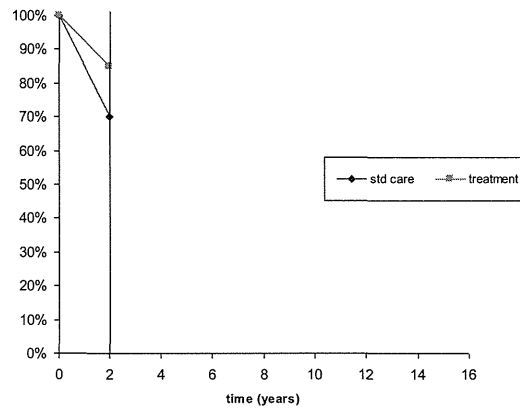


But it's not always straightforward...

Difficulties include:

- Short term trials; no long term follow up of patients
- Different patient populations
- Dosing schedules in trials not consistent with clinical practice
- Crossover of patients in trials
- Comparators in trials not consistent with NZ clinical practice
- Surrogate endpoints
- Need to create indirect comparisons for head-to-head
- Low grade evidence increases uncertainty in results
- Poor adherence in real life

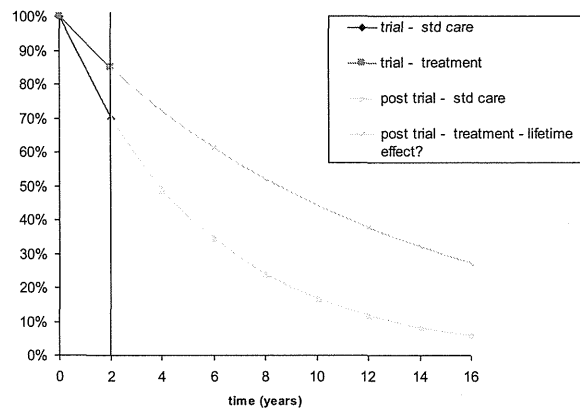
Extrapolating beyond trial data...



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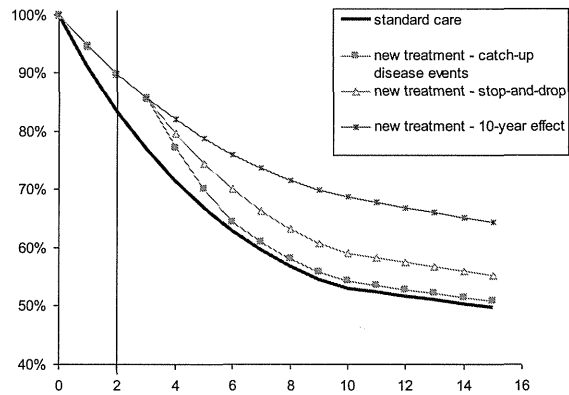
Extrapolating beyond trial data...



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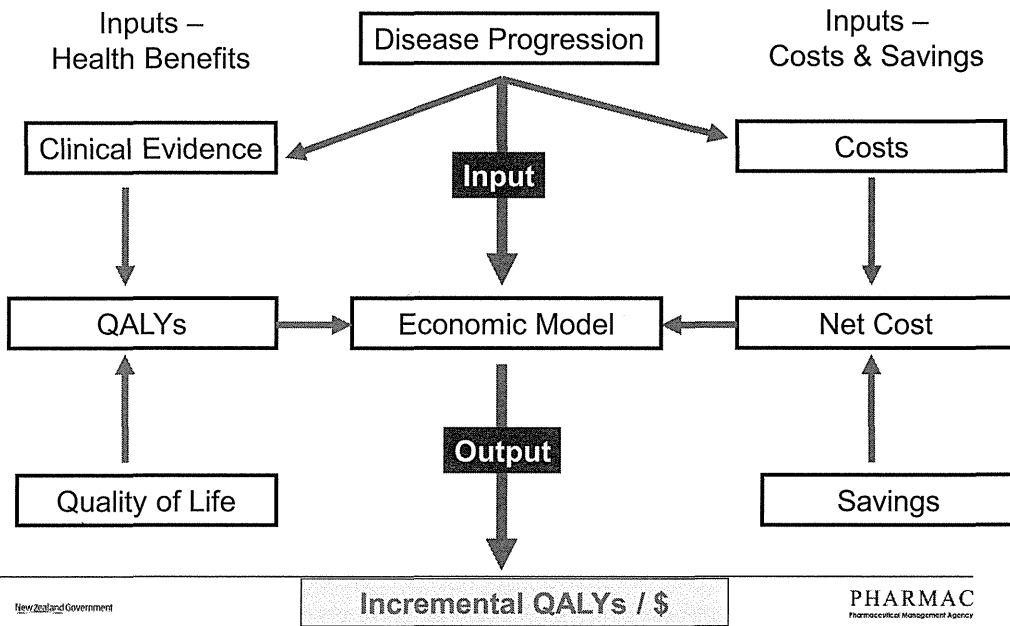
Extrapolating beyond trial data...



