



QIMR Berghofer
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Health economics of melanoma detection, diagnosis & treatment

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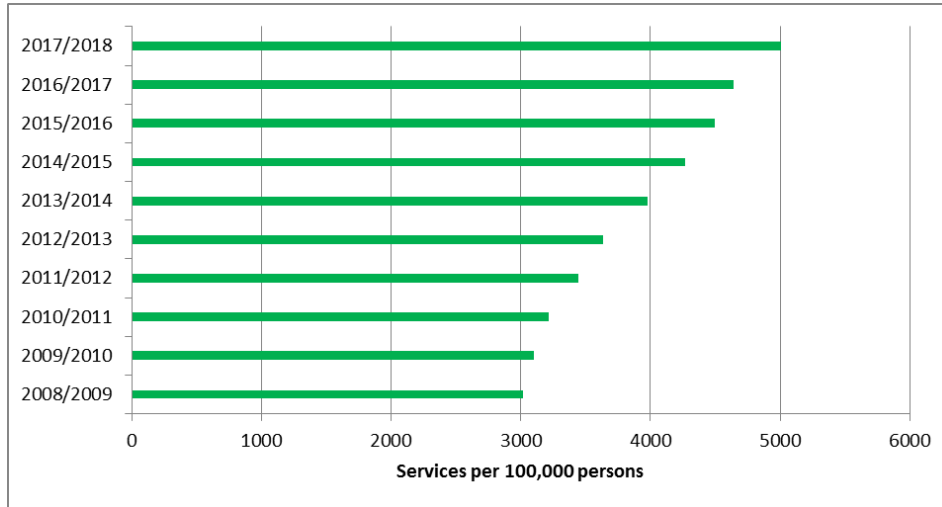
What are the costs involved in detecting melanoma?

- GP ± specialist visit ± biopsy + pathology
= \$37.60 + \$73.85 + \$44.40 + \$73.40 = \$229.25 (not all people screened proceed to biopsy etc)
- What is the number needed to screen (NNS) to detect 1 melanoma?

Source	# whole body exams	# melanomas	NNS to detect 1 melanoma	Cost per melanoma detected
2018 Matsumoto - US derm clinic	33,647	155	215	US\$32,594
2006 Aitken - Qld community	16,383	33	496	AU\$26,825*
2012 Breitbart - Germany	360,288	585	616	AU\$33,314*
BreastScreen Aust. 2015/16 \$268.6million	1,772,540 mammograms	6800 breast cancers	NNS to detect 1 brca =260	AU\$39,500*

*Ballpark estimates based on 9% (Aitken 2006) of all people receiving whole body skin exams referred for biopsy etc

