BMJ Open

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Journal:	*BMJ Open*
Manuscript ID	bmjopen-2017-016701
Article Type:	Research
Date Submitted by the Author:	03-Mar-2017
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Primary Subject Heading:	Public health
Secondary Subject Heading:	Health policy, Public health
Keywords:	Health policy < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, PUBLIC HEALTH, EDUCATION & TRAINING (see Medical Education & Training)

Pharmaceutical industry-funded events for health professionals:

A cross-sectional analysis of data released under Australian transparency rules

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Word count: 2208

Abstract

Objectives To analyse patterns and characteristics of pharmaceutical industry sponsorship of events for Australian health professionals and to understand the implications of changes in reporting standards for payments to health professionals.

Design Cross-sectional analysis.

Participants and Setting 301 publicly available company transparency reports downloaded from the website of Medicines Australia, the pharmaceutical industry trade association, covering the period from October 2011 to September 2015.

Results Forty-two companies sponsored 116,845 events for health professionals, on average 608 per week with 30 attendees per event. Events typically included a broad range of health professionals: 82.0% included medical doctors and 38.3% trainees. Oncology, surgery and endocrinology were the most frequent clinical areas of focus. Most events (64.2%) were held in a clinical setting. The median cost per event was AU$ 263 (Interquartile range $153-$1,195) and over 90% included food and beverages.

Conclusions Over this four-year period, industry-sponsored events were widespread and pharmaceutical companies maintained a high frequency of contact with health professionals. Most events were held in clinical settings, suggesting a pervasive commercial presence in everyday clinical practice. Food and beverages, known to be associated with changes to prescribing practice, were almost always provided. New Australian transparency provisions explicitly exclude meals from the reporting requirements, thus a large proportion of potentially influential payments from pharmaceutical companies to health professionals will disappear from public view.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- Transparency reports exist in Australia where companies report every industry-sponsored event for health professionals.
- From these publicly available reports, we have created a searchable world-first database with details of more than 100,000 industry-sponsored events for health professionals, enabling researchers to analyse the intersection of pharmaceutical marketing and medical education.
- The submission of transparency reports by companies to Medicines Australia is voluntary and we could not verify the accuracy and completeness of data.
- Since the Code of Conduct's transparency reporting requirements applies only to members of Medicines Australia, the available reports likely underestimate the true extent of industry sponsorship of events for health professionals.

Introduction

Full disclosure of financial relationships between the pharmaceutical industry and health professionals is a key strategy adopted to make these interactions more transparent. Many jurisdictions have recently introduced transparency provisions, including the Unites States (US) and the European Union, but the extent of the disclosure obligation varies. For example, meals and drinks fall outside the scope of disclosure obligations under new voluntary transparency provisions introduced by the European Federation of Pharmaceutical Industry Associations.(1) At the same time, in the US, over 100 medical societies recently backed a bill that would exempt pharmaceutical and medical device companies from reporting an entire category of payments to doctors: those related to continuing medical education.(2)

Australia was one of the first countries to move towards public reporting of these payments. Since 2007, Medicines Australia, the trade association of the prescription medicines industry, has required member companies to provide detailed reports of sponsorship of events for health professionals, including hospitality and travel for attendees, room rentals, speaker honoraria, and food, with reports published on the Medicines Australia website.(3) These disclosure provisions were a condition for approval of Medicines Australia's Code of Conduct by the Australian Competition and Consumer Commission and were upheld following a legal appeal by industry.(4) Reports include events for all registered healthcare professionals, making Australia one of the few countries with transparency extending to non-physicians.(5,6) Changes to this policy were introduced in 2015, with the focus on events replaced by disclosure of payments to individuals.(3) Moreover, the new Code no longer requires reporting of payments for food and beverages.

At a time when disclosure policies are being debated and revised in several settings, Australian data can provide valuable insights into patterns of industry sponsorship and on characteristics of transparency provisions that are needed to capture expenditures of pharmaceutical companies on health professionals. Apart from two analyses of data from the first six months of the Australian

disclosure scheme,(5,7) and one brief report on events involving nurses,(6) no comprehensive longer-term analyses have been conducted.

The objectives of this study are: to describe the nature and frequency of industry-sponsored events for health professionals; to create an open-access searchable database of these events; and to estimate the information that will be lost under newly introduced reporting standards.

Methods

Data Sources

We downloaded all the available reports from the Medicines Australia website (www.medicinesaustralia.com.au) in PDF format. The 301 PDF reports of approximately 15,000 pages covered the period October 2011 to September 2015. The PDFs had been originally created in Microsoft Excel. We requested the original Excel files from Medicines Australia but were refused on the basis that member companies had not given permission for their release. We converted the PDF files into Excel format using free, online converter programs, cleaned the data to address errors introduced during file conversion, and ensured consistency of reporting in each column.