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Cost-Utility Analysis



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Health-Related Quality of Life

Health-related quality of life:

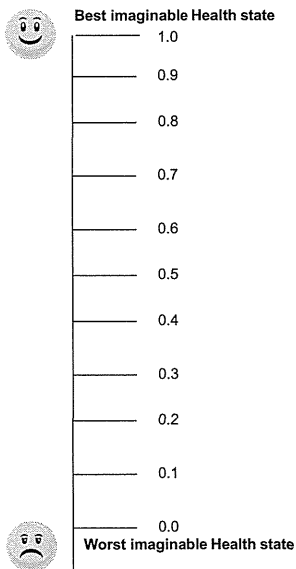
Physical, social and emotional aspects of a patient's well being
Represented as a utility (measure of preference) and can range from scores of less than 0 (worse than death) to 1 (perfect health)

Incremental QALYs consist of change in life expectancy (survival) plus the change in quality of life resulting from treatment

$$\text{QALYs} = \text{time (years)} \times \text{quality (utilities)}$$

PHARMAC measures utility using the NZ EQ-5D (multi-attribute utility instrument)

Place four health states:



- A. Bed ridden, unable to perform usual activities, extreme pain many times during the day, as a result of the condition anxiety and depression.
- B. Some vision loss
- C. Severe acne
- D. Renal disease - dialysis

Quality of Life (QoL) – EuroQol EQ-5D

Mobility

1. No problems walking around
2. Some problems walking around
3. Confined to bed

Self-Care

1. No problems with self care (washing and dressing)
2. Some problems with washing and dressing
3. Unable to wash or dress

Usual activities

1. No problems with performing usual activities
2. Some problems with performing usual activities
3. Unable to perform usual activities

Pain/Discomfort

1. No pain or discomfort
2. Moderate pain or discomfort
3. Extreme pain or discomfort

Anxiety/Depression

1. Not anxious or depressed
2. Moderately anxious or depressed
3. Extremely anxious or depressed

Health State: 11111

QoL: 1

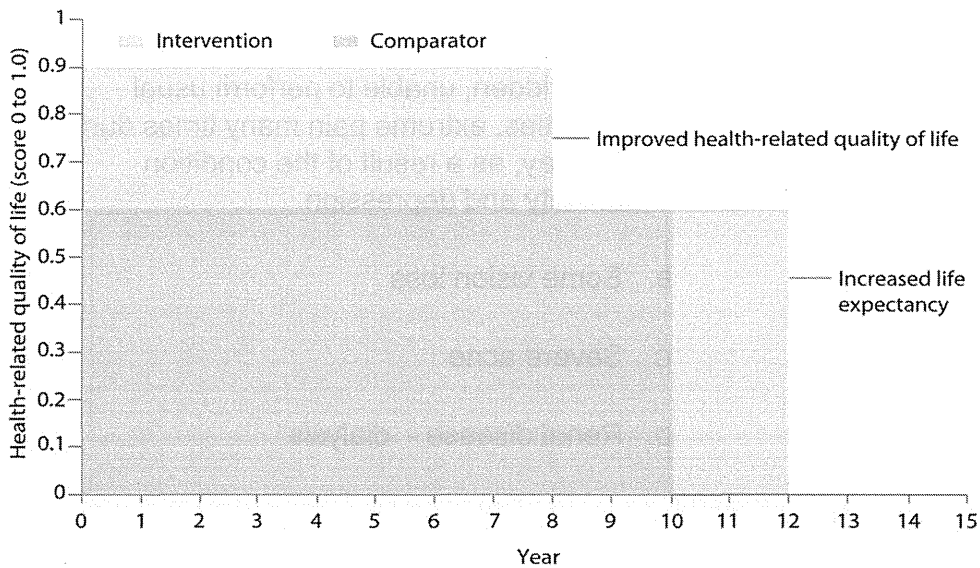
Health State: 11212

QoL: 0.690

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QALYs: a graphical representation