Skin biopsy rates have increased 66% in one decade in Australia

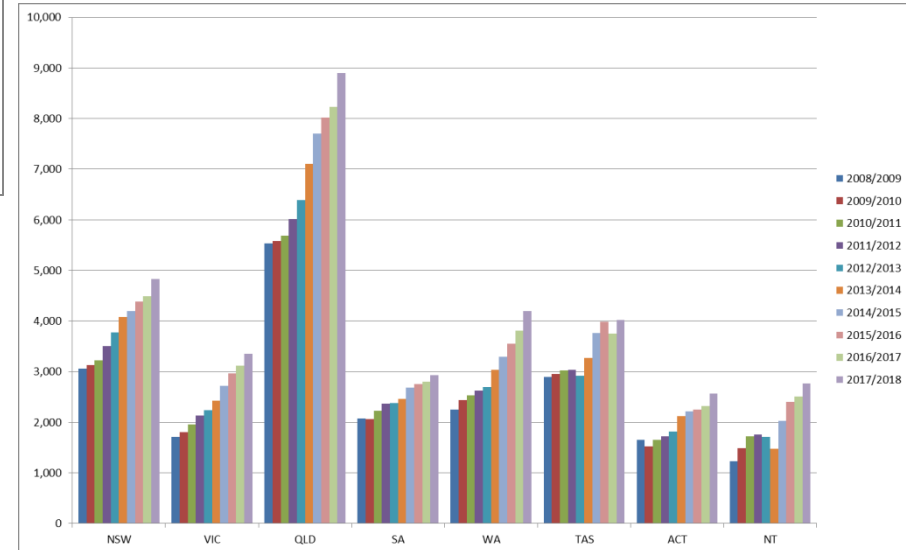


30071 item for skin biopsies

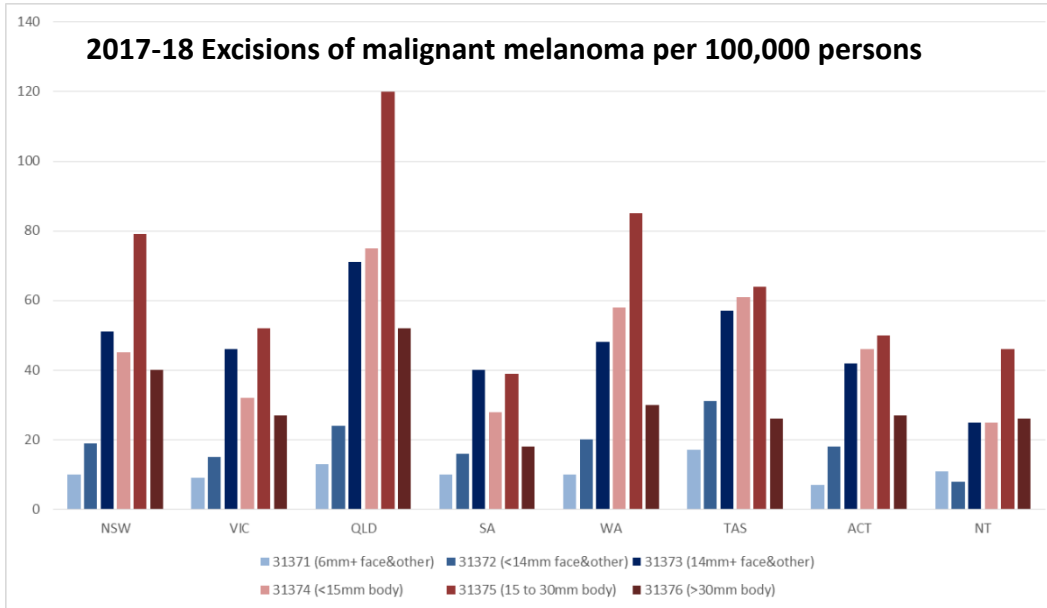
Rates per 100,000 persons

1.3 million biopsies in 2017/2018

\$45.3 million per year Australia wide



What are the treatment costs of melanoma?



Excisions are more common on the body
15mm-30mm

Excisions are more common in Qld

\$14.8 million per year Australia-wide

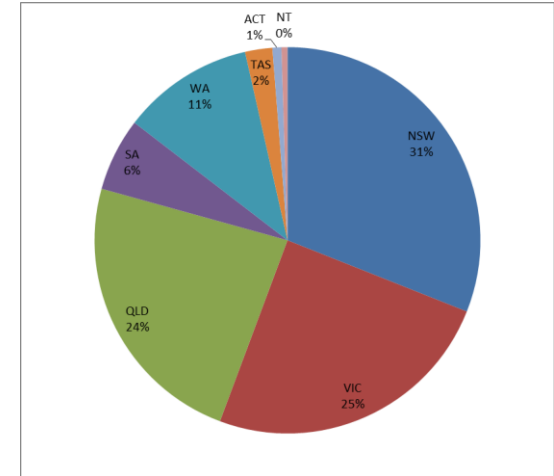
Malignant melanoma, appendageal carcinoma, connective tissue tumour of skin or merkel cell carcinoma of skin (malignancy confirmed from the excised specimen or previous biopsy)					
6mm+	Nose, eyelid, eyebrow, lip, ear, digit, genitalia or a contiguous area	31371	\$357.00	\$303.45	
<14mm	Face, neck, scalp, nipple-areola, distal lower/upper limb	31372*	\$308.70	\$262.40	
14mm+	Face, neck, scalp, nipple-areola, distal lower/upper limb	31373*	\$356.80	\$303.30	
<15mm	Body, other than above	31374*	\$281.90	\$239.65	
15 to 30mm	Body, other than above	31375*	\$303.40	\$257.90	
>30mm	Body, other than above	31376*	\$351.60	\$298.90	