Coding

We designed a coding scheme based on the available data and variables of theoretical interest based on the literature on industry-professional interactions.(8,9) The research team iteratively developed a set of keywords to define each variable of interest (Supplementary File 1). Using Excel's filter function, we used the keywords to search the unstructured descriptive text and to dichotomously code event features as "present/absent", including:

- sponsoring companies, grouped based on mergers and acquisitions as of March 31st 2016;
- geographical location by Australian state or overseas location;

- professional status of attendees (e.g. specialists, nurses, trainees);
- clinical focus based on clinical specialty of attendees and event description (e.g. oncology, endocrinology, cardiology);
- type of event (e.g. journal club, workshop, in-services);
- type of hospitality provided (e.g. breakfast, lunch, dinner)

Statistical analysis

We present frequency tables for the characteristics of the events, and median spending levels per event and company. Cost variables are reported in AU$. As the data were not normally distributed, we used Mann-Whitney U tests for the differences between medians. Analyses were performed using SPSS-Version 22.

Results

General Overview

From October 2011 to September 2015, 42 pharmaceutical companies in Australia sponsored 116,845 events involving health professionals. On average, there were 2,434 events per month and 608 events per week. Each year, the number of events sharply decreased in December through February, likely reflecting the holiday season.

Table 1 provides illustrative examples of sponsored events as presented verbatim in the company reports, chosen to reflect variations in reporting and event type. Events varied greatly in scope and intensity, ranging from a half hour journal club with sandwiches in a hospital meeting room, to a several day conference with overseas flight, accommodation and hospitality provided. The professional status was sometimes described generically as "healthcare professionals" or contained a list of the professions in attendees. The level of detail companies reported regarding the program's content and the extent of explicit product promotion also varied; most of the event descriptions were disease-focused (e.g. "Journal Club on Chronic Obstructive Pulmonary Disease") but in some cases the events mentioned specific drug names (e.g. "Introducing Zoely and other Emerging Trends in Contraception").

Attendees

Over this four-year period, there were 3,481,750 individual attendances at industry-sponsored events. On average there were 30 participants (SD=137.12) per event; 97.2% (n=113,595) of the events had fewer than 100 attendees and 0.2% (n=210) had more than 1000 participants. Over 40% (n=47,084) of events included participants from multiple professions. Table 2 lists the professional status of attendees and the most frequent clinical areas of focus for the events. Events were most frequently oncology-related, while otolaryngology and andrology were least represented.

Location and characteristics of sponsored events

Three quarters of events were held in the three Australian states with the largest populations: New South Wales (30.7%, n=35,888), Victoria (26.9%, n=31,448), and Queensland (18.8%, n= 21,963), and few were held overseas (1.9%, n= 2,262). Nearly two thirds of events (64.2%, n=74,998) were held in a clinical setting, such as hospitals, clinics or doctors' offices. Non-clinical venues included restaurants, hotels and convention centres. One third of the events were described as a generic "meeting" (37.5%, n=43,810) while others were described as journal clubs (28.5%, n=33,281), clinical meetings (3%, n=3,533), grand rounds (3.8%, n=4,472), in-services (2.6%, n=3,038), or workshops (2.6%, n=3,029). Only 4.2% (n=4,290) were described as scientific meetings (e.g. conferences or congresses).

Costs and hospitality

Reporting companies spent AU$ 286,117,928 on events for health professionals. On average, companies spent AU$ 2,449 per event (SD $15,020) while the median cost was AU$ 263 (Interquartile range (IQR)$153-$1,195). The median cost per person was AU$ 14 (IQR $10- $68). In 81.7% of the events (n=95,483) the costs were below AU$ 100 per attendee and in 2.1% (n=2,438) the costs were over AU$ 1000 per attendee.

Table 3 shows the median cost per person by characteristics of events. The median total cost per person was significantly higher when the event format was a scientific meeting (AU$ 93, IQR $33-659) compared with other event types (p<0.001), for events held overseas (AU$ 710, IQR $91-7,300) compared with events held in Australia (p<0.001) or outside the clinical settings (AU$ 91, IQR $28-154) as compared with events in the clinical setting (p<0.001).

Reported "hospitality or financial support" provided to attendees included registration fees, travel, accommodation, parking and food and beverage. Food was provided at 90.4% (n=105,667) of events: 22.2% included lunches (n=25,935), 17.0% dinners (n=19,873), 12.0% teas (n=14,067), 11.0% breakfasts (n=12,806), 2.7% were all-day events with meals (n=3,113), and for 25.6% (n=29,873), type of food and beverage was unspecified. Total cost of food was more than AU$ 84 million (AU$ 84,862,791), accounting for 29.7% of the total cost of these functions. However, for 65% (n=75,949) of events, the total listed cost for food and beverage was equal to the listed total cost of the event, indicating that the company's sponsorship extended to food and beverage only. The median cost of food per person was AU$ 12 (IQR $8-$20).

The top companies

Of the 42 pharmaceutical companies that provided reports, the top five in terms of the numbers of sponsored events were AstraZeneca, Novartis, Merck Sharp & Dohme, Roche, and Pfizer (Table 4). Boehringer Ingelheim had the highest cost per event with a median cost of AU$ 2,007 (IQR $1,308-$2,654), while Eli Lilly spent the least with a median cost per function of AU$ 145 (IQR $62-$455). Table 4 provides an overview of event sponsorship by the top 20 companies, representing 87.8% of events.

