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## **Title**

Industry payments to Australian medical oncologists and clinical haematologists: a cross-sectional analysis of publicly-available disclosures.

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## **Abstract**

### *Background*

Payments to medical oncologists and clinical haematologists can negatively affect prescribing practice, but the extent of payments to these specialists is unknown in Australia.

### *Aims*

We aimed to analyse the extent of payments from the pharmaceutical industry to Australian cancer physicians as reported during the first collated period of the *Disclosure Australia* website.

### *Methods*

We performed a retrospective, cross-sectional analysis of payments made from November 2018 to April 2019, using a file downloaded from the *Disclosure Australia* website. We checked the names of listed medical practitioners against Medical Board of Australia records to assign specialties. The number of medical oncologists, clinical haematologists, other specialist physicians and non-specialist physician medical practitioners was calculated, along with the payments to each of these groups.

### *Results*

A total of \$7,332,407 was paid to 2775 medical practitioners. Of these, 236 were medical oncologists, 189 were haematologists and 1145 were other specialist physicians. This represents 31.7% of Australian medical oncologists and 30.9% of Australian haematologists, compared to 11.7% of all other specialist physicians and 1.1% of all other non-specialist physician medical practitioners. Medical oncologists received significantly higher payments (median \$2,131.26) than other specialist physicians (median \$1,376.00, 2-tailed  $p=0.004$ ) and other medical practitioners (median \$709.00, 2-tailed  $p<0.001$ ), while haematologists received significantly higher payments (median \$1,519.95) than other medical practitioners (2-tailed  $p<0.001$ ), but similar payments to other specialist physicians (2-tailed  $p=0.08$ ).

## *Conclusions*

Australian cancer physicians receive payments at a higher proportional frequency and in greater dollar amounts than other specialist physicians and other medical practitioners in general.

## **Introduction**

Up to one in five people will die due to malignancy.(1) Drugs used to treat cancer are projected to represent almost 20% of the global medication market by 2024, more than four times the nearest competing therapy group.(2) These drugs have become more expensive with time, despite commentary arguing these increases are unsustainable.(3, 4) Given their control of sales revenues within this lucrative market, prescribers of these drugs are a likely target for influence by the pharmaceutical industry.

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In Australia, the Commonwealth *Therapeutic Goods Act* (1989) dictates that all marketing of prescription medications must be directed at prescribers, and not consumers.(5) In the case of anti-cancer treatments, these prescribers are medical oncologists and clinical haematologists, both recognised as subspecialists by the Royal Australasian College of Physicians (RACP) and endorsed as such by the Medical Board of Australia within the Australian Health Practitioner Regulation Agency (APHRA).(6) Collectively, they may be described as cancer physicians.

Payments from pharmaceutical companies negatively influences prescribing practice, both for cancer physicians and other medical practitioners.(7-10) Prescribers who receive research funding, honoraria or sponsorship of conference travel show positive attitudes to the sponsor's medications, prescribe the sponsor's drug more and are more likely to request the sponsor's drug on a hospital formulary.(11) Nonetheless, it is permissible in Australia for pharmaceutical companies to directly pay doctors for numerous services or events.

Previous research into pharmaceutical expenditure in Australia has shown more sponsored events for medical oncologists and haematologists than other specialties.(12, 13) Approximately 13% of Australian medical oncologists report company sponsorship to attend Continuing Medical Education events, although this figure is limited by a low response rate and potential reporting bias.(14) However, no previous analysis has ever occurred of all direct payments from the pharmaceutical industry to Australian cancer physicians.

In other jurisdictions, this has been explored in detail. In the United States, according to mandated industry disclosures, between 52.4% and 66.2% of oncologists receive direct funding.(15-17) In Japan, the rate is as high as 70.6%.(18) The equivalent frequency in Australia is unknown.

The majority of, but not all, pharmaceutical companies operating in Australia are members of Medicines Australia.<sup>(19)</sup> This organisation maintains a Code of Conduct by which its members are expected to abide. Since 2016, under the direction of the Australian Competition and Consumer Commission (ACCC), the Code has required members to disclose payments made to all health care practitioners, including medical practitioners. Since 2019, these are reported on a centralised, searchable website named *Disclosure Australia*.<sup>(20)</sup> Payments are reported on this website every six months, representing distinct “disclosure periods” that ended four months prior to the date of publication.

