

HARMONY

HARM reduction for Nicotine, Opiates and You

Cost effectiveness of E-cigarettes vs Nicotine Replacement Therapy for smoking cessation among NSW opiate agonist treatment clients



Acknowledgement

I acknowledge that we are on the lands of the Gadigal people. I pay my respects to Elders past and present and celebrate the diversity of Aboriginal peoples and their ongoing cultures and connections to the lands and waters of NSW.

Investigators, staff, funding

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- Funding

- NSW Health Translational Research Grant Scheme



Vaporised Nicotine Products (VNPs)

- Evidence supports nicotine VNPs for tobacco harm reduction¹
- High certainty evidence that nicotine VNPs can assist smoking cessation better than NRT (patches, gum, chews)²

1. Edwards S et al. Tobacco Harm Reduction with Vaporised Nicotine (THRiVe): A Feasibility Trial of Nicotine Vaping Products for Smoking Cessation Among People Living with HIV. *AIDS Behav.* 2023 Feb;27(2):618-627.

2. Lindson N et al Electronic cigarettes for smoking cessation. *Cochrane Database of Systematic Reviews* 2024, Issue 1. Art. No.: CD010216.

- People receiving treatment for opiate dependence have the highest rates of smoking.¹
- Mortality rate 18 x higher due to tobacco smoking.²
- Reported tobacco smoking rates between 73% to 94%.¹



Opiate Treatment Clients

1. Guydish J et al. An international systematic review of smoking prevalence in addiction treatment. *Addiction*. 2016 Feb;111(2):220-30
2. Engstrom A et al. Mortality in patients with substance abuse: a follow-up in Stockholm County, 1973-1984. *International Journal of the Addictions*. 1991;26(1):91-106

HARMONY Trial

- **Design:** Randomised single blinded parallel agroup trial
- **Intervention:** VNP vs Combination NRT
- **Duration:** 12-week treatment + 12-week follow-up
- **Target Recruitment:** 572
- **Sites:** 6 x NSW Health opioid treatment clinics
 - Hunter New England LHD
 - Sydney LHD
 - South West Sydney LHD
 - Western Sydney LHD
 - St Vincent's LHN
 - South East Sydney LHD



Intervention - VNPs

- Innokin Endura T18-II starter kit + 5 spare coils
- 12-weeks supply unflavoured e-liquid nicotine
- 1-week supply of NRT patches
- Instructions for correct use



Intervention - NRT

- 12 weeks combination NRT
 - Patch (Step 1/21mg)
 - Inhalator (15mg)
 - Gum (4mg)
 - Lozenge (4mg)
 - QuickMist (150sprays @ 1mg)
- Pre-packaged, not customizable
- Instructions for correct use



HARMONY Demographics

	VNP N = 259	NRT N = 241	Overall N = 500
Gender: Male	157 (61%)	151 (63%)	308 (62%)
Aboriginal or Torres Strait Island origin	63 (24%)	553 (22%)	116 (23%)
Age (mean, SD)	46 (10)	46 (9)	46 (10)
Education up to & including year 10	183 (71%)	171 (71%)	354 (71%)
Income: Government benefit or pension	212 (82%)	203 (84%)	415 (83%)

HARMONY Health Behaviours

	VNP N = 259	NRT N = 241	Overall N = 500
Opiate Treatment: Methadone	145 (56%)	122 (51%)	267 (53%)
Average Treatment length: years	5.6	5.4	5.5
Anxiety/Depression (PHQ4): Mod + Severe	186 (72%)	173 (71%)	359 (71%)
Nicotine Addiction (HSI): Mod + High	210 (81%)	192 (79%)	402 (80%)
Smoking quit attempts in past year: Zero	142 (55%)	139 (58%)	281 (56%)
Smoking quit method: Willpower	81 (70%)	81 (79%)	162 (75%)

HARMONY Primary Outcome

Effect of treatment on 7-day abstinence from tobacco at week 12

VNP	NRT	Risk ratio	Mean difference	Bayes factor	Posterior probability
52/217 (24%)	24/195 (12%)	1.99 (CrI 1.32, 2.98)	0.12 (CrI 0.05, 0.18)	1,719	>0.99

Bayes Factor	Interpretation
> 100	Extreme evidence for e-Cig compared to NRT
30 - 100	Very strong evidence for e-Cig compared to NRT
10 - 30	Strong evidence for e-Cig compared to NRT
3 - 10	Moderate evidence for e-Cig compared to NRT
1 - 3	Anecdotal evidence for e-Cig compared to NRT
1	No evidence for e-Cig compared to NRT