Excess in Qld compared to Australia

- 18%
- 26%
- 37%
- 56%
- 56%
- 44%

Medicines for advanced melanoma 2017/2018

Name	Brand	PBAC Approvals	2017/2018 cost
Ipilimumab	Yervoy®	Nov 2012	\$68.9 million
Dabrafenib	Tafinlar®	2013	\$54.8 million
Trametinib	Mekinist®	June 2015	\$56.0 million
Pembrolizumab	Keytruda®	June 2015	\$150.6 million
Nivolumab	Opdivo®	May 2016	\$16.3 million
Vemurafenib	Zelboraf®	March 2016	\$4.5 million
Cobimetinib	Cotellic®	Jan 2017	\$4.1 million
			\$355.2 million



**Total (all medications)
Australia = \$355.2 million
But pricing agreements exist**

DUSC Report n=3762 patients in 2017

Source: Medicare – item reports
<http://medicarestatistics.humanservices.gov.au/statistics>

Health system burden of UV damaged skin

AU\$115,109 per case
AU\$38,000 per case
AU\$1,700 per case



Advanced stage III, IV Melanoma

\$355 M

Early stage Melanoma

\$???

AU\$1,300 per case

SCCs

\$700 M

BCCs

AU\$106 per case



Other malignancies,
actinic keratoses, naevi,
benign skin lesions, UV
damaged skin

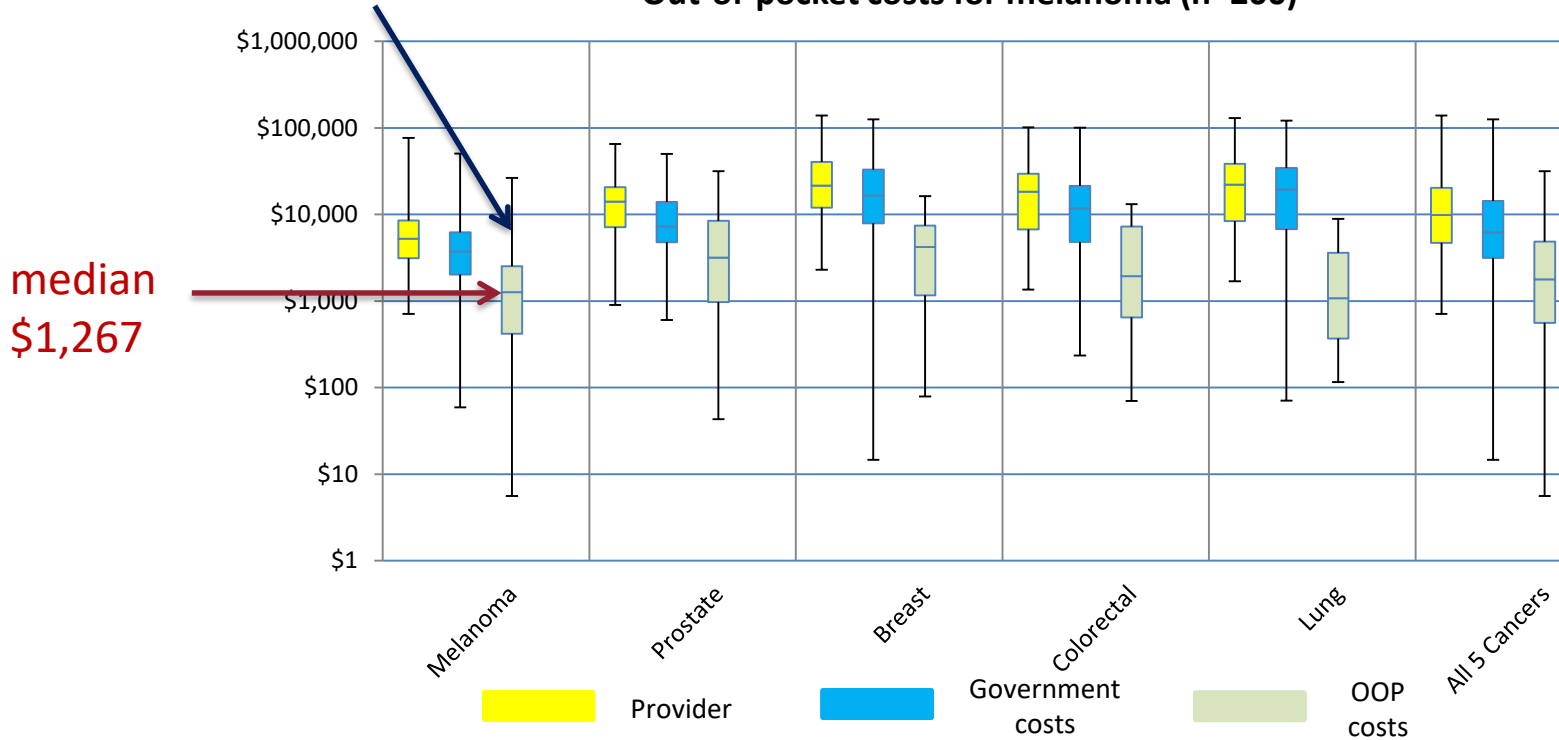
?????