Notably, the nature of disclosed expenditures by pharmaceutical companies changed after 2016.<sup>(21)</sup> While greater transparency now occurs for payments to individuals, specific payments are excluded, including provision of food and beverages either at sponsored events or within clinical settings. While this demonstrates both an improvement and weakening of industry disclosures, it underscores the need for analysis of the new dataset, as this reports a different form of industry spending in Australia.

## **Aims**

We aimed to analyse the extent of payments from the pharmaceutical industry to Australian cancer physicians as reported during the first collated period of the *Disclosures Australia* website, and to compare these payments to those received by other medical practitioners.

## **Methods**

### *Study design*

We performed a retrospective, cross-sectional analysis of payments made to Australian medical practitioners over a six-month period.



### Source and participants

In August 2019, Medicines Australia released its first collated record of pharmaceutical company payments to health practitioners via the *Disclosure Australia* website. These data related to payments made during a six-month period from November 2018 to April 2019 by all pharmaceutical company members of Medicines Australia.

We obtained this full record directly from the publicly-available website as an Excel comma separated values (.csv) file. Within this file, each payment was listed separately to reflect specific situations resulting in remuneration. The information available for each payment consisted of the variables listed in Table 1.

<b>Table 1: Variables available directly from Disclosures Australia</b>
Company name
Date of Event
Healthcare professional (ie name)
Healthcare professional type
Practice address
Type of service
Type of event
Payment made to (ie healthcare professional or third party)
Registration fees (in AUD)
Travel costs (in AUD)
Fees for service (in AUD)

<b>Additional demographic details available in the AHPRA Register of practitioners</b>
Specialty/ies recognised by AHPRA
Medical school completion year
Specialist fellowship certification year
Australian medical council certification year (if overseas-trained)

The payments were then sorted by *Healthcare professional type*, with all payments to non-medical practitioners (eg, nurses, pharmacists) excluded from the analysis. Following this, the payments were sorted by *Healthcare professional*, so that multiple payments to individual practitioners could be identified.

The names and addresses of each practitioner are the only identifying details available from *Disclosure Australia*. We cross-checked each name against records publicly available in the *Register of practitioners* on the Australian Health Practitioner Regulation Agency (AHPRA) website in 2019.<sup>(22)</sup> We used these records to reliably identify as many of the medical practitioners listed as possible. When names could not be confirmed in the *Register*, an Internet search was performed using Google by name and practice location to provide more information. All non-medical practitioners or non-practicing (eg academic) medical practitioners were then excluded.

For each reliably identified medical practitioner, whenever possible we added the demographic information available in the *Register* but missing in the disclosure, as listed in Table 1. Most pertinently, we assigned specialties to each of the names.

We then classified practitioners into four separate groups based on specialties: medical oncologists, clinical haematologists, all other internal medicine specialists (ie other specialist physicians), and all remaining, non-specialist physician medical practitioners. The final group (ie all remaining medical practitioners) included any registered doctor who was not endorsed as an adult internal medicine subspecialist by the RACP and AHPRA. This included all general practitioners, non-medical specialists, paediatricians and trainee doctors, regardless of their potential specialty training program.

For practitioners with both haematologist and medical oncologist registration, we classified their payments into their dominant specialty, determined through a combination of their publication histories and their usual fields of practice as advertised on official cancer centre websites.

### *Analysis*

The payments made to each identified practitioner were combined to produce a total payment amount for each person during the disclosure period. We calculated the mean payment per group for comparison. We also calculated the number of individuals per group to compare to the total number of such practitioners in Australia based on the *Register* totals at June 2019,(23) to estimate proportions of practitioners in each group receiving payments.

To further examine how payments to cancer physicians compared to other internal medicine specialists, we performed an exploratory post hoc analysis of payments by subspecialty type. In addition to medical oncologists and clinical haematologists, we assessed payments to cardiologists, endocrinologists, gastroenterologists, neurologists, respiratory physicians, rheumatologists, renal physicians and all remaining internal medicine specialists.