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CUA example

QoL of Life

PFS=0.716

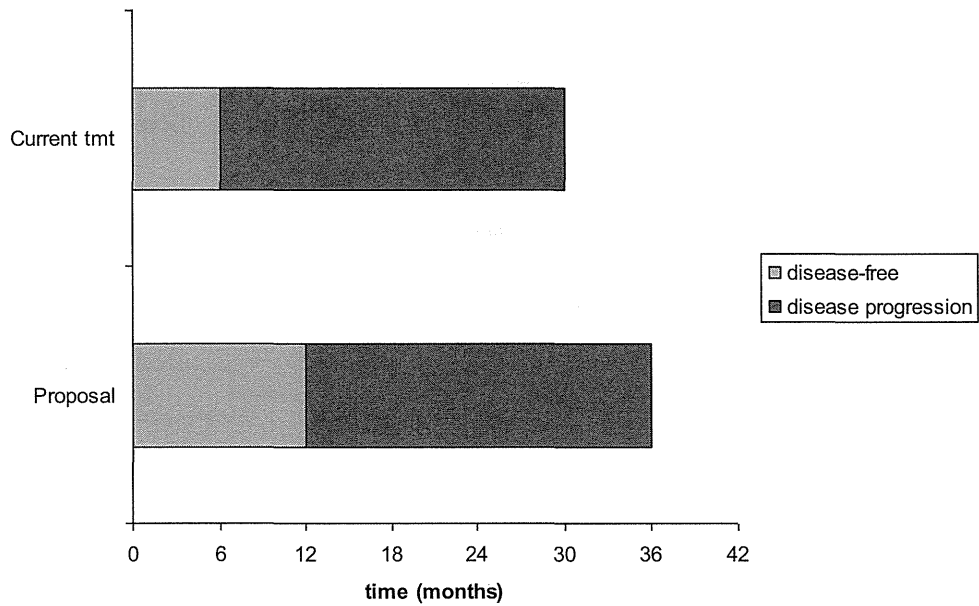
PD=0.611

Death=0

	Proposal	Current tmt
Progression-free survival (PFS)	12m 0.716	6m 0.358
Progressed disease (PD)	24m 1.22	24m 1.22
Overall survival	36m 1.94	30m 1.58

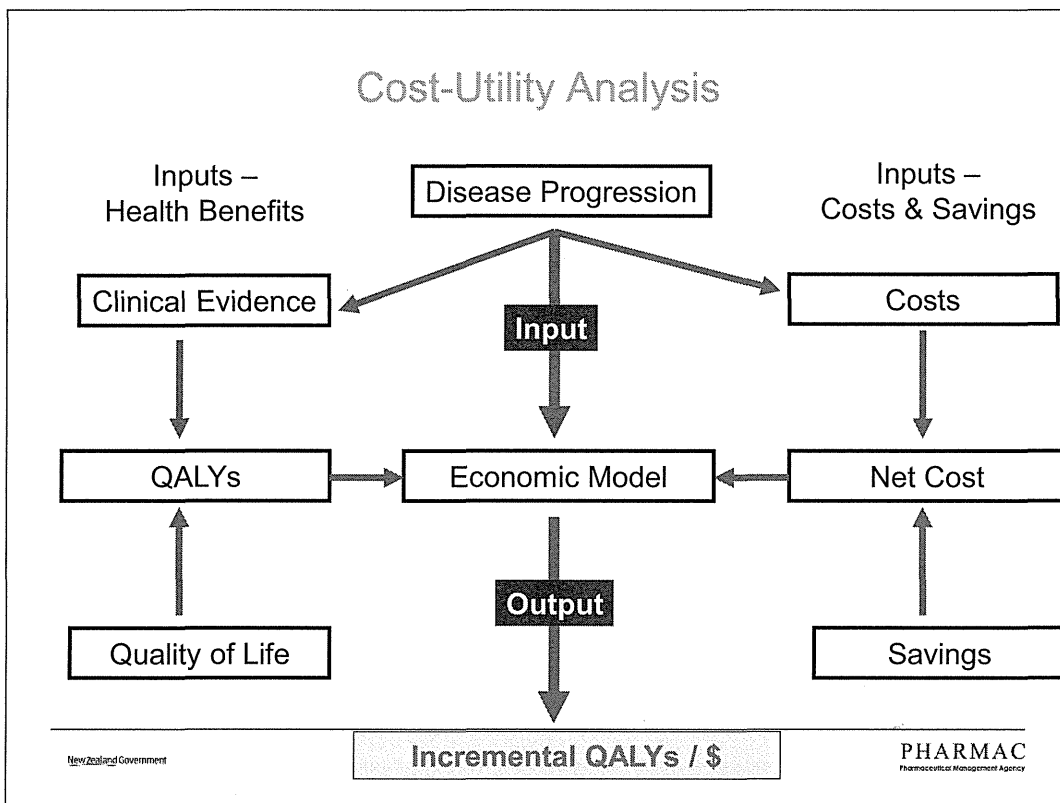
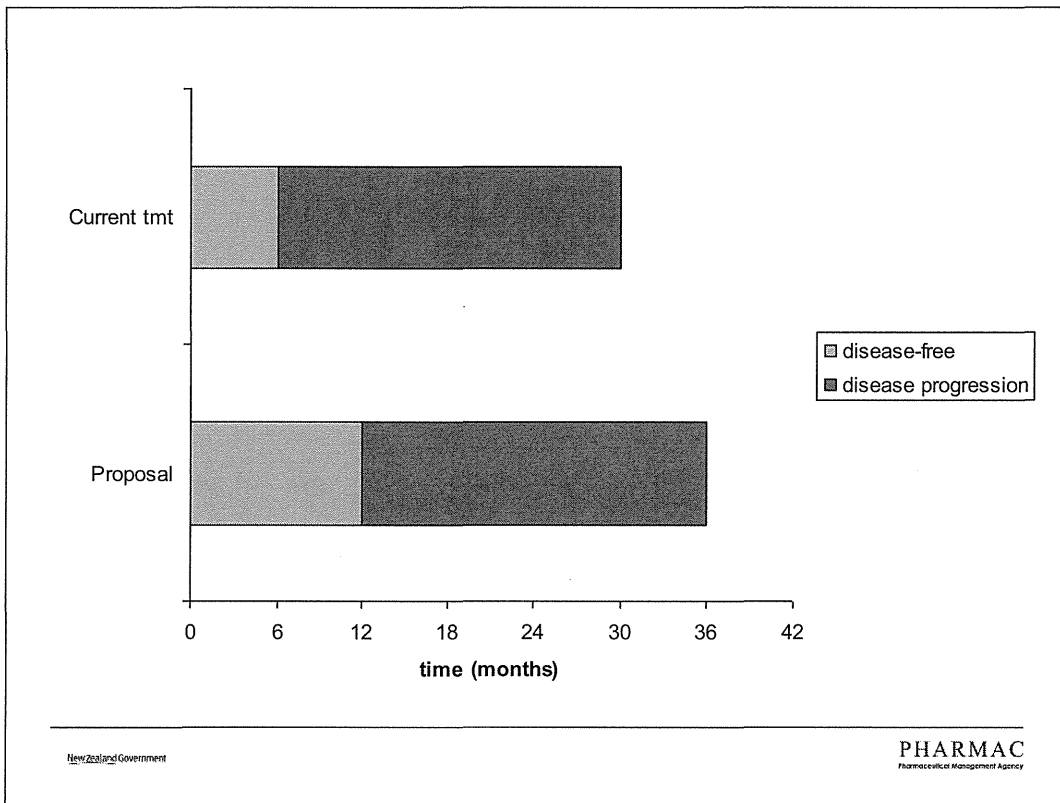
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Pharmaceutical Costs



