Topical Sirolimus 0.2% Gel for Treatment of Facial Angiofibroma Associated with Tuberous Sclerosis Complex in the United States: A Budget Impact Analysis

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BACKGROUND

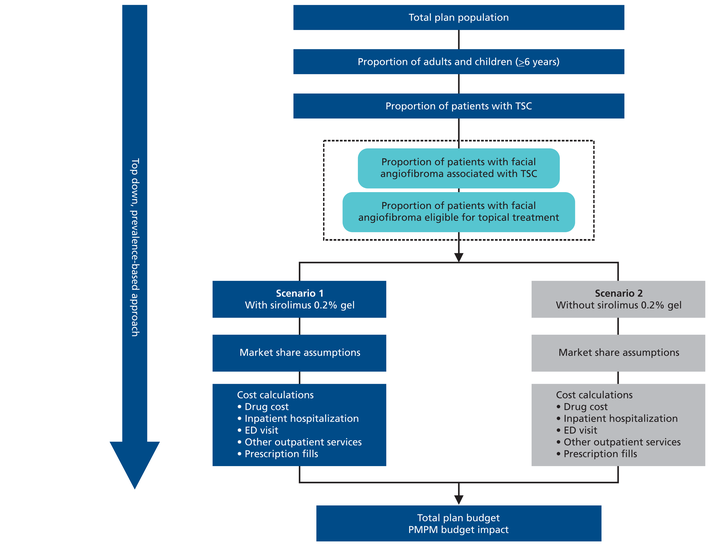
- In the US, sirolimus 0.2% gel is the first and only Food and Drug Administration-approved topical treatment for patients with facial angiofibroma, one of the predominant cutaneous manifestations of tuberous sclerosis complex (TSC), a rare autosomal dominant disorder that affects over 2 million people worldwide and up to 80,000 in the US alone.[1,2] Facial angiofibroma occurs in 83%-90% of TSC patients.[3,4]
- The complexity of managing facial angiofibroma associated with TSC, its psychosocial impact on patients and caregivers,[5,6] and the substantial utilization of healthcare resources[7] motivates early diagnosis and treatment, to improve the quality of life of the affected individuals.[8,9,10]
- A budget impact analysis was conducted to assess the potential economic impact of introducing topical sirolimus 0.2% gel to a formulary for the treatment of facial angiofibroma associated with TSC from the US third-party payer perspective.

METHODS

MODEL FRAMEWORK

- Using a top-down, prevalence-based approach, a budget impact model was developed to evaluate the total costs for treating patients with facial angiofibroma associated with TSC (≥6 years) in two scenarios: with sirolimus 0.2% gel and without sirolimus 0.2% gel, reflecting the treatment practice at the time of study analysis and before approval of topical sirolimus 0.2% gel in the US.
- Treatments for facial angiofibroma associated with TSC were based on the guidelines available at the time of study analysis, including cryotherapy, laser, surgery (procedures only), everolimus, sirolimus, tacrolimus (medication only), and a combination of procedures and medications.
- The model assessed the budget impact from a third-party payer perspective, including Commercial, Medicaid, and Medicare payers in the US.
- Model inputs included data on epidemiology, drug acquisition, inpatient hospitalization, emergency department (ED) visit, office visit, other outpatient services, and prescription refill costs obtained from published literature and a real-world study **(Figure 1)**.
- Market share data for the current intervention mix was obtained from the real-world evidence (RWE) study of the claims database analysis.[11]
- The model outcomes were the total budget impact per million population and per member per month (PMPM) budget impact of topical sirolimus 0.2% gel.

Figure 1. Model framework

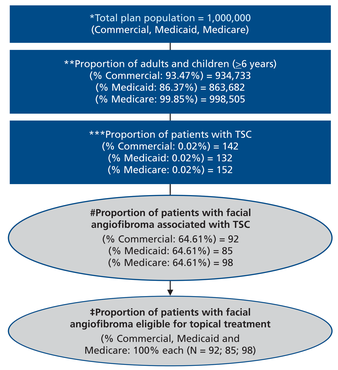


ED, emergency department; PMPM, per member per month; TSC, tuberous sclerosis complex

POPULATION

- Epidemiological inputs for the hypothetical plan target population of 1 million members are shown in **Figure 2**.
- The population of adults and children (≥6 years) was considered based on the US Census Bureau,[12] and Health Insurance Coverage Status data (2017–2020).[13] The proportion was derived from TSC Alliance[14] and data on the facial angiofibroma population from a published real-world study.[7]

Figure 2. Size of eligible target population



**User input (Hypothetical plan population)*
***Health Insurance Coverage Status and Type of Coverage--All Persons by Age and Sex: 2017 to 2020; United States Census Bureau, National Demographic Analysis Tables: 2020*
****TSC Alliance [Available from: https://www.tscalliance.org/about-tsc/what-is-tsc/] Accessed on 11 Jul, 2021*
#Boggarapu et al. (2022)
‡Based on clinical expert opinion (Assumption)

CLINICAL EVENTS

- Improvement rates for topical sirolimus 0.2% gel were based on clinical trial data[15,16] with patients categorized into adequately and inadequately controlled facial angiofibroma. The improvement rates were analyzed from the investigator and Independent Review Committee perspective at 12 and 52 weeks **(Table 1)**.

Table 1. Rate of improvement of facial angiofibroma as assessed by Independent Review Committee and Investigator

Category	Independent Review Committee		Investigator	
	Week 12	Week 52	Week 12	Week 52
Topical sirolimus 0.2% gel, %	60	78.2	23.3	60.9
Vehicle gel, %	0	0	6.3	6.3

MARKET SHARE

- Steady growth in the market share for topical sirolimus 0.2% gel was assumed to be 5.8%, 10.6%, and 13.0% in the first three years, and 13.1% in the fourth and fifth years, respectively **(Table 2)**.