Availability of database

The analysable dataset in CSV file format we have created is available at: doi [to be inserted prior to publication]

Discussion

Pharmaceutical industry-funded events for health professionals were frequent and pervasive with almost three and a half million individual attendances at over 116,000 events in the four-year period between 2011 and 2015. As a frame of reference, in 2014 there were 610,148 registered health professionals in Australia,(10) suggesting that there was wide exposure to these events. Events typically included a broad range of professionals and multidisciplinary teams, including most commonly: medical specialists, nurses, trainees and primary care doctors. Nearly two-thirds of events were held in clinical settings. Average costs per person were modest and the vast majority of events (90.4%) included the provision of food and beverages. Additionally, for most events (65%), the only funding provided was for food and beverages. Thus, our analysis suggests that the new Australian and European transparency rules will decrease transparency because hospitality in the form of food and/or beverages will be exempt from reporting.(1,3)

Although professional education is critical for improving patient care, previous studies of internal pharmaceutical industry documents have shown that sponsored events have been effectively used as a marketing tool.(11,12) A systematic review from 2010 found that with rare exceptions, exposure to pharmaceutical industry information is associated with either no effect on prescribing or with adverse effects such as lower prescribing quality, higher frequency or costs.(13) More recently, analyses of the Open Payments database in the US, have shown that payments for educational training and even the provision of low cost free meals, commonly provided at sponsored events, are associated with increased prescribing of promoted, costly, brand-name medications.(14,15)

Finally, we also found a high prevalence of trainee attendance at these events. Targeting medical trainees can lead to a process of normalisation and enculturation while trainees develop their professional identity. (16) This has been described as an effective strategy “to influence physicians from the bottom up.”(12) Medical school policies limiting trainee-industry interaction have been associated with a shift in

attitude (17) and reduced prescribing of costly new medicines without therapeutic advantages.(18)

Our study has a number of limitations. Firstly, we relied on reports submitted by companies to Medicines Australia and could not verify the accuracy and completeness of data. Secondly, since the Code of Conduct's transparency reporting requirements applies only to members of Medicines Australia, the available reports likely underestimate the true extent of industry sponsorship of events for health professionals. For example, non-member manufacturers of prescription medicines and manufacturers of generic medicines, over-the-counter medicines and medical devices are not covered by these rules. Thirdly, with regard to the coding scheme, the research team identified a set of keywords to define each variable of interest and it is possible that some synonyms were missed due to variability in the data provided. Fourthly, we did not assess the content of events due to the unstructured and variable nature of reporting. Fifthly, our analysis focuses on industry sponsorship of events and did not examine differences in how event organizers manage potential influences. And finally, costs were not adjusted for inflation as this would likely have a limited impact on the Australian dollar over such a short time period. Notwithstanding these limitations, we have conducted a cross-sectional analysis of the only publicly available data on industry-sponsored events for health professionals.

In conclusion, our findings have several international implications for future research and policy initiatives. While Australian transparency reports are difficult to analyse due to their format, we have created an open-access searchable world-first database with details of more than 100,000 industry-sponsored events, enabling researchers to analyse the intersection of pharmaceutical marketing and medical education. Similarly, individual institutions such as hospitals or universities may use the data to see what industry-sponsored activities are happening within their own backyards, and whether they meet contemporary expectations for transparency and independence.

At the policy level, at a time when new rules are being debated and revised globally, our findings underscore the need for more disclosure, not less. Transparency rules should be as inclusive as possible with regard to the type of companies required to

report and also in terms of the scope of payments and categories of health professionals covered. The onus of reporting should not be on the industry only; for example, public sector hospitals could be required to report meal subsidies from pharmaceutical and device manufacturers. A stronger policy option, already implemented at several academic medical centres in the US, would be to eliminate the provision of free food by manufacturers.(19) In the long term, ways of expanding funding for independent continuing professional education should be explored. In the short term, health professionals should be more aware of the independent sources of information on drugs that are already available (e.g. NPSMedicineWise, the Australian Medicines Handbook and the independent drug bulletins).

Finally, our findings show decision-makers the extent of industry-sponsored activity which will be hidden if "free food" fails to be included in future transparency regimes.

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Contributors: AF, QG, BM, RM, LB conceived of the study. AF, QG, BM, RM, EW designed the coding scheme. AF, QG and SS acquired and analysed all data. AF drafted the manuscript. All the authors contributed to the writing of the paper and approved the final version. AF is the guarantor.

Funding: The work was partially funded via a University of Sydney Faculty of Pharmacy summer scholarship.

Role of the Funder/Sponsor: The funding source had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

Competing interests: All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author). Dr. Mintzes reports that she was an expert witness on behalf of plaintiffs in a Canadian class action suit concerning cardiovascular risks of a testosterone gel. This testimony included an analysis of promotion of testosterone to health professionals; there was no specific relationship to the current study. The authors declare no other relationships or activities that could appear to have influenced the submitted work.

Ethical approval: Not required.

Data sharing: Upon acceptance for publication, the full dataset will be made available as a CSV file with a link in the publication.

Access to the data: All authors had full access to all of the data (including statistical reports and tables) in the study and can take responsibility for the integrity of the data and the accuracy of the data analysis.