For medical oncologists and clinical haematologists specifically, we summarised the payment totals by specific companies in Australia as a whole, as well as the reasons listed for these payments.

### *Statistics*

All statistical analyses took place using either SPSS v.26 (IBM, New York) or direct calculation. To initially assess normality of the data, histograms of payments were produced and a Shapiro-Wilk test was performed, confirming a positive (right) skewed distribution.

Given the non-normal distribution of the payments, an independent-samples Kruskal-Wallis test was used to assess differences in total payments between the four pre-determined specialty groups. Mann-Whitney *U* tests were then specifically used to compare pairwise payments for pre-specified groups.

The estimated comparative proportions of each practitioner group-type receiving payments were analysed using Fisher's Chi-squared tests. For all tests, we considered a p-value of less than 0.05 significant.

### **Results**

#### *Payments by Specialty Group*

There were 4832 reports of payments to medical practitioners provided as reimbursements during a six month period from November 2018 to April 2019. These payments related to events that took place from December 2015 to November 2019, as some payments were provided as reimbursements after the event occurred or in anticipation of an upcoming event. Values are expressed in 2019 Australian dollars.

A total of \$7,332,407 was paid to 2775 identified registered medical practitioners. Of these, 185 were registered as clinical haematologists, 233 were medical oncologists, seven were both clinical haematologists and medical oncologists, 1145 were other specialist physicians and 1205 were other, non-specialist physician medical practitioners. After classifying dual-registered cancer physicians into their dominant specialty the haematologist and medical oncologist group populations rose to 189 and 236 respectively.

Figure 1 above shows the payments per medical specialty by the percent of clinician per designated group receiving specific levels of payments. Given the skewed payment distribution, we assessed medians for each payment group, reported with full range and inter-quartile range (IQR), presented in Table 2. Medical oncologists received the highest median payments at \$2,131.26 (IQR \$844.65-\$5,653.06), followed by haematologists (\$1,519.95, IQR \$912.20-\$3,621.57), other specialist physicians (\$1,376.00, IQR \$818.59-\$3,412.82) and other non-specialist physician medical practitioners (\$709.00, IQR \$295.00-\$1,345.00). We analysed these payment distributions using the

non-parametric Kruskal-Wallis test, rejecting the null hypothesis that the distribution of payments were the same across the specialties ( $p < 0.001$ ).

**Table 2: Payments by Specialty Group, November 2018 to April 2019\***

Specialty	Medical oncologists	Clinical haematologists	Other internal medicine specialist physicians	Subgroups							
				Cardiologists	Endocrinologists	Gastroenterologists	Neurologists	Respiratory physicians	Rheumatologists		
N	236	189	1145	219	182	151	88	181	103		
Total	\$1,027,352.92	\$719,565.40	\$3,733,230.75	\$722,662.67	\$758,647.59	\$352,821.01	\$321,247.19	\$518,123.22	\$435,787.02		
Median	\$2,131.26	\$1,519.95	\$1,376.00	\$1,362.34	\$1,793.78	\$915.01	\$2,414.75	\$1,636.36	\$1,210.00		
Inter-Quartile Range	\$4,808.41	\$2,709.37	\$2,594.23	\$1,854.55	\$3,548.18	\$1,670.04	\$4,920.27	\$2,949.90	\$5,781.81		
Mean (95% confidence interval)	\$4,353.19 (\$3,636.17-\$5,070.21)	\$3,807.22 (\$3,087.13-\$4,527.31)	\$3,260.46 (\$2,956.72-\$3,564.21)	\$3,299.83 (\$2,661.61-\$3,938.05)	\$4,168.39 (\$3,153.50-\$5,183.29)	\$2,336.56 (\$1,750.17-\$2,922.96)	\$3,650.54 (\$2,880.04-\$4,421.03)	\$2,862.56 (\$2,421.73-\$3,303.39)	\$4,230.94 (\$3,003.86-\$5,458.03)		
Minimum	\$190.90	\$133.00	\$131.82	\$196.34	\$271.82	\$131.82	\$184.25	\$242.00	\$131.82		
Maximum	\$38,461.82	\$36,050.00	\$78,851.00	\$31,282.71	\$62,620.10	\$21,012.93	\$14,644.46	\$19,503.00	\$37,260.33		

