharmacy cost to treat patients with severe primary axillary hyperhidrosis from the perspective of a managed care plan.
- Sensitivity analyses were performed using the range of probabilities presented in Table 1 to assess differences in incremental cost-effectiveness and budget impact results from variations in population treatment characteristics, rates for treatment effectiveness, patient acceptance of treatment, and need for follow-up treatment.

RESULTS

- For a 1 million-member US managed care plan adopting the treatment algorithm with BoNTA, the first year estimated number of severe primary axillary hyperhidrosis patients receiving any type of treatment is 75 (0.0075% of the plan population). (Figure 4)

TREATMENT COSTS AND OUTCOMES

- For the 75 severe primary axillary hyperhidrosis patients:
  - The total incremental annual cost of treatment is $19,790 for the treatment algorithm with BoNTA compared to the algorithm without BoNTA, including all drug, visit, and procedural costs. (Table 3A)
  - The number of successfully treated patients is 51 (68%) for the treatment algorithm with BoNTA vs. 37 (50%) for the treatment algorithm without BoNTA.

INCREMENTAL COST PER SUCCESSFULLY TREATED PATIENT

- The estimated incremental cost per successfully treated patient is approximately $1,400 based on the following calculation for 75 patients with severe primary axillary hyperhidrosis patients:

$$\frac{(\$43{,}042_{\text{Treatment algorithm with BoNTA}} - \$23{,}252_{\text{Treatment algorithm without BoNTA}})}{(51\ \text{patients}_{\text{Treatment algorithm with BoNTA}} - 37\ \text{patients}_{\text{Treatment algorithm without BoNTA}})}$$

BUDGET IMPACT

- The incremental per member per month (PMPM) total pharmacy and medical cost for the treatment algorithm with BoNTA is approximately $0.002. (Table 3A)
  - In the treatment algorithm with BoNTA, the total PMPM is $0.004
  - In the treatment algorithm without BoNTA, the total PMPM is $0.002
- The annual cost per severe primary axillary hyperhidrosis patient is $578 in the treatment algorithm with BoNTA vs. $312 in the treatment algorithm without BoNTA. (Table 3B)
  - Thus, the monthly total pharmacy and medical cost per patient is estimated to be $48 in the treatment algorithm with BoNTA compared to $26 in the treatment algorithm without BoNTA. (Table 3B)

SENSITIVITY ANALYSES

- Cost-effectiveness and budget impact results were robust across a range of sensitivity analyses, which focused primarily on axillary hyperhidrosis prevalence, diagnosis, treatment acceptance, and treatment effectiveness rates.
  - Variations in these key probabilities for the decision analysis model resulted in small changes to the incremental cost-effectiveness and budget impact of the treatment algorithm with BoNTA.

DISCUSSION

- Patients with severe primary axillary hyperhidrosis experience substantial occupational, psychological, and physical impairment.
  - Dermatology-specific quality of life impairments in these patients are similar to those experienced by patients with moderate to severe psoriasis.[3]
- While the measure of treatment success used in this cost-effectiveness analysis cannot be directly compared to other dermatologic conditions, the dermatology-specific quality of life improvements observed with BoNTA treatment for severe primary axillary hyperhidrosis have been reported to be similar or greater than those reported for biologic treatment for moderate to severe psoriasis.[3]
- The incremental pharmacy budget impact of the treatment algorithm with BoNTA for severe primary axillary hyperhidrosis at approximately $0.002 PMPM is minimal compared to published pharmacy budget impacts (PMPM) for other treatments[8] such as:
  - Anticonvulsants = $1.15 PMPM
  - Antihistamines = $1.10 PMPM
  - Antipsychotics = $0.56 PMPM
  - Anti-migraine agents = $0.54 PMPM
- BoNTA treatment for severe primary axillary hyperhidrosis fulfills an unmet medical need for a safe and effective treatment following failure on TAC and prior to surgery, and provides substantial improvement in daily activity limitations associated with severe primary axillary hyperhidrosis.

FIGURE 3. Decision Analysis Tree for the Incremental Cost-Effectiveness and Budget Impact of the Treatment Algorithm with BoNTA following TAC failure for Severe Primary Axillary Hyperhidrosis Compared to Treatment Algorithm without BoNTA

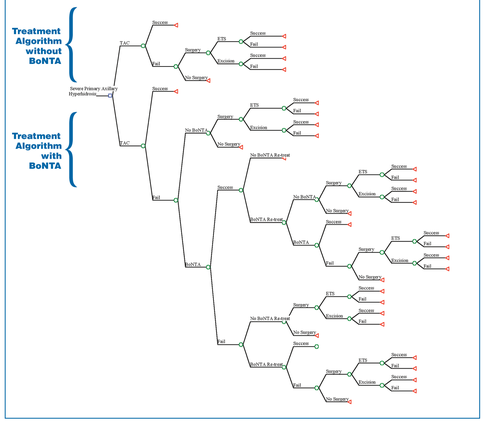

FIGURE 4. Prevalence of Severe Primary Axillary Hyperhidrosis in a 1 Million-Member US Managed Care Plan