Price of pharmaceutical

- Include any rebate
- Include future generic prices
- Include price movements

Dose of pharmaceutical

- Dose should be based on dose used in clinical practice providing there is evidence of efficacy at the proposed dose
- Include any dose adjustments

Associated pharmaceutical costs

- Include dispensing fees and pharmacy mark-up
- Include administration cost

CUA example

Patients receive treatment until disease progression

Pharmaceutical costs

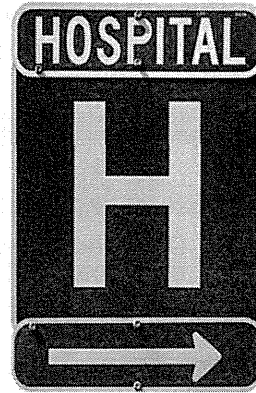
	New treatment	Current treatment
Treatment cost per month	\$1,000	\$750
Length of treatment (PFS)	12	6
Total drug cost	\$12,000	\$4,500

Health Sector Costs

Hospital costs estimated using Diagnostic Related Group (DRG) prices

Outpatient costs

- Outpatient clinic appointments
- Laboratory and diagnostic tests
- Nursing services
- Hospital-based outpatient programmes



Patient Costs

Include direct patient healthcare costs that are at least partially subsidised by government

- General Practitioner visits
- Pharmaceutical co-payments
- Home or continuing care