\*Payments per group compared using Kruskal-Wallis one way analysis of variance,  $p < 0.001$ , indicating significant differences in

		Other medical practitioners (non-specialist physicians)	
Renal physicians	Other internal medicine specialists		
54	167	1205	
\$117,343.51	\$506,598.54	\$1,852,258.22	
\$2,022.92	\$1,100.00	\$709.00	
\$2,075.66	\$1,878.63	\$1,050.00	
\$2,173.03 (\$1,692.73)	\$3,033.52 (\$1,958.16)	\$1,537.14 (\$1,384.72)	
\$2,653.33)	\$4,108.89)	\$1,689.57)	
\$205.00	\$180.90	\$81.81	
\$7,352.50	\$78,851.00	\$29,227.33	

We then performed pairwise comparisons for the pre-specified specialty groups of interest using Mann-Whitney *U* tests. Specifically, we analysed four comparisons: medical oncologists versus other specialist physicians, medical oncologists versus other non-specialist physician medical practitioners, haematologists versus other specialist physicians and haematologists versus other non-specialist physician medical practitioners.

Again using mean rank comparisons, we determined that medical oncologists received significantly higher payments than other specialist physicians (2-tailed  $p=0.004$ ) and other medical practitioners (2-tailed  $p<0.001$ ), while haematologists received significantly higher payments than other medical practitioners (2-tailed  $p<0.001$ ). The amount received by haematologists did not differ significantly from other specialist physicians (2-tailed  $p=0.08$ ).

When compared against other internal medicine specialties, medical oncologists had the highest category total of payments, as well as the highest mean payment amount (also presented in Table 2). Median payments to medical oncologists were the second highest after neurologists (\$2,414.75, IQR



\$4,920.27). Haematologists had the third highest category total payments (after medical oncologists, endocrinologists and cardiologists), the fourth highest mean payment amount (after medical oncologists, rheumatologists and endocrinologists), and fifth highest median payment amount (after neurologists, medical oncologists, renal physicians, endocrinologists and respiratory physicians). These distribution differences were statistically significant using a Kruskal-Wallis test ( $p < 0.001$ ), and did not change our overall conclusions.

#### *Proportions of Specialists Receiving Payments*

Using contemporaneous Australian medical workforce summary data, we calculated the proportions of each defined speciality group receiving payments. These results are presented in Table 3, showing that approximately 32% of Australian medical oncologists and 31% of Australian haematologists received payments during the disclosure period. This compares to 12% of other internal medicine subspecialist physicians and only 1% of other, non-specialist physician medical practitioners.

<b>Specialty group</b>		<b>Received payment (n)</b>	<b>Total registered in Australia at June 2019 (n)</b>	<b>Proportion received payment (%)</b>
Medical oncologists		240*	757	31.7
Clinical haematologists		192*	621	30.9
Other internal medicine specialist physicians (total)		1145	9780	11.7
<i>Subgroups</i>	<i>Cardiologists</i>	<i>219</i>	<i>1481</i>	<i>14.8</i>

	<i>Endocrinologists</i>	182	766	23.8
	<i>Gastroenterologists</i>	151	960	15.7
	<i>Neurologists</i>	88	677	13.0
	<i>Respiratory physicians</i>	181	775	23.4
	<i>Rheumatologists</i>	103	404	25.5
	<i>Renal physicians</i>	54	610	8.9
	<i>Other internal medicine specialists</i>	167	4107	4.1
Other medical practitioners (non-specialist physician)		1205	107838	1.1
<i>*Includes dual-registered medical oncologists and clinical haematologists in both groups, consistent with AHPRA workforce reporting.</i>				

These proportions were analysed in the same crosswise pairings as the payment estimates. Fisher's Chi-squared testing showed that the proportion of medical oncologists receiving payments was higher than other specialist physicians ( $p < 0.001$ ) and other medical practitioners ( $p < 0.001$ ). The proportion of haematologists receiving payments was also higher than other specialist physicians ( $p < 0.001$ ) and other medical practitioners ( $p < 0.001$ ).