Exploratory modelling of downstream costs of VNPs for smoking cessation

HARMONY intervention costs broken down by treatment

**Substitute for discontinued
inhalators*

	NRT		VNPs	
Baseline	21mg Patches (28 pack)	\$51.67	E-Cigarette device	\$38.74
	1 x 4mg gum (large)*	\$60.00	Innokin Prism Coil Pack T18/22	\$0.01
	Oral spray 1mg (3 pack)	\$98.99	8 x 12mg nicotine e-liquid	\$50.24
	Medical screening	\$43.90	21mg Patches (7 pack)	\$33.99
	Educational brochure	\$0.14	Medical screening	\$43.90
			Educational brochure	\$0.14
Week 4	21mg Patches (28 pack)	\$51.67	8 x 12mg nicotine e-liquid	\$50.24
	Oral spray 1mg (3 pack)*	\$98.99		
	4 x 4mg lozenge	\$176.00		
	1 x 4mg gum (large)	\$60.00		
Week 8	21mg Patches (28 pack)	\$57.24	8 x 12mg nicotine e-liquid	\$50.24
	Oral spray 1mg (3 pack)*	\$98.99		
	4 x 4mg lozenge	\$176.00		
	1 x 4mg gum (large)	\$60.00		
Total		\$1,028.02		\$277.50

Cost-effectiveness analysis

Exploratory cost-effectiveness analysis

- Pragmatic exploratory model of downstream effects on health service use
- Model based on **HARMONY trial results** extrapolated to the eligible **OAT population** in NSW.
- **Downstream costs*** based on admission costs:
 - Acute myocardial infarction (AMI)
 - Stroke
 - Chronic obstructive pulmonary disease (COPD).

Calculated using **exact-risk (Poisson)** mapping with an **OAT risk multiplier** (increased event risks)

** exploratory analysis only so included downstream costs were not exhaustive*

Cost-effectiveness analysis



- **Payment scenarios**
 - Not Funded: state govt. does not subsidise VNP goods (device/consumables)
 - Funded: state govt. subsidises VNP goods
 - **Hospitalisations avoided** - monetised using NSW activity-based funding
 - **Sample divided between the two treatment groups**
 - VNP $n = 1803$
 - NRT $n = 1803$
- Over a 5-year period, assuming smoking cessation status remains

Cost-effectiveness analysis

- Quit rates used in model

	VNP	NRT
HARMONY trial results	24%	12%
Base-case (= 50%)	12%	6%
Cochrane results	10%	6%

- The Incremental Cost (Not Funded) was calculated as:

$$Program\ cost - \sum_d Offset_d$$

and represents the **difference in costs** between VNP and NRT

Results

- Using **Base-case** quit rates (VNP = 12%; NRT = 6%)
 - Not subsidised **VPN cost saving** due to fewer hospital admissions of **\$22,209** per additional quitter compared to NRT
 - Subsidised **VPN cost saving** of **\$17,586** per additional quitter compared to NRT
- **VPN intervention was dominant**

Results

		HARMONY results	Base-case (50%)	Cochrane results
	Incremental quit rate	0.12 (0.00091, 0.00234)	0.06 (0.00017, 0.00082)	0.05 (0.00008, 0.00047)
VNP Funded	Incremental cost (\$1000s)	-2,213.4* (-2,788.6, -1,393.7)	-1,902.2* (-2,788.5, -1,393.9)	-1,798.55* (-2,788.6, -1,394.1)
	ICER#	Dominant	Dominant	Dominant
VNP Not funded	Incremental cost (\$1000s)	-2,713.75* (-2,789.1, -1,394.2)	-2,091.44* (-2,788.8, -1,395)	-2,298.8* (-2,788.7, -1,394.2)
	ICER#	Dominant	Dominant	Dominant

* Negative incremental cost indicates net savings to government

Incremental Cost-Effectiveness Ratio

Modelled outcomes based on quit rates

Outcome	HARMONY results	Base-case (50%)	Cochrane results
Extra quitters	216	108	72
AMIs avoided (5y)	26	13	9
Strokes avoided (5y)	23	11	8
COPD admissions avoided (5y)	0.90	0.45	0.30
Hospital costs saved (5y)	\$622,311	\$311,155	\$207,437