Indirect patient costs not included

- Captured in the QALY (“usual activities”)
- Ethical issues

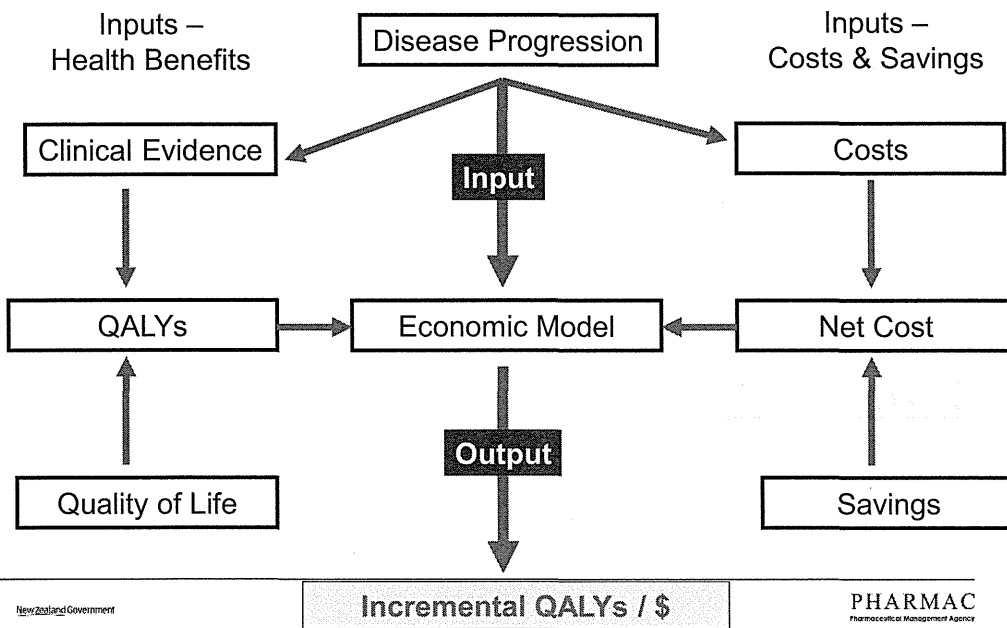
CUA example

	Proposal	Current tmt
Pharmaceutical cost	\$12,000	\$4,500
PFS medical management costs (e.g. specialist visits, blood tests)	\$1,500 (12 months)	\$750 (6 months)
PD medical management costs (e.g. GP visits, hospital visit)	\$2,424 (24 months)	\$2,424 (24 months)
Total cost	\$15,924	\$7,674

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Cost-Utility Analysis



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CUA example

QoL of Life

PFS=0.716

PD=0.611

Death=0

Clinical Trial A560

	Proposal	Current tmt
Progression-free survival (PFS)	12m (0.716)	6m (0.358)
Progressed disease (PD)	24m (1.22)	24m (1.22)
Overall survival	36m (1.94)	30m (1.58)

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CUA example

Costs

	Proposal	Current tmt
Pharmaceutical cost	\$12,000	\$4,500
PFS medical management costs	\$1,500	\$750
PD medical management costs	\$2,424	\$2,424
Total cost	\$15,924	\$7,674

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CUA example

Pharmaceutical	Total Costs	Incr costs	QALY	Incr QALY	Cost per QALY	QALYs/\$1m
Proposal	\$15,924	\$8,250	1.94	0.358	\$23,044	43
Current treatment	\$7,674		1.58			

To account for uncertainties in the inputs, the final result will usually be expressed as a range in reports.

Additional Slides

History



PHARMAC History

1993 – PHARMAC set up, Annual Spend \$445m

1997 - First tender awarded for sole supply

1999 - Prescription for Pharmacoeconomic Analysis first published

2003 – Annual spend \$510m

First decade: \$2 billion cumulative savings¹
6% p.a. prescription growth

2004 – One Heart Many Lives pilot programme launched

2011 – Full management of cancer treatments

2013 – Annual budget \$784m

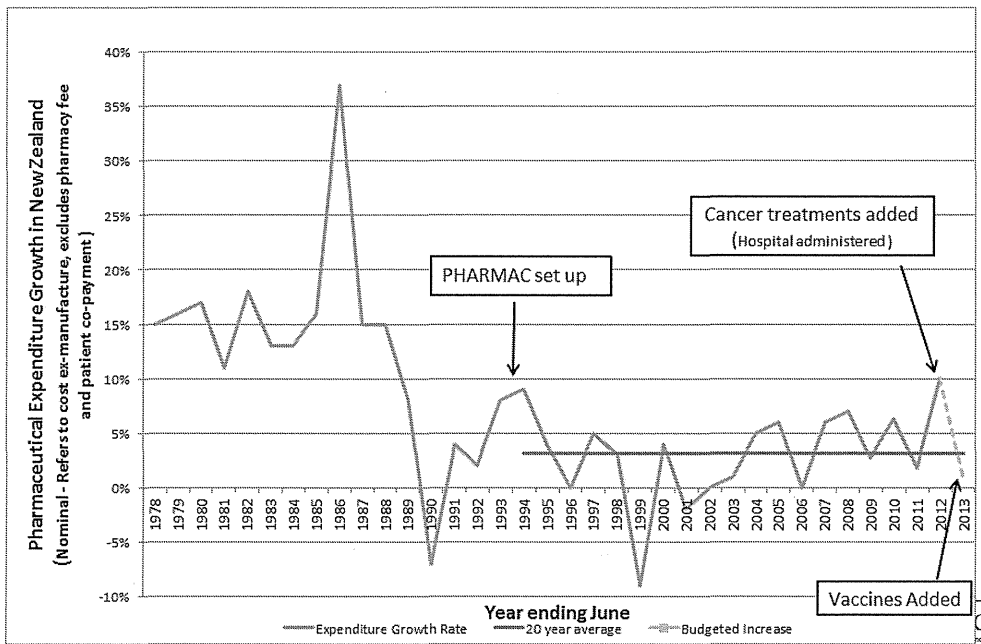
Second decade: \$4 billion cumulative savings¹
6% p.a. prescription growth

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1 Compared to no price reductions, over the 10 year period