In our exploratory post hoc analysis by subspecialties, the proportion of medical oncologists and haematologists who received payments was the highest and second highest respectively. Figures for each subspecialist group are additionally provided in Table 3.

### *Payments by Company*

Payments to medical oncologists and clinical haematologists by company are displayed in Figure 2, listed in descending total value. Payments to medical oncologists and clinical haematologists by category are displayed in Figure 3.

During the disclosure period, a total of 449 payments were made to medical oncologists, totalling \$1,027,352.92. The highest total category of payment was for travel costs at \$495,218.04, followed closely by service fees, including consulting and advisory panels, totalling \$491,450.03. A total of 337 payments were made to clinical haematologists, totalling \$719,565.40. The highest total category of payment was for travel costs at \$440,094.65, almost twice that paid for service fees at \$243,967.78.

For medical oncologists, the highest individual company payment came from Merck and its affiliates, the manufacturer of such drugs as pembrolizumab (~9,360 per cycle(24)) totalling \$239,797.00. Merck also had the highest number of payments at 142. For haematologists, the highest company payment was from Celgene, which produces lenalidomide (~\$6610 per cycle(24)) at \$132,204.00. The highest number of payments was from Novartis, which produces nilotinib (~\$5,220 per month(24)), at 86. For medical oncologists, the top five companies were responsible for 78% of all payments, while for clinical haematologists this figure was 70%.

A full breakdown of payments to both medical oncologists and clinical haematologists is provided in the Supplementary Appendix.

## **Discussion**

This is the first direct analysis of pharmaceutical industry payments to medical oncologists and haematologists in Australia. Almost a third of cancer physicians received direct payments from November 2018 to April 2019, compared to 11 percent of other internal medicine subspecialist physicians and only one percent of GPs, trainees and other non-specialist physician medical practitioners. The value of these payments was significantly higher to medical oncologists than both other medical practitioners and other specialist physicians, and was significantly higher to haematologists than other medical practitioners, but not other specialist physicians.

For the pharmaceutical industry, anti-cancer medications are a hugely lucrative commodity, projected to provide up to US\$237 billion in annual revenue globally by 2024, by far the largest market share of any disease group.(2) With the cost to consumers and governments rising, this study provides valuable information about conflicts of interest among cancer physicians, the prescribers of these medicines. By the RACP's own standards, it is best practice to refuse payments from the pharmaceutical industry.(25) Despite these standards, payments continue to be received by cancer physicians on a large scale.

Payments from pharmaceutical companies, regardless of the extent, influences prescribing practice, in a way that can potentially be detrimental for patient care.(7-10) Gifts of any value can create reciprocity.(26, 27) Receipt of just one sponsored meal in the US has been associated with increased prescribing of the sponsor's brand-name drug.(15, 28)

It is also known, specifically, that payments from the pharmaceutical industry can affect prescribing by cancer physicians. For example, oncologists in the US are more likely to prescribe some anti-cancer drugs over their competitors, such as sunitinib, dasatinib and nilotinib, if they have received payments from the drug's manufacturer, despite no clear evidence of direct clinical superiority.(15) Authors of

oncology clinical practice guidelines and consensus statements are also more likely endorse specific drugs when they maintain financial conflicts of interest with their manufacturers.(29) This highlights the potential clinical ramifications of our findings.

To some extent, interactions between cancer physicians and the pharmaceutical industry are at this time unavoidable. It is in the interest of patients to have access to major clinical trials, and these are frequently designed and sponsored by drug companies. Novel medications are often accessed by patients directly from drug companies ahead of federal funding, with cancer physicians acting as the prescribing intermediary.

However, any interaction creates a conflict of interest. The fundamental role of a drug company is to maximise its profits, while the fundamental role of a cancer physician is to provide his or her patients with the best possible care. Financial relationships in particular have no demonstrable benefit for patients; to our knowledge, not a single previous study has shown industry payments to physicians to improve patient care.