Tables and Boxes

Table 1. Illustrative examples of industry sponsored events

Company	Date	Event content	Venue	Professionals Present	Hospitality	Total Costs and Costs of hospitality per head
Astrazeneca	Sep.-15	Educational Event - Dinner meeting Going for Goal: Optimising Treatment in Type 2 Diabetes and Incretin Based Therapies; and On the Road to Glycemic Control. 2 hours	Hotel Realm Barton, ACT	32 General Practice Nursing Endocrinology	Dinner with Alcoholic and Non Alcoholic Beverages	$3,305.45 includes 1 speaker fee for $1,218.18 Hospitality per head: $65.23

		educational content				
Astrazeneca	Mar.-15	Educational Event - Lunch meeting Restless Legs. 1 hour educational content	The Golden Horse Footscray, VIC	10 General Practice Respiratory Medicine	Lunch	$848.82 includes speaker fee $600 Hospitality per head: $24.88
Novartis	Feb.-15	Sponsorship of Journal Club on: Chronic Obstructive Pulmonary Disease 1 hr educational content	Gold Coast University Hospital Southport, QLD	20 Medical Students, Nurses, Pharmacists	Afternoon Tea	$184 Hospitality per head: $9.20
Novartis	Mar.-14	Sponsorship of Day Seminar on: Immunosuppressant 8 hrs educational content	Alfred Health Melbourne, VIC	120 Cardiologists, Nurses, Registrars, Renal Physicians, Surgeons, Transplant Physicians	Breakfast, Coffee, Lunch, Afternoon Tea, Light Refreshments, Morning Tea, Non-Alcoholic Beverages	$2,665 Includes Speaker Meal Costs (for 8 speakers): $167 Hospitality per head: $20.82
Merck Sharp & Dohme Australia	Oct. -11	Oncology Journal Club [hours of education = 1]	Mercy Women's Hospit	5 Oncologists, Nurses	Food & beverages	$19.64, Hospitality per head: $3.92

			al, Heidelberg, VIC			
Merck Sharp & Dohme Australia	Oct. -11	Evening educational meeting "Introducing Zoely and other Emerging Trends in Contraception" [hours of education = 2.5]	Boathouse by the Lake, Barton, ACT	25 Obstetricians and Gynaecologist	Food & beverages	Total Cost $2180.15 Includes speaker fee 688.36, speaker food & bev $59.07, Hospitality per head: $57.31
Roche Products	Apr. -14	Multi Disciplinary Breast Cancer Clinical Review Meeting Educational Content = 1hr	Royal Adelaide Hospital North Terrace Adelaide, SA	13 Surgery Doctor Oncology Doctor Oncology Nurse Pathology Doctor	Lunch	$247 Hospitality per head: $19
Roche Products	Jan. -13	Grand Rounds Educational Content = 1 hr 15 mins	Bunbury Regional Hospital Bussell Highway Bunbur	20 Hospital Healthcare Professionals	Lunch	$272 Hospitality per head $13.60

			y,WA			
Pfizer Australia	Apr. -13	Pfizer Australia provided Sponsorship for Healthcare Professional to attend The European Congress of Clinical Microbiology and Infectious Disease (ECCMID) 2013. Educational Content - 33.75 hr(s).	International Congress Centrum, Berlin, Germany	1 Infectious Disease Specialist	Registration Fee, Travel, Accommodation	Total cost $10,855.00 Includes Registration Fee (1 attendee $878), Travel (Flights $8,196, Transfers $219), Accommodation (6 Room Nights $1,562)
Pfizer Australia	Jun. -15	Journal Club - Chronic Pain, Educational Content - 1 hr(s).	Peter MacCallum Cancer Centre, East Melbourne, VIC	15 Palliative Care Nurse; Palliative Care Physician	Meal / Drinks	$156 Hospitality per head $10.40

Table 2. Professional status of attendees and clinical areas of focus for the events (n = 116,845).

Characteristic	Number of events	Percent
Professional status of attendees*		
Medical specialist	80,060	68.5%
Nurses	46,214	39.6%
Trainees	44,774	38.3%
Primary care doctors	24,662	21.1%
Pharmacists	9,781	8.4%
Clinical areas of focus**		
Oncology	22,987	19.7%
Surgery	13,306	11.4%
Endocrinology	12,655	10.8%
Cardiology	9,033	7.7%
Haematology	8,200	7.0%

*percentages do not add to 100 because multiple types of professionals could attend an event.

**data are presented for the 5 most frequent areas of focus so percentages do not add to 100.

Table 3. Characteristics of events and median cost per person

	Number of events n=116,845 n (%)	**Median total cost per person*(Interquartile Range) $ AU**
Location		
Overseas	2,262 (1.9%)	$ 710 (91-7,300)
Within Australia	114,583 (98.1%)	$ 14 (10-62)
Setting		
Clinical setting	74,998 (64.2%)	$ 12 (9-15)
Non-clinical setting	41,847 (35.8%)	$ 91 (28-154)
Event type		
Scientific meeting (e.g. congress, conferences)	4,920 (4.2%)	$ 93 (33-659)
Other types of events	111,925 (95.8%)	$ 14 (10-60)

*Includes hospitality as well as other costs (e.g. venue hire, speaker honoraria, audiovisual hire)

Table 4. The top twenty companies in terms of number of sponsored events.

