

Supplemental Information

1. Estimating the cost of intervention delivery

To provide the unit cost of high-flow therapy, it was assumed that each high-flow machine would be in use for 80% of the time over a 5-year period and that each infant with bronchiolitis requires high-flow oxygen support for 1.85 days. This is the mean number of days of oxygen therapy recorded in the study for the high-flow group.¹ For the standard-oxygen group who were escalated to high-flow therapy as rescue option, the unit cost of the machine was estimated using the same approach with the mean duration of high-flow therapy observed in the trial (2.26 days; Table 2).

The cost of a high-flow Airvo 2 system machine (AU\$2,795; NZ\$2,200) was taken from the manufacturer's price list. This gives the unit cost of the nasal high-flow machine per infant supported as AU\$3.53 (NZ\$2.79). We also assumed that any service costs for these machines are equal and not included in the analysis and no costs for a standard-oxygen therapy, as they are routinely available at all hospital sites.

The consumables used as part of the treatment such as nasal cannula and tubing were recorded and multiplied by unit costs of the item using the manufacturer's price to calculate the cost of consumables. For the standard-oxygen group, it was assumed that one set of nasal prong was used per infant costing AU\$2.64 (NZ\$3.24). There were no cases of adverse events such as nasal injury thus neither treatment cost of an adverse event such as the application of antiseptic/antibacterial cream nor long-term consequences from such events were considered in the economic analysis.

The costs per infant for the early high-flow group and standard-oxygen group with rescue high-flow are summarised in (Supplementary Table S1).

The use of any medications such as steroids, antibiotics, antipyretics, bronchodilators and hypertonic saline was at the discretion of the attending clinicians and not prescribed in the protocol. Likewise, laboratory investigations were not mandated for the trial.

Table S1: Costs per infant for nasal high-flow and standard-oxygen therapy (costs in AU\$)

Resource	Early High-Flow Group (n=739)	Standard-Oxygen +/- Rescue High-Flow Group (n=733)	Source
High-flow equipment	2795	2795	Manufacturer cost (Fisher & Paykel)
Shelf life of the machine (years)	5	5	Assumed five-year lifespan on the machines
Machine utilisation rate	80%	80%	Assumed that the devices are in use for 80%
Days on high-flow oxygen support	1.85	2.26	Mean number of days of high-flow oxygen/rescue therapy after trial entry, PARIS I trial ¹
Equipment set-up cost	-	-	Assumed similar set-up costs for both high-flow and standard-oxygen therapy
Maintenance cost	-	-	Assumed similar maintenance costs
Unit cost per infant (capital)	3.53	-	
Consumable cost per infant	136.61	2.64	Manufacturer consumable costs, resource usage from PARIS trial
Total cost per infant	139.21	2.64	

Table S2: Unit costs (NZ\$) used to value resource use measured for two study sites in New Zealand in sensitivity analysis

	Unit	Unit Cost	Source
Intervention costs			
High-flow equipment (AIRVO™2 system)	Item	2200.00	Manufacturer
Pediatric circuit	Item	56.00	Manufacturer
Pediatric nasal cannula (Optiflow™)	Item	35.00	Manufacturer
Oxygen tubing	Item	9.90	Manufacturer
Wiggle pads	Item	4.50	Manufacturer
Pediatric nasal cannula	Item	3.24	Manufacturer
Bronchiolitis treatment			
Bronchiolitis treatment and LoS	Episode of care (NZdrg60x code 70A)	Varies	WIESNZ16 ²
Estimating Capital equipment cost			
	Early High-Flow Group	Standard-Oxygen +/- High-Flow Group	Source/Assumption
Equipment	2200	2200	Manufacturer cost
Shelf life of the machine in years	5	5	Assumed five-year lifespan on the machines
Machine utilisation rate	80%	80%	Assumed that the devices are in use for 80%
Days on high-flow oxygen support	1.85	2.26	PARIS I trial, ¹ mean number of days of high-flow oxygen/rescue therapy after trial entry
Equipment set-up cost	-	-	Assumed similar set-up costs for both high-flow and standard-oxygen therapy
Maintenance cost	-	-	Assumed similar maintenance costs
Unit cost per infant	3.15	3.95	

Table S3: Cost and incremental cost per infant for high-flow vs standard-oxygen therapy, sensitivity analysis (AU\$)

	Early High-Flow Group (n=739)	Standard-Oxygen +/- Rescue High-Flow Group (n=733)	Incremental cost per infant (95% CrI)^a
Base case: Australian unit costs, 80% machine utilization rate, mean (SD)	7314 (5586)	6893 (5809)	420 (-176 to 1002)
New Zealand costs for NZ sites, converted to AU\$, mean (SD)	6908 (5251)	6472 (5128)	435 (-110 to 967)
Australian unit costs, mean (SD) for machine utilization rate:			
10%	7338 (5597)	6900 (5820)	438 (-158 to 1011)
20%	7324 (5591)	6896 (5814)	428 (-169 to 1000)
40%	7316 (5588)	6894 (5810)	423 (-173 to 995)
60%	7314 (5587)	6983 (5809)	421 (-175 to 993)
100%	7312 (5586)	6893 (5808)	420 (-176 to 992)

^a 95% non-parametric credible interval based on 10,000 bootstrap replications

Table S4: Two-way sensitivity analysis of cost differential of high-flow compared with standard-oxygen as machine lifespan and utilisation rates vary

Utilization rate (%)	Machine lifespan (years)					
	2	4	5	6	8	10
10	468.94	443.38	438.26	434.86	430.59	428.04
20	443.38	430.59	428.04	426.33	424.20	422.93
40	430.59	424.20	422.93	422.07	421.01	420.37
60	426.33	422.07	421.22	420.65	419.94	419.52
80	424.20	421.01	420.37	419.94	419.41	419.09
100	422.93	420.37	418.85	419.52	419.09	418.84

Note: Positive values represent a cost saving of standard-oxygen over high-flow and negative values represent a cost saving of high-flow over standard-oxygen.

References

1. Franklin D, Babl FE, Schlapbach LJ, et al. A Randomized Trial of High-Flow Oxygen Therapy in Infants with Bronchiolitis. *N Engl J Med*. 2018;378(12):1121-1131. doi: 10.1056/NEJMoa1714855.
2. The NCCP Casemix – Cost Weights Project Group. New Zealand Casemix Framework For Publicly Funded Hospitals Including WIESNZ16 Methodology and Casemix Purchase Unit Allocation for the 2016/17 Financial Year. Wellington: Ministry of Health; 2016.