>\$1billion per year

What about patient out-of-pocket costs?

Top 25% of patients are
between \$2,519 & \$26,483

Out-of-pocket costs for melanoma (n=200)



EXAMPLE 3:

Medical Practitioner details

Name		
Specialty	Dermatologist	
Suburb		
State		
Website URL		
Consulting Rooms	Location	
Private	Phone Number	

Approach to Fees

This practitioner undertakes to charge only fees associated with a clinical service and Medicare item number, except for the following clinical services that do not attract a Medicare Benefit

.....

The practitioner will not charge administrative, booking fees or any fees not associated with a clinical service

Non-admitted (out-of-hospital) Consultations and Procedures

Medicare Item Number	Descriptor	Maximum fee charged by Dr xx	Medicare Benefits Payable – 85% of Schedule Fee*	Most common out-of-pocket costs for Dr xx for this item*
104	Initial Consultation	\$234/\$167 (concession)	\$73.85	\$157
105	Subsequent Consultation	\$138/\$107 (concession)	\$37.15	\$99
14050	PUVA or UVB therapy	\$75	\$44.85	\$30
30071	Diagnostic biopsy of skin	\$178/\$78.20 (concession)	\$44.40	\$134
30192	Treatment of premalignant skin lesions	\$91.00/59.35	\$33.65	\$26
30196	Confirmed malignant neoplasm of skin	\$290/187.80 (concession)	\$107.40	\$183
31361	Removal of malignant skin lesion	\$510/\$307.55 (concession)	\$158.70	\$351

*The Medicare benefit paid may be increased (and therefore the out-of-pocket cost reduced) if patients are eligible for Medicare Safety Net Payments

Commonwealth Advisory Committee into Out-of-Pocket Costs

New requirement for doctors to be more transparent when fee charging so patients avoid 'bill shock'

Corporate entities now own ~10-15% of all GP practices in Australia

- The proportion of GPs who own their own practices is falling
- Corporate entities run GP practices plus on-site pathology laboratories plus diagnostic imaging and even pharmacies
- Creates incentives for doctors to refer patients to their own businesses for testing and increase volume of claims, profits
- Reforms in GP remuneration are key – quality of care should be the focus not volume of care
- 65% of doctors bulk bill – declining slightly over time (MABEL Medicine in Australia: Balancing Employment and Life survey)



The Australian health system is set up to reward doctors for high volume



The Productivity Costs of Premature Mortality Due to Cancer in Australia: Evidence from a Microsimulation Model

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Each premature death from melanoma costs society \$288,000

Table 3. Cumulative GDP impacts of premature mortality (2003 to 2030).