Company	Number of events	Number of attendees	Total cost of food and beverage (AU$)	Total cost of function* (AU$)	Median total cost per event (IQR) (AU$)
AstraZeneca	13,968	435,686	12,725,027	31,766,776	318 (165-2,261)
Novartis	10,120	244,069	6,600,503	27,467,246	270 (167-1,154)
Merck Sharp & Dohme	9,142	214,621	5,388,247	18,352,116	341 (180-1,182)
Roche	7,383	174,878	2,891,426	16,625,126	186 (129-284)
Pfizer	7,125	188,439	3,740,677	18,464,785	236 (141-573)
Sanofi	6,764	261,089	3,243,420	13,668,127	240 (149-600)
Amgen	5,562	117,767	4,545,874	11,145,245	192 (117-332)
Eli Lilly	5,419	138,765	2,270,896	7,949,786	145 (62-455)
Servier Lab	4,245	145,111	4,347,268	14,002,283	482 (196-2,252)
Mundipharma	4,168	135,517	2,956,613	8,939,046	342 (182-2,394)
Janssen	3,901	140,549	3,168,024	14,643,568	320 (164-1,818)
GlaxoSmithKline	3,706	103,331	2,993,037	6,292,242	254 (161-1,645)
CSL	3,285	138,170	1,337,909	6,000,501	288 (179-1,427)
Bristol Myers Squibb	3,151	138,446	2,492,290	12,755,630	245 (82-1,900)
Bayer	2,964	151,084	1,417,055	8,146,292	396 (194-1,500)
IPSEN	2,802	85,475	984,477	5,163,600	254 (169-454)
Abbott/AbbVie	2,774	59,793	3,291,305	6,437,623	255 (157-1,037)
Boehringer Ingelheim	2,223	56,204	6,050,143	8,724,933	2,007 (1,308-2,654)
Gilead Sciences	2,049	45,510	990,419	7,061,338	245 (160-540)
Merk Serono	1,841	41,809	1,376,023	4,237,372	229 (145-626)

Total – Top 20	102,592	3,016,313	72,810,634	247,843,635	262 (152-1,199)
All companies	116,845	3,481,750	84,862,792	286,117,928	263 (153-1,195)

Abbreviations: IQR, interquartile range

* Includes food and drink as well as other costs (e.g. venue hire, speaker honoraria, audiovisual hire)

Supplementary File 1. Keywords for coding

Variable name	Keyword search
COMPANY	A. Menarini Australia Pty Ltd; Abbott Australasia Pty Ltd OR AbbVie Pty Ltd; Actelion Pharmaceuticals Australia Pty Ltd; Alexion Pharmaceuticals Australasia PTY LTD; Allergan Australia Pty Ltd; Amgen Australia; Astellas Pharma Australia Pty Ltd; Astrazeneca Pty Ltd; Baxter Healthcare Pty Ltd; Bayer Australia Ltd; Besins Healthcare Australia; BioCeuticals; Biogen Idec Australia Pty Limited; Boehringer Ingelheim Pty Limited; Bristol-Myers Squibb Australia Pty Limited; Celgene Pty Ltd; CSL (includes also bioCSL Australia Pty Ltd and CSL Behring); Eisai Australia Pty Ltd; Eli Lilly Australia Pty Ltd; Fresenius Kabi Australia; Gilead Sciences Pty.; GlaxoSmithKline Australia Pty Ltd; iNova Pharmaceuticals (Aus) Pty Ltd; IPSEN Pty Ltd; Janssen; LEO Pharma Pty Ltd; Lundbeck Australia; Merck Serono Australia Pty Ltd; MSD Australia Pty Ltd; Mundipharma Pty Ltd; Mylan EPD; Norgine Pty Limited; Novartis Pharmaceuticals Australia Pty Limited (includes also Alcon Laboratories); Novo Nordisk

	Pharmaceuticals; Pfizer Australia; Roche Products Pty Limited; Sanofi/Sanofi Aventis Australia Pty Ltd; Servier Laboratories (Australia) Pty Ltd; Shire Australia; Takeda Pharmaceuticals Australia Pty Ltd (includes also Nycomed Pty Ltd Report); UCB Pharma; Vifor Pharma Pty Ltd
LOCATION	
New South Wales	NSW, New South Wales, Sydney, other cities or suburbs, and postal codes of NSW*
Victoria	VIC, Victoria, Melbourne, other cities or suburbs and postal codes of VIC*
Australian Capital Territory	ACT, Australian Capital Territory, Canberra, other cities or suburbs, and postal codes of ACT*
Western Australia	WA, Western Australia, Perth, other cities or suburbs, and postal codes of WA*
South Australia	SA, South Australia, Adelaide, other cities or suburbs, and postal codes of SA*
North Territory	NT, North Territory, other cities or suburbs, and postal codes of NT*
Tasmania	TAS, Tasmania, Hobart, other cities or suburbs, and postal codes of Tasmania*
Overseas	Overseas: outside of Australia**
*Where the state or capital was not listed, events were hand coded based on postal codes, cities or suburbs **Events not taking place in an Australian state were hand-coded	