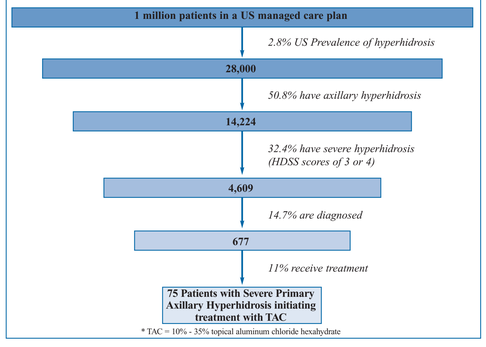

TABLE 1. Key Probabilities for Decision Analysis Model

	Estimate	Suggested Range	Data Source
Baseline prevalence of hyperhidrosis[9]	2.8%	0.1-10%	Strutton et al 2004
Proportion with axillary hyperhidrosis[9]	50.8%	35-75%	Strutton et al 2004
Proportion with severe hyperhidrosis[9] (HDSS score of 3 or 4)	32.4%	25-45%	Strutton et al 2004
Diagnosed prevalence of severe axillary hyperhidrosis	14.7%	10-40%	Derived from retrospective medical and pharmacy claims database and Strutton et al 2004
Proportion of hyperhidrosis patients receiving treatment	11.0%	10-40%	Retrospective medical and pharmacy claims database
Receipt of surgery given failure on previous treatment	5%	1-10%	Retrospective medical and pharmacy claims database
Acceptance of first BoNTA treatment	50%	40-60%	Market research of 100 dermatologists and previously treated patients
Acceptance of BoNTA re-treatment	84%	75-95%	Market research of 100 dermatologists and previously treated patients
Requiring second treatment with BoNTA	70%	60-80%	US phase III clinical study
TAC effectiveness rate[5]	48%	30-70%	Kowalski et al 2005
BoNTA effectiveness rate (2-point improvement on HDSS)[6]	75%	75-90%	Lowe and Glaser 2004
ETS effectiveness rate[5]	67%	35-99%	Kowalski et al 2005
Excision of sweat glands effectiveness rate	78%	66-90%	Review of published literature

TABLE 2. Treatment and Medical Costs

	Cost	Source
Topical Aluminum Chloride (TAC)		
AWP[10]	$7.16	Aluminum chloride hexahydrate (35ml), manufactured by Person & Covey, Inc.
Initial Office Visit	$71.00	Private payer fee for level 3 office visit for established patient[11]
Botulinum Toxin Type A (BoNTA)		
AWP[12]	$582.50	Botulinum toxin type A, manufactured by Allergan, Inc.
Procedure fee	$207.00	National unadjusted Medicare payment for CPT code 64614
Surgery		
Endoscopic Transthoracic Sympathectomy (ETS)	$9,326.00	MEDPAR 2002 base payment for DRG 8 (inflated to April 2004 USS with CPI for Hospital Services); 2004 revised final rule payment for CPT 32664 and 00520
Local excision of sweat glands	$1,355.00	Private payer fee for CPT code 11451; Medicare reimbursement for a bilateral modifier for both axillae

AWP=Average Wholesale Price; CPT=Current Procedural Terminology; MEDPAR=Medicare Provider Analysis and Review; CPI=Consumer Price Index; DRG=Diagnosis Related Group

TABLE 3A. Treatment Costs for the Algorithm with BoNTA Treatment Vs. the Treatment Algorithm without BoNTA Treatment

Aggregate Pharmacy and Medical Costs	Algorithm With BoNTA Treatment	Algorithm Without BoNTA Treatment
Annual Cost of Treatment (75 patients)	$43,042.00	$23,252.00
Annual Cost Per Plan Member (1 million plan members)	$0.043	$0.023
Cost Per Member Per Month	***$0.004***	***$0.002***
Proportion of Costs Due to:		
Drugs	46%	6%
Office Visits	16%	23%
Procedures	38%	71%

TABLE 3B. Annual and Monthly Cost of a Severe Primary Axillary Hyperhidrosis Patient to a Plan

	Algorithm With BoNTA Treatment	Algorithm Without BoNTA Treatment
Annual Cost Per Severe Primary Axillary Hyperhidrosis Patient	$578	$312
Monthly Cost per Severe Primary Axillary Hyperhidrosis Patient	$48	$26

CONCLUSIONS

- At an incremental cost of $1400 per successfully treated patient over 1 year, bilateral botulinum toxin type A treatment of 50 U per axilla is a cost-effective treatment for severe primary axillary hyperhidrosis inadequately managed with topical agents.
- Botulinum toxin type A provides meaningful improvements in daily activity limitations to plan members with severe primary axillary hyperhidrosis for a small incremental total pharmacy and medical cost of $0.002 per member per month in a 1 million-member managed care plan.

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DISCLOSURES

The development of this poster was supported by Allergan, Inc.
Jonathan W. Kowalski, Arliene Ravelo, and Jeff Lee are employees of Allergan, Inc. David R. Strutton was a paid consultant to Allergan, Inc. at the time of this research.

NOTE: *Dosing and results reported in this study are specific to the formulation of botulinum toxin type A manufactured by Allergan, Inc. (Irvine, California). The Allergan, Inc. formulation is not interchangeable with other botulinum toxin products and cannot be converted by using a dose ratio.*