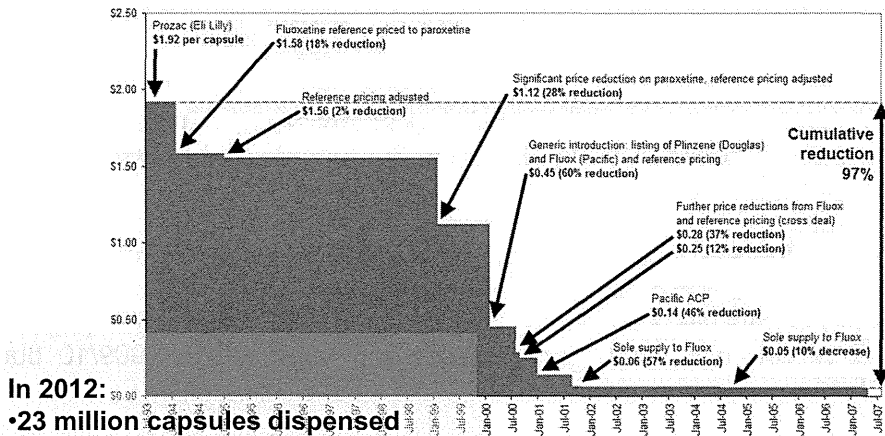
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Pharmaceutical Spending in New Zealand



How our pricing strategies work – the fluoxetine story

1993: \$1.92 per cap



In 2012:
 •23 million capsules dispensed
 •220,000 prescriptions
 •Drug cost of \$730,000
 •Savings of \$40 million

2013: \$0.03 per cap

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Funding options that PHARMAC had before it during 2009/10 that were not funded (implemented) during that year

These options comprise any proposal for funding potentially under consideration by PHARMAC at any stage between 1 July 2009 and 30 June 2010 that were not funded during that time.

The list includes any funding proposals that were under active consideration; assessed but not under active consideration; recommended decline by PTAC; undergoing assessment (therefore not yet prioritised); waiting for clinical information (e.g. PTAC review) before they could be further progressed; and approved in 2009/10 but not funded until 2010/11.

The list includes all funding proposals received by PHARMAC since 2008 (which will also be included in the web application tracker). All efforts have been made to include all historic funding proposals received before then, but some of these may inadvertently not have been included.

The patient population is an estimate of the number of people to be treated with the medicine (often provided by the applicant), and is expressed as a broad range. The range does not take into account any possible targeting mechanisms that may apply should a funding decision be made.

Pharmaceutical	Funding Requested For	Patient Population
Abacavir/lamivudine/zidovudine	HIV infection	1,000-10,000
Adapalene	Acne - first line	10,000-50,000
PKU Supplementation (Add-ins)	Phenylketonuria (PKU)	100-1000
Adrenaline Auto-injector	Anaphylaxis	1,000-10,000
Agalsidase alfa	Fabry disease (a-galactosidase A deficiency) - Enzyme replacement therapy (ERT)	<100
Alemtuzumab	Chronic lymphocytic leukemia - third line	<100
Alglucosidase alfa (Myozyme)	Pompe's disease	<100
Aliskiren	Hypertension	50,000+
Aminioacid Formula without phenylalanine (PKU Anamix Junior LQ)	Phenylketonuria (PKU)	<100
Atomoxetine	Attention Deficit Hyperactivity Disorder (ADHD) - increased access	10,000-50,000
Azacitidine	Myelodysplastic syndromes	100-1000
Bevacizumab	Metastatic colorectal cancer - first line	100-1000

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Pharmaceutical	Funding Requested For	Patient Population
Bevacizumab	Metastatic colorectal cancer confined to the liver	100-1000
Bimatoprost 0.03% and timolol maleate 0.5%	Open-angle glaucoma (OAG) or ocular hypertension (OHT)	1,000-10,000
Bortezomib	Induction therapy	100-1000
Bortezomib	Multiple Myeloma, Relapsed refractory - second line	100-1000
Bortezomib	Multiple Myeloma in patients ineligible for stem cell transplant - first line	100-1000
Brimonidine Tartrate 0.15%	Glaucoma	10,000-50,000
Budesonide	Crohn's disease (steroid dependency and longer SA period); and gut Graft vs. Host disease.	100-1000
Budesonide (Entocort CIR)	Crohn's disease - patients with psychiatric problems and patients with relapse during pregnancy	100-1000
Budesonide (Entocort CIR)	Microscopic colitis	100-1000
Budesonide with eformoterol	Asthma	50,000+
Buprenorphine patches	Persistent moderate to severe pain	100-1000
Buprenorphine/naloxone	Detoxification and maintenance treatment of opioid dependence	1,000-10,000
Calcipotriol and betamethasone	Psoriasis	10,000-50,000
Candesartan	Heart Failure (widening access to allow combination with an ACEi)	1,000-10,000
Capecitabine	Adjuvant high risk stage II colorectal cancer	100-1000
Capecitabine	Neoadjuvant rectal cancer	100-1000
Cinacalcet hydrochloride	Secondary hyperparathyroidism	<100
Ciprofloxacin and hydrocortisone ear drops	Chronic suppurative otitis media	10,000-50,000
Clopidogrel	Transient Ischemic Attack (TIA) - high risk patients	1,000-10,000
Clopidogrel	Stroke + Transient Ischemic Attack (TIA) - alternative to aspirin and dipyridamole combo therapy	1,000-10,000
Clopidogrel	Acute Coronary Syndrome (ACS) - widening access to 12 months (from 3 months)	1,000-10,000
Clopidogrel	Drug-Eluting Stents (DES) - widening access to 12 months (from 6 months)	1,000-10,000
Clopidogrel	Cardio vascular disease - Widening of access to include patients intolerant to aspirin	1,000-10,000
Cox 2 inhibitors	Haemophilia with arthropathy	100-1000