MEALS	
• Lunch	Lunch
• Dinner	Dinner
• Breakfast	Breakfast
• Tea	Afternoon tea, morning tea, light refreshments, light meals, sandwiches & drinks, coffee cart, snack and beverage, sushi
• All day events with meals	Day delegate package*; conference package**
• Food unspecified	food & beverages, meals, drinks, in hospital catering, beverages, wine
• No meals provided	Sponsorship/accommodation only, no hospitality provided, travel/accommodation only (domestic events)
*Note: "day delegate package" consisted of entries where multiple meals were listed ((Lunch, tea), (Breakfast, tea), (Dinner, tea), (Breakfast, lunch, tea)) **Note: "conference package" consisted of events lasting multiple days and typically included a day delegate package, often accommodation (food and beverage not reported separately), registration (food and beverage not reported separately), or travel (including flights, registration, airfares, accommodation and food and beverages not reported separately)	
EVENTS HELD IN CLINICAL SETTING	Hospital; clinic; practice; medicare local; health centre; surgery; medical centre; medical; health care centre; specialist centre; cancer centre; cancer care centre; heart centre; medical and dental centre;

	endocrine centre; radiotherapy centre; radiation centre; optical centre; eye centre; renal unit; ward; department; dept; community health; family planning; education centre.
PROFESSIONAL STATUS	
• Primary care doctors	GP; general practitioner; family medicine.
• Nurses	Nurse
• Pharmacists	Pharmacist
• Trainees	Registrar; resident; intern; student; advanced trainee; RMO; resident medical officer; JHO; SHO; senior house officer; PHO; principal house officer; fellow
• Specialty care	Specialist; consultant; senior medical officer; SMO; visiting medical officer; VMO; general medicine; general physician; *ology physician; *ology doctor; allergist; allergy physician; anesthesiologist; anesthetist; anaesthesiologist; anaesthetist; andrologist; cardiologist; dermatologist, diabetologist; emergency physician; emergency medicine physician; endocrinologist; epileptologist; gastroenterologist; geriatrician; getriatric physician; gynaecologist; obstetrician; OB/GYN; haematologist; hematologist; hepatologist; immunologist; infectious

	disease physician; infectious disease doctor; internal medicine physician; microbiologist; neonatologist; neurologist; nuclear medicine physician; nephrologist; renal physician; renal doctor; urologist; oncologist; pharmacologist; pulmonologist; psychogeriatrician; ophthalmologist; rheumatologist; radiologist; respiratory physician; respiratory medicine physician; respiratory medicine doctor; palliative care physician; pathologist; sexual health physician; sexual health doctor; psychiatrist; psychiatry doctor; paediatrician; surgeon; surgery doctor; intensive care doctor; intensivist; intensive care physician; cardiothoracic
CLINICAL FOCUS	
• Allergy/Immunology	Allergist; allergy; immunologist; immunology
• Anaesthesiology	Anesthesiologist; anesthetist; anaesthesiologist; anaesthetist; anaesthesiology
• Andrology	Andrologist
• Cardiology	Cardiologist; cardiology
• Dermatology	Dermatologist; dermatology
• Emergency	Emergency
• Endocrinology	endocrinologist; endocrinology; diabetologist; diabetology; diabetes
• Gastroenterology	Gastroenterologist; gastroenterology; Hepatologist; hepatology

• Geriatrics	Geriatrician; geriatric; psychogeriatrician; elderly
• Haematology	Haematologist; haematology; hematology; hematologist
• Infectious Diseases	Infectious disease; microbiologist; microbiology
• Internal Medicine	Internal medicine
• Intensive care	Intensive care; intensivist; critical care
• Neonatology	Neonatologist; neonatology; NICU; neonatal
• Nuclear medicine	Nuclear medicine
• Nephrology	Nephrologist, nephrology; renal; kidney
• Neurology	Neurologist; neurology; epileptologist
• Obstetrics/Gynaecology	Gynaecologist; gynaecology; obstetrician; OB/GYN; obstetrics
• Oncology	Oncologist; oncology; cancer
• Ophthalmology	Ophthalmologist; ophthalmology
• Otolaryngology	Otolaryngology
• Palliative care	Palliative care
• Pathology	Pathologist; pathology
• Pharmacology	Pharmacologist; pharmacology
• Paediatrics	Paediatrician; paediatric*; pediatric*
• Psychiatry	Psychiatrist; psychiatry; mental health
• Radiology	Radiologist; radiology
• Rheumatology	Rheumatologist; rheumatology
• Respiratory medicine	Lung specialist; respiratory; pulmonologist
• Sexual health	Sexual health
• Surgery	Surgeon; surgery; surgical; operating theatre
• Urology	Urologist; urology
*Note: the clinical focus is a proxy variable based on clinical specialty of attendees	

and/or event description.	
EVENT TYPE	
• Meeting (all inclusive/NOS)	Search for generic word "meeting"
• Journal club	Journal club; journalclub
• Inservice	Inservice
• Workshop	Workshop
• Grand rounds	Grand round; grandround
• Scientific meeting	scientific meeting; congress; conference AND NOT videoconference/teleconference
• Clinical meeting	internal meeting; departmental meeting; clinical meeting; case review, case conference; case study meeting; case study conference
• Multidisciplinary meeting	Multidisciplinary meeting