Cancer type	Working years lost	PVLI lost (\$ millions)	95% CI	% of total PVLI lost	No. of deaths	PVLI lost per death (\$000's)
Lung cancer	15,943	765	738–785	18%	5,746	133
Colorectal cancer	10,332	497	471–516	12%	3,253	153
Brain cancer	6,571	326	309–340	8%	1,003	325
Breast cancer	7,519	307	293–324	7%	2,171	142
Melanoma	4,897	249	239–265	6%	867	288
Lymphoma	4,263	209	193–221	5%	1,101	190
Leukaemia	4,180	201	190–213	5%	990	203
Pancreatic cancer	4,083	197	187–207	5%	1,398	141
Oesophageal cancer	3,134	156	145–167	4%	849	184
Stomach cancer	3,113	154	145–165	4%	830	186
Liver cancer (excluding hepatitis B and C related)	2,929	150	139–158	4%	720	209
Mouth and oropharynx cancers	2,805	142	134–151	3%	566	250
Prostate cancer	2,605	125	115–135	3%	1,547	81
Kidney cancer	2,414	121	114–130	3%	656	185
Bone and connective tissue cancer	1,890	88	79–99	2%	240	368
Ovarian cancer	1,505	61	55–68	1%	632	97
Multiple myeloma	1,205	58	52–65	1%	488	120
Bladder cancer	1,029	50	44–56	1%	480	104
Cervical cancer	967	39	33–45	1%	213	183
Laryngeal cancer	718	36	31–42	1%	186	192
Non-melanoma skin cancers	639	32	26–37	0.8%	197	163
Gallbladder cancer	544	26	22–30	1%	192	134
Corpus uteri cancer	354	14	43,770	0.3%	183	79
Testicular cancer	237	13	10–16	0.3%	16	793
Eye cancer	126	7	4–9	0.2%	24	275
Thyroid cancer	96	4	3–6	0.1%	54	78
Other malignant neoplasms	3,554	171	158–184	4%	1,131	151
All	87,653	4,200	4,140–4,258	100%	25,733	163

GDP = Gross Domestic Product; PVLI = Present Value of Lifetime Income; CI = confidence interval

Is melanoma screening or surveillance cost-effective?

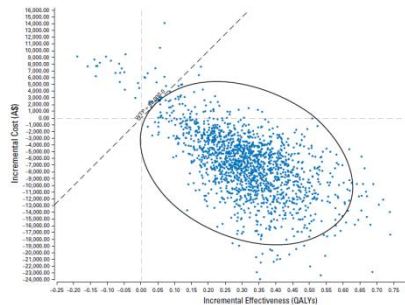
Study	Country	Intervention	Frequency of skin checking	Cost-effective
Girgis 1996	Australia	Screening persons over 50 yrs by GP	Every 2 years	Yes
Freedberg 1999	US	Screening high-risk patients by dermatologist	1 time screen	Yes - caveats
Beddingfield 2003	US	Screening general population	1 time screen	Yes - caveats
Losina 2007	US	Screening general population	Various	Yes - caveats
Pil 2014	Belgium	Screening general population	1 time screen	Unclear
Tromme 2016	Belgium	Dermoscopy vs no dermoscopy in derm screening	?	Yes
Gordon 2017	Australia	Self-skin checks & GP for suspicious lesions	12 month follow-up	No - borderline
Watts 2017	Australia	Specialised surveillance in high risk melanoma patients	6 monthly	Yes
Wilson 2018	UK	'Compound' screening - more frequent with higher risk score	Various	Yes - borderline
Podlipnik 2018	US	Surveillance using CT/brain MR imaging	Scans 6 monthly	Unclear