Furthermore, previous systematic reviews have explored the potential benefits of interactions with the pharmaceutical industry in general, and failed to identify improved outcomes for patients. Spurling et al found only a single study that could demonstrate any improvement in prescriber knowledge (in this case, the treatment of complex Lyme disease), but the same study showed the additional potential for harm (poorer knowledge of treatment for uncomplicated Lyme disease).(30)

There are several limitations in this study, in large part due to limitations in the database itself. The first is that the limited scope of the disclosure period means it is difficult to accurately estimate annual payment rates, or the true number of clinicians receiving payments. It would be inaccurate to simply

double the six-monthly figures as this assumes such payments are regular, when the reality of this dataset is that payments were highly sporadic.

These payments also represent a minority of the interactions that occur between doctors and the pharmaceutical industry. For example, they do not include attendance at events where drug companies sponsor food and beverages, nor do they take into account general interpersonal interactions between representatives and doctors. While such sponsored events were previously reported in Australia by individual companies, and discussed in the literature,(12) they no longer feature in contemporary disclosures.

We additionally discovered and corrected some inaccuracies in categorisation of medical practitioners during our analysis. It is therefore conceivable that some misclassifications were missed when we initially excluded all non-medical health practitioners. This reflects an inaccuracy with the original data collection by Medicines Australia.

The observational nature of this research also limits our understanding of why practitioners chose to receive these payments. Nor do we understand whether cancer physicians felt they were acting in the best interest of patients when providing a remunerated service, for example through the development of clinical trial protocols. This should be the focus of further research in this area, to better guide policy decisions around interactions with industry, particularly in the context of cancer physicians.

In the US, payments to medical practitioners are mandatorily disclosed under the *Open Payments (Sunshine) Act*. The details for any given practitioner can be searched on the *Open Payments* website,(31) with that individual's payments compared to other practitioners of the same speciality. Alternatively, the payments to all members of an entire speciality can be easily produced, and compared to other specialities.

This contrasts with a lack of clarity in the Medicines Australia model of disclosures. While the public is able to easily search for any given practitioner by name, the *Disclosure Australia* website does not allow this information to be understood in context. Indeed, this study has attempted to provide this context, but the current reporting mechanism is not adequate for what is ostensibly a method of providing accurate and open information to the public in perpetuity.

It would be prudent for Australian disclosures to follow this US model. As it stands, the ACCC has overseen an inadequate form of reporting interactions with the pharmaceutical industry. Fundamentally, more detail needs to be collected and made available to the public. This is true both for direct payments to clinicians and other gifts provided by the industry, which are now lacking in disclosure reports. While the move to make collated disclosures easily searchable is commendable, this study shows that it does not go far enough.

## Conclusions

Current payments to Australian cancer physicians from the pharmaceutical industry occur at a higher frequency than to other doctors in general and to other specialist physicians specifically. The extent of payments to medical oncologists is higher per practitioner than those made to other doctors and other specialist physicians, while haematologists receive higher payments than other doctors but not other specialist physicians. Manufacturers of expensive pharmaceuticals target Australian cancer physicians, frequently paying for specific advisory services and subsidising travel.