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Pharmaceutical	Funding Requested For	Patient Population
Dabigatran	Stroke, systemic embolism, atrial fibrillation	10,000-50,000
Dabigatran	Prevention of venous thrombosis following orthopaedic surgery	1,000-10,000
Darunavir	HIV infection (patients who have failed at least 3 antiretroviral regimens)	100-1000
Darunavir	HIV infection	1,000-10,000
Dasatinib	Bridge to allogeneic transplant in patients with a defined donor	<100
Deferasirox	Congenital anaemia with resulting chronic iron overload in patients (all ages) contraindicated to desferrioxamine	<100
Deferasirox	Congenital anaemia with resulting chronic iron overload in patients (all ages) intolerant to desferrioxamine	<100
Deferiprone	Congenital anaemia with resulting chronic iron overload in patients (all ages) contraindicated to desferrioxamine	<100
Deferiprone	Congenital anaemia with resulting chronic iron overload in patients (all ages) intolerant to desferrioxamine	<100
Desogestrel	Contraception	50,000+
Dipyridamole 200mg	Stroke prophylaxis	1,000-10,000
Dipyridamole 200mg + aspirin	Stroke prophylaxis	1,000-10,000
Docetaxel	Early breast cancer	100-1000
Donepezil	Alzheimer's disease (Dementia)	10,000-50,000
Dornase Alfa	Cystic fibrosis - widening of access FEV1 <= 75% predicted	100-1000
Duloxetine	Treatment-resistant major depression	1,000-10,000
Elemental Formula (Alfare)	Cow's milk protein allergy, food intolerance and hypersensitivity	1,000-10,000
Elemental Formula (Neocate Nutra)	Food allergies	1,000-10,000
Erlotinib	Non-Small Cell Lung Cancer (NSCLC)	<100
Erythropoietin	Anaemia in cancer patients	100-1000
Escitalopram	Depression	10,000-50,000
Etravirine	HIV infection (patients who have failed at least 3 antiretroviral regimens)	<100
Everolimus	Prevention of rejection of renal/cardiac transplants	<100

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Pharmaceutical	Funding Requested For	Patient Population
Exenatide	Type 2 diabetes	100-1000
Ezetimibe	Hyperlipidemia (add-on to atorvastatin)	10,000-50,000
Female condoms	STI prevention and contraception	50,000+
Fentanyl low dose patches	Pain	100-1000
Folic Acid	Supplementation in pregnancy (0.4mg to replace 0.8mg tablet)	10,000-50,000
Food Thickeners	Dysphagia	1,000-10,000
Fulvestrant	Locally advanced or metastatic breast cancer - third line	<100
Galantamine	Alzheimer's disease (Dementia)	10,000-50,000
Gefitinib	Non Small Cell Lung Cancer (NSCLC)	<100
Gemcitabine	Pancreatic cancer	100-1000
Gemcitabine	Locally advanced or metastatic cholangiocarcinoma	<100
Gemfibrozil	Hypercholesterolemia patients intolerant to statins	100-1000
Gluten free foods	Amendment to SA biopsy requirement	10,000-50,000
Gluten free Gluten	Coeliac disease	1,000-10,000
Gluten Free Multi-seed bread mix (Bakels)	Coeliac disease	1,000-10,000
Golimumab	Rheumatoid arthritis - second-line TNF inhibitor	100-1000
Golimumab	Psoriatic Arthritis - second line TNF Inhibitor	100-1000
Golimumab	Ankylosing spondylitis - second line TNF Inhibitor	100-1000
High dose fluticasone/salmeterol	Asthma and COPD	1,000-10,000
Homocystinuria (HCU) Cooler	Homocystinuria	<100
Hydrolysed rice protein formula (Risolac)	Cows milk protein intolerance	1,000-10,000
Idursulfase	Hunter syndrome (Mucopolysaccharidosis II, MPS II) - Enzyme replacement therapy (ERT)	<100
Imatinib	Gastrointestinal Stromal Tumor (GIST), C-kit Negative	<100
Imatinib	Chronic myelogenous leukemia (CML) - allow doses higher than 400mg (600mg max)	<100
Imiquimod	Actinic keratosis	50,000+
Insulin aspart 30/70	Type 1 diabetes	1,000-10,000
Insulin detemir	Type 1 diabetes - second line LA insulin	100-1000