STROBE—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Page 1, 2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Page 2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Page 4, 5
Objectives	3	State specific objectives, including any prespecified hypotheses	Page 5
Methods			
Study design	4	Present key elements of study design early in the paper	Page 5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Page 5
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	Page 5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Page 5,6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Page 5,6
Bias	9	Describe any efforts to address potential sources of bias	Methods: page 5, 6 Limitation: page 11
Study size	10	Explain how the study size was arrived at	Page 5,6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Page 6
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Page 6
		(*b*) Describe any methods used to examine subgroups and interactions	N/A
		(*c*) Explain how missing data were addressed	N/A
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	N/A
		(*e*) Describe any sensitivity analyses	N/A

Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Page 7
		(b) Give reasons for non-participation at each stage	N/A
		(c) Consider use of a flow diagram	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Page 7
		(b) Indicate number of participants with missing data for each variable of interest	N/A
Outcome data	15*	Report numbers of outcome events or summary measures	7-9
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	N/A
		(*b*) Report category boundaries when continuous variables were categorized	N/A
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N/A
Discussion			
Key results	18	Summarise key results with reference to study objectives	Page 10
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Page 11
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Page 10,11
Generalisability	21	Discuss the generalisability (external validity) of the study results	Page 10-12
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Page 15

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

A cross-sectional analysis of pharmaceutical industry-funded events for health professionals in Australia

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2017-016701.R1
Article Type:	Research
Date Submitted by the Author:	13-Apr-2017
Complete List of Authors:	Fabbri, Alice; Universita degli Studi dell\'Insubria, Centre of Research in Medical Pharmacology; The University of Sydney, Charles Perkins Centre and Faculty of Pharmacy Grundy, Quinn; The University of Sydney, Charles Perkins Centre and Faculty of Pharmacy Mintzes, Barbara; The University of Sydney, Charles Perkins Centre and Faculty of Pharmacy Swandari, Swestika; The University of Sydney, Charles Perkins Centre and Faculty of Pharmacy Moynihan, Ray; Bond University, Faculty of Health Sciences and Medicine; The University of Sydney, Sydney Medical School Walkom, Emily; University of Newcastle, Bero, Lisa; The University of Sydney, Charles Perkins Centre and Faculty of Pharmacy
Primary Subject Heading:	Public health
Secondary Subject Heading:	Health policy, Public health
Keywords:	Health policy < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, PUBLIC HEALTH, EDUCATION & TRAINING (see Medical Education & Training)

A cross-sectional analysis of pharmaceutical industry-funded events for health professionals in Australia

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Word count: 2446

Abstract

Objectives To analyse patterns and characteristics of pharmaceutical industry sponsorship of events for Australian health professionals and to understand the implications of recent changes in transparency provisions that no longer require reporting of payments for food and beverages.

Design Cross-sectional analysis.

Participants and Setting 301 publicly available company transparency reports downloaded from the website of Medicines Australia, the pharmaceutical industry trade association, covering the period from October 2011 to September 2015.

Results Forty-two companies sponsored 116,845 events for health professionals, on average 608 per week with 30 attendees per event. Events typically included a broad range of health professionals: 82.0% included medical doctors, including specialists and primary care doctors, and 38.3% trainees. Oncology, surgery and endocrinology were the most frequent clinical areas of focus. Most events (64.2%) were held in a clinical setting. The median cost per event was AU$ 263 (Interquartile range $153-$1,195) and over 90% included food and beverages.

Conclusions Over this four-year period, industry-sponsored events were widespread and pharmaceutical companies maintained a high frequency of contact with health professionals. Most events were held in clinical settings, suggesting a pervasive commercial presence in everyday clinical practice. Food and beverages, known to be associated with changes to prescribing practice, were almost always provided. New Australian transparency provisions explicitly exclude meals from the reporting requirements, thus a large proportion of potentially influential payments from pharmaceutical companies to health professionals will disappear from public view.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- From publicly available reports released under Australian transparency rules, we have created a searchable world-first database with details of more than 100,000 industry-sponsored events for health professionals, enabling researchers to analyse the intersection of pharmaceutical marketing and medical education.
- In order to analyse the database, we iteratively identified a set of keywords for each variable of interest, however it is possible that some synonyms were missed.
- We relied upon data as presented in the Medicines Australia transparency reports and we did not verify the accuracy and completeness of data.
- Transparency requirements apply only to member companies, excluding manufacturers of generics, over-the-counter and non-member prescription medicine manufacturers, thus our analysis likely underestimates the true extent of industry sponsorship of events for health professionals.

Introduction

Full disclosure of financial relationships between the pharmaceutical industry and health professionals is a key strategy adopted to make these interactions more transparent. Many jurisdictions have recently introduced transparency provisions, including the Unites States (US) and the European Union, but the extent of the disclosure obligation varies. For example, meals and drinks fall outside the scope of disclosure obligations under new voluntary transparency provisions introduced by the European Federation of Pharmaceutical Industry Associations.(1) At the same time, in the US, over 100 medical societies recently backed a bill that would exempt pharmaceutical and medical device companies from reporting an entire category of payments to doctors: those related to continuing medical education.(2)

Australia was one of the first countries to move towards public reporting of these payments. Since 2007, Medicines Australia, the trade association of the prescription medicines industry, has required member companies to provide detailed reports of sponsorship of events for health professionals, which include company-initiated events, sponsored events organised by a third party, trade displays at educational events and sponsorship of healthcare professionals to attend events both in Australia and overseas.(3) The reports are published on the Medicines Australia website and include events for all registered healthcare professionals, making Australia one of the few countries with transparency extending to non-physicians.(4,5) These disclosure provisions were a condition for approval of Medicines Australia's Code of Conduct by the Australian Competition and Consumer Commission and were upheld following a legal appeal by industry.(6) Changes to this policy were introduced in 2015, with the focus on events replaced by disclosure of payments to individuals.(3) The reports detailing event sponsorship and aggregate payments to health professionals have been discontinued, and replaced with reports of payments to named individuals, similar to the Open Payments database in the US. Moreover, the new Code no longer requires reporting of payments for food and beverages.