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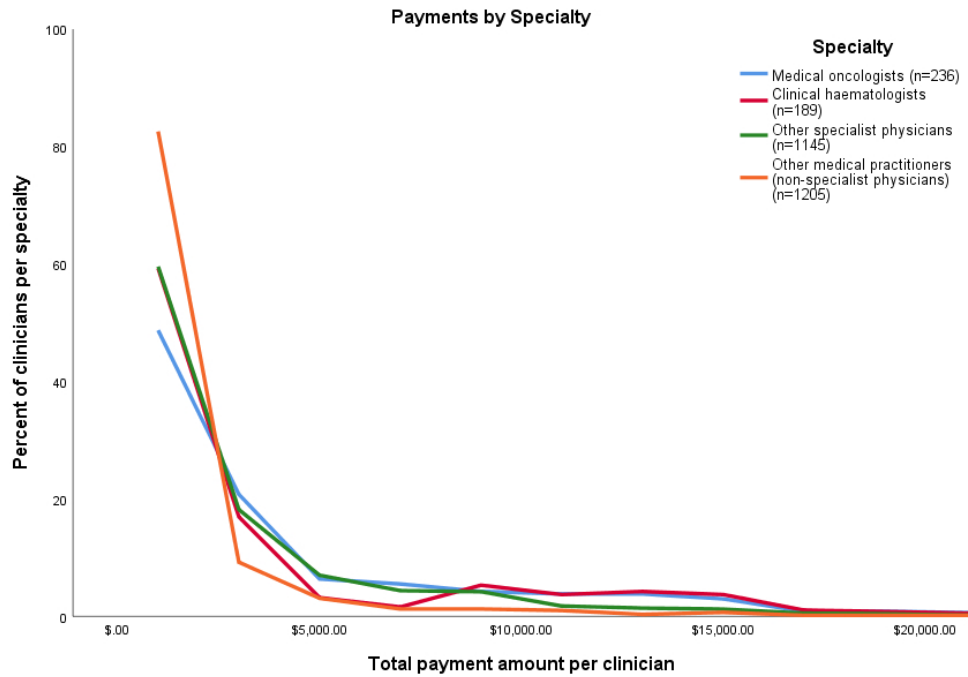
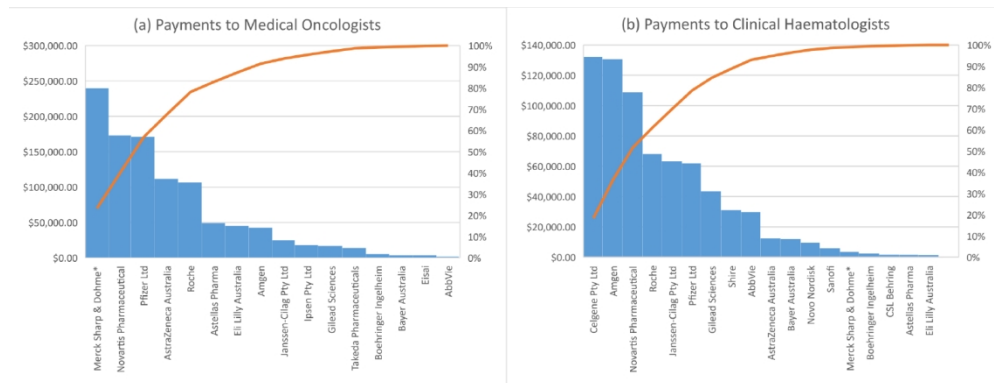


Figure 1: Distribution of payments by frequency for each of the four specified groups  
229x159mm (96 x 96 DPI)



\*Includes Merck Serono Australia Ltd.

Figure 2: Cumulative amount of payments by company name to (a) medical oncologists and (b) clinical haematologists.

428x172mm (96 x 96 DPI)

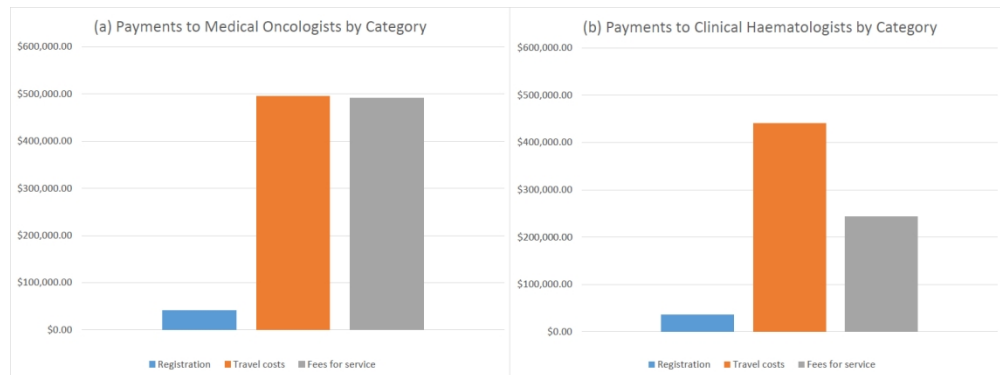


Figure 3: Total payments by category to (a) medical oncologists and (b) clinical haematologists.

427x159mm (96 x 96 DPI)