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Pharmaceutical	Funding Requested For	Patient Population
Interferon beta-1-a (rch)	Multiple Sclerosis (MS) - relapsing-remitting	1,000-10,000
Iodine	Supplementation for pregnancy and breast feeding	50,000+
Isopropyl alcohol 95% and anhydrous glycerin 5%	Swimmers ear	10,000-50,000
Ketamine	Palliative care patients with intractable pain not adequately controlled with opioids.	100-1000
Ketogenic diet formula (Ketocal)	Chronic intractable epilepsy	<100
Ketotifen fumarate	Treatment of ocular allergy	<100
Lacosamide	Epilepsy	100-1000
Lanreotide	Acromegaly and Neuroendocrine tumours	100-1000
Lapatinib	Advanced/metastatic HER-2 positive breast cancer	<100
Laronidase	Mucopolysaccharidosis I (MPS I) to treat the non-neurological manifestations - Enzyme replacement therapy (ERT)	<100
Latanoprost with timolol	Glaucoma	1,000-10,000
Latex oral dams	Prevention of STI transmission	50,000+
Lenalidomide	Multiple Myeloma	100-1000
levofloxacin	Helicobacter pylori- 2nd line use	10,000-50,000
Levonorgestrel Implants	Long acting reversible contraception	10,000-50,000
levonorgestrel Intraurine system	Long acting reversible contraception	10,000-50,000
Losartan	Gout	10,000-50,000
Metoclopramide oral liquid	Nausea and vomiting	1,000-10,000
Metronidazole	Bacterial vaginosis	10,000-50,000
Mianserin	Depression, treatment-resistant	1,000-10,000
Milk substitute formula (S-26 Gold)	Premature infants	1,000-10,000
Modafinil	Narcolepsy - last-line treatment	1,000-10,000
Modafinil	Narcolepsy - open listing	1,000-10,000
Modulen IBD	Crohn's Disease	1,000-10,000
Montelukast	Asthma - aspirin induced (AIA)	1,000-10,000
Montelukast	Asthma - exercise induced (EIA)	1,000-10,000
Montelukast	Asthma - patients intolerant to inhaled corticosteroids	1,000-10,000
Montelukast	Asthma - preschool wheeze	50,000+
Multiple Sclerosis (MS) Treatments	Multiple Sclerosis (MS) - Amending entry criteria	100-1000
Multiple Sclerosis (MS) Treatments	Multiple Sclerosis (MS) - Removal of exit criteria	100-1000
Multiple sclerosis (MS) treatments	Multiple Sclerosis (MS) - Amending exit criteria	100-1000

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Pharmaceutical	Funding Requested For	Patient Population
Multiple Sclerosis (MS) treatments	Multiple Sclerosis (MS) - Amending treatment switching criteria	100-1000
Mycophenolate	Prophylaxis of acute transplant rejection in patients receiving allogeneic renal transplants	<100
Naglazyme	Maroteaux-Lamy syndrome (Mucopolysaccharidosis VI, MPS VI), Enzyme replacement therapy (ERT)	<100
Naltrexone	Amending access criteria for alcohol dependence	1,000-10,000
Naltrexone	Henoch-Schonlein purpura (low dose)	<100
Naratriptan	Acute migraine	10,000-50,000
Nebulised hypertonic saline	Cystic fibrosis	100-1000
Niacin + Irapirant (extended release)	Hypercholesterolaemia and mixed dyslipidaemia	<100
Nilotinib	Chronic Myeloid Leukaemia - after failure of imatinib	<100
Non-latex condoms	Contraception	50,000+
Octreotide	Acromegaly - where surgery is contraindicated or awaiting effects of radiotherapy	<100
Octreotide	Acromegaly - presurgery	<100
Octreotide	TSH-producing pituitary adenomas	<100
Octreotide	Nausea and vomiting from malignant bowel obstruction	<100
Olanzapine depot	Schizophrenia- second line for patients who have failed on risperidone depot	100-1000
Olanzapine depot injection	Schizophrenia	1,000-10,000
Omalizumab	Severe allergic asthma	100-1000
Orablend	Paediatric patients who cannot take oral tablet formulations	50,000+
Oral feed (Fortijuice)	Malnutrition	1,000-10,000
Oral nutrient feed (fortisip compact)	Malnutrition	1,000-10,000
Oral supplement 1 Kcal/ml	Oral supplement	1,000-10,000
Oral supplement powder (Enprocal)	Malnutrition and physical frailty	1,000-10,000
Oxcarbazepine	Epilepsy - second line after carbamazepine	1,000-10,000
Oxybutynin patches (transdermal)	Urinary incontinence	1,000-10,000
Paediatric enteral feed - 0.75 kcal/ml with fibre RTH (Nutrini Low Energy Multi Fibre)	Low energy feed required	1,000-10,000
Paediatric enteral feed 1.5 kcal with fibre RTH (Nutrini Energy Multi Fibre)	Disease related malnutrition	1,000-10,000