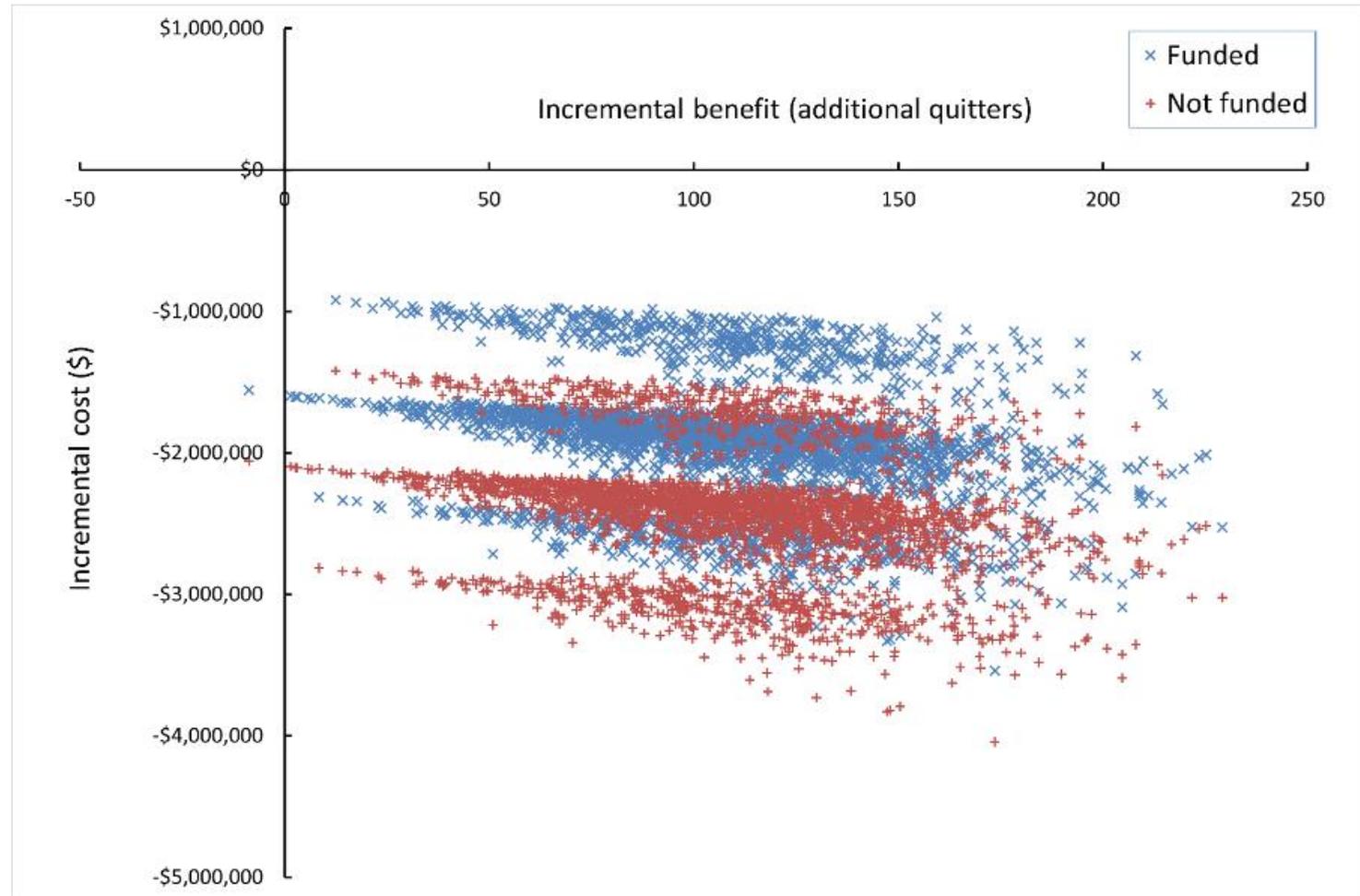
Modelled cost of the program

VNP	VNP Per participant (\$)	277
	Total (\$)	500,332
NRT	Per participant (\$)	1,028
	Total (\$)	2,091,444

* Assumes that participants receive the same products as those in the HARMONY trial

Cost-effectiveness plane

- Shows funded and not funded in the same plane
- Both scenarios are firmly in the lower right quadrant



Conclusion

- VNP ~2x effective for tobacco smoking cessation for group NSW OAT
 - Notable low effectiveness of interventions
- NRT ~ 3.7x costly cf VNP
- Cost-effectiveness modelling from this – 5 years, 3606 people
 - Benefit \$1.9M - \$2.1M - avoided hospitalisations (AMI, stroke)
- Potential for significant health & economic benefits if adopted
- HNE - Implementation study
- Liaise with NSW MoH – product on NSW Hospital formulary
- Policy gaps exist - VNP use in inpatient settings – potential benefits



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Thank you

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HARMONY Funding

NSW Health Translational Research Grant Scheme

Cost differences - program, quitter, total

		HARMONY results (\$1000s)	Base-rate (\$1000s)	Cochrane results (\$1000s)
Funded	Program – VNP vs NRT	-1591.11	-1591.11	-1591.11
	Cost per extra quitter	-10.23	-17.58	-24.94
	Total incremental cost	-2213.42	-1902.27	-1798.55
Not funded	Program – VNP vs NRT	-2091.44	-2091.44	-2091.44
	Cost per extra quitter	-12.54	-22.21	-31.88
	Total incremental cost	-2713.75	-2402.60	-2298.88
Break-even Govt outlay for VNPs (per ppt) - cost-neutral		1.51	1.33	1.28