Cost-effectiveness studies on screening / surveillance

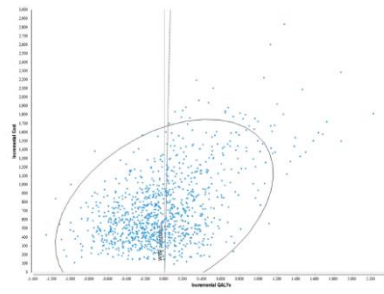
Study	Intervention	Target Population	Results	Comments
Watts 2017 (Aus)	Specialised surveillance in very high risk melanoma patients	NSW Very high risk, had previous melanoma and/or genetic high risk	Superior Cost-saving, more QALYs	Driven by fewer excisions, cost of spec surveillance and cost of treating advanced disease
Gordon 2017 (Aus)	Self-skin check program & GP if suspicious lesion found	QLD Men aged over 50 years old	Inferior Cost more, fewer QALYs	Driven by extent of KCs, mels – high burden of other skin cancers
Wilson 2018 (UK)	'Compound' screening with whole-body checks, more frequent with higher risk score	Risk-stratified approach – Williams risk score 0-67 based on 7 Qs, low score= 1 time screen vs high score=annual screening	£10,199 per QALY gained if compound approach	Lack costs on screening, logistics?, very volatile model

Probability of being cost-effective:

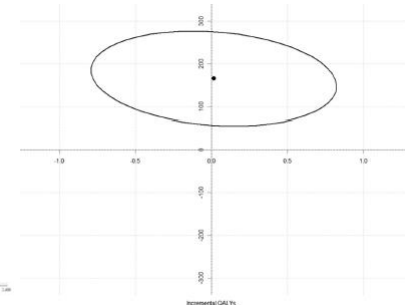
Watts 2017
>95%



Gordon 2017
44%



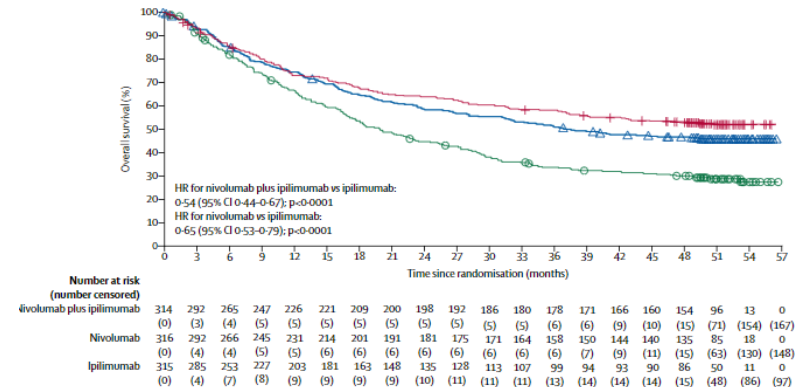
Wilson 2018
51%



Opportunity costs for investing in melanoma screening/early detection programs

- Early detection competes with primary prevention and treatment development to 'save lives'. **Can we save lives in other ways more cost-effectively?**
- Treatments are expensive but do extend survival: **4-year survival is now 53%** for advanced melanoma (nivolumab+ipilimumab). Saving lives is getting harder when survival is already very good.

Study	Intervention	Results	Cost-effective?
Cristofolini 1992	Health campaign (Italy)	\$400 per life year saved, RoI \$3.80	YES
Garrantini 1996	Educational campaign (Italy)	US\$3357 per life year saved	YES
Kyle 2008	School-based program (US)	Cost savings \$12m, RoI \$2-\$4	YES
Hirst 2009	Solaria regulation (Aus)	Cost saving \$9.9m	YES
Shih 2009	SunSmart – multifaceted (Aus)	Cost saving \$180m, RoI \$2.32	YES
Gordon 2009	Sunscreen – SCC/BCC (Aus)	Cost saving \$88K for n=812	YES
Hirst 2012	Sunscreen – Melanoma (Aus)	\$40,890 per QALY	YES
Shih 2015	SunSmart – Victoria (Aus)	Cost saving RoI \$3.20 / 36c Prev vs \$9 Tx	YES
Perez 2015	Mass-media – NSW (Aus)	Cost saving RoI \$3.85	YES
Pil 2015	Prim/sec prevention (Belgium)	Cost saving / cost effective	YES



2018 Hodi et al. Lancet Oncology 19: 1480-92

CONCLUSIONS

- Costs of melanoma screening **cannot ignore other cost burdens** of all other skin cancers and lesions
- **Opportunity costs** - Investment in screening or early detection competes with other strategies (prevention, treatment) to achieve the same goal (reduce melanoma deaths)
- Evidence is unclear on whether screening for melanoma is **cost-effective**

Thank you

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