Table 2. Market share inputs

Treatments	Without topical sirolimus 0.2% gel, %						With topical sirolimus 0.2% gel, %				
	Current	Year 1	Year 2	Year 3	Year 4	Year 5	Year 1	Year 2	Year 3	Year 4	Year 5
Topical sirolimus 0.2% gel	0	0	0	0	0	0	5.8	10.6	13	13.1	13.1
Procedure only	7.8	7.8	7.8	7.8	7.8	7.8	7.3	6.9	6.8	6.8	6.8
Medication only	82.4	82.4	82.4	82.4	82.4	82.4	77.7	73.7	71.7	71.7	71.7
Procedure plus medication	9.8	9.8	9.8	9.8	9.8	9.8	9.2	8.7	8.5	8.5	8.5
Total	100	100	100	100	100	100	100	100	100	100	100

COSTS

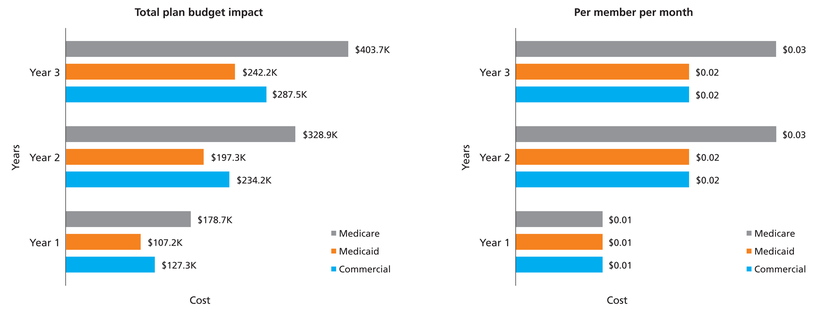
- Topical sirolimus 0.2% gel acquisition costs were derived based on wholesale acquisition costs (WAC) of 10 gm topical sirolimus tube (estimated at $1,750)[17] and calculated for 6-11 years and 12 years or older. All costs are presented in 2021 US dollars **($)**.
- The drug cost was calculated as the maximum recommended dosage for each age group. The 12-week and 52-week drug acquisition costs for patients aged 6-11 years and ≥12 years were estimated to be $8,820 and $11,760 (12 weeks), and $38,220, and $50,960 (52 weeks), respectively.
- Claims database analysis reports were the source to derive healthcare resource utilization and base case-related costs based on patients with facial angiofibroma (who received medication only, procedure only, procedure and medication), patients without facial angiofibroma, commercially insured patients, Medicaid-enrolled patients, Medicare enrolled patients and patients from across 6-11 years, 12-64 years, and ≥65 years age groups.
- The model did not include adverse event-related costs, as no grade 3/4 adverse events were observed in the sirolimus gel 0.2% clinical trials.[15,16]

RESULTS

BASE-CASE ANALYSES

- The estimated 3-year budget impact for patients availing Commercial insurance was $287,450 with a $0.02 PMPM cost; for the Medicaid population was $242,208 with a $0.02 PMPM cost, and for the Medicare population was $403,693 with $0.03 PMPM **(Figure 3)**.
- The 5 year topical sirolimus 0.2% gel acquisition costs were estimated to increase 2.27-fold in the Commercial ($146,214), Medicaid ($121,871), and Medicare ($169,916) populations compared to year 1.
- The budget impact for all time horizons and payers resulted in a PMPM cost below $0.04.

Figure 3. Budget impact of topical sirolimus 0.2% gel (Commercial, Medicaid, and Medicare populations)



Plan-level budget impact values are provided against each payer type each year. Costs are estimated in 2021 US dollars.

SCENARIO ANALYSES

- Across all the scenarios, the PMPM cost remained below $0.06 under alternative model assumptions across payers. The first scenario set the model horizon to 5 years and had a plan-level impact of $289,217 in the Commercial population, $243,698 in the Medicaid population, and $406,175 in the Medicare population **(Table 3)**.

Table 3. Scenario analysis of Commercial, Medicaid, and Medicare payers

Scenarios	Scenario description	Used Values	Commercial		Medicaid		Medicare	
			Plan level impact ($)	PMPM impact ($)	Plan level impact ($)	PMPM impact ($)	Plan level impact ($)	PMPM impact ($)
Scenario 1	Model time horizon set to 5 years		289,217	0.02	243,698	0.02	406,175	0.03
Scenario 2	Response rate assessed by IRC	IRC	492,870	0.04	412,814	0.03	622,390	0.05
Scenario 3	Response rate assessed for 52 weeks	52 weeks	497,864	0.04	416,961	0.03	627,692	0.05
Scenario 4	Proportion of patients with FA associated with TSC[a]	57.3%	256,500	0.02	216,130	0.02	360,228	0.03
Scenario 5	Proportion of patients with FA associated with TSC[b]	50.0%	223,822	0.02	188,595	0.02	314,335	0.03

Note: For scenarios 2 through 5, all results were reported following a model time horizon of 3 years. Source: [a]Kingswood et al. (2022); [b]Meta-analysis: Ahlsen et al. (1994), Wiederholt et al. (1985), Ohno et al. (1981), Osborne et al. (1991), Hunt et al. (1984) • FA, facial angiofibroma; IRC, Independent Review Committee; PMPM, per month per member; TSC, tuberous sclerosis complex

CONCLUSIONS

- This is the first analysis to report the estimated budget impact of introducing topical sirolimus 0.2% gel as a treatment option for patients with facial angiofibroma related to TSC in the US.
- Introducing topical sirolimus 0.2% gel for managing facial angiofibroma associated with TSC will likely have a meager impact on the US health plans' budget.

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