At a time when disclosure policies are being debated and revised in several settings,(1,2,3) Australian data can provide valuable insights into patterns of industry sponsorship and on characteristics of transparency provisions that are needed to capture expenditures of pharmaceutical companies on health professionals. Apart from two analyses of data from the first six months of the Australian disclosure scheme,(4,7) and one brief report on events involving nurses,(5) no comprehensive longer-term analyses have been conducted.

The objectives of this study are: to describe the nature and frequency of events for health professionals sponsored by pharmaceutical companies that are members of Medicines Australia; to create an open-access searchable database of these events; and to estimate the information that will be lost under newly introduced reporting standards.

Methods

Data Sources

We downloaded all the available reports from the Medicines Australia website (www.medicinesaustralia.com.au) in PDF format. The 301 PDF reports of approximately 15,000 pages covered the period October 2011 to September 2015. The PDFs had been originally created in Microsoft Excel. We requested the original Excel files from Medicines Australia but were refused on the basis that member companies had not given permission for their release. We converted the PDF files into Excel format using free, online converter programs, cleaned the data to address errors introduced during file conversion, and ensured consistency of reporting in each column.

The reports cover information on the sponsoring company, timing, venue type, number and profession of participants, hospitality and travel for attendees, room rentals and equipment, and speaker honoraria.(3)

Coding

We designed a coding scheme based on the available data and variables of theoretical interest based on the literature on industry-professional interactions(8,9) and on two previous analyses of data from the first six months of the Australian disclosure scheme.(4,7) The research team iteratively developed a set of keywords to define each variable of interest (Supplementary File 1). Using Excel's filter function, we used the keywords to search the unstructured descriptive text and to dichotomously code event features as "present/absent", for the following variables:

- sponsoring companies, grouped based on mergers and acquisitions as of March 31st 2016;
- geographical location by Australian state or overseas location;
- professional status of attendees (e.g. specialists, nurses, trainees);
- clinical focus based on clinical specialty of attendees and event description (e.g. oncology, endocrinology, cardiology);
- type of event (e.g. journal club, workshop, in-services);
- type of hospitality provided (e.g. breakfast, lunch, dinner)

Statistical analysis

We present frequency tables for the characteristics of the events, and median spending levels per event and company. Cost variables are reported in AU$. As the data were not normally distributed, we used Mann-Whitney U tests for the differences between medians. Analyses were performed using SPSS-Version 22.

Results

General Overview

From October 2011 to September 2015, 42 pharmaceutical companies in Australia sponsored 116,845 events involving health professionals. On average, there were 2,434 events per month and 608 events per week. Each year, the number of events sharply decreased in December through February, likely reflecting the holiday season.

Table 1 provides illustrative examples of sponsored events as presented verbatim in the company reports, chosen to reflect variations in reporting and event type. Events varied greatly in scope and intensity, ranging from a half hour journal club with sandwiches in a hospital meeting room, to a several day conference with overseas flight, accommodation and hospitality provided. The professional status was sometimes described generically as "healthcare professionals" or contained a list of the professions in attendees. The level of detail companies reported regarding the program's content and the extent of explicit product promotion also varied; most of the event descriptions were disease-focused (e.g. "Journal Club on Chronic Obstructive Pulmonary Disease") but in some cases the events mentioned specific drug names (e.g. "Introducing Zoely and other Emerging Trends in Contraception").

Attendees

Over this four-year period, there were 3,481,750 individual attendances at industry-sponsored events. The median number of event attendees was 18 (interquartile range (IQR) 12-25); 97.2% (n=113,595) of the events had fewer than 100 attendees and 0.2% (n=210) had more than 1000 participants. Over 40% (n=47,084) of events included participants from multiple professions. Table 2 lists the professional status of attendees and the most frequent clinical areas of focus for the events. Events were most frequently oncology-related, while otolaryngology and andrology were least represented.

Location and characteristics of sponsored events

Three quarters of events were held in the three Australian states with the largest populations: New South Wales (30.7%, n=35,888), Victoria (26.9%, n=31,448), and Queensland (18.8%, n= 21,963), and few were held overseas (1.9%, n= 2,262). Nearly two thirds of events (64.2%, n=74,998) were held in a clinical setting, such as hospitals, clinics or doctors' offices. Non-clinical venues included restaurants, hotels and convention centres. One third of the events were described as a generic "meeting" (37.5%, n=43,810) while others were described as journal clubs (28.5%, n=33,281), clinical meetings (3%, n=3,533), grand rounds (3.8%, n=4,472), in-services (2.6%, n=3,038), or workshops (2.6%, n=3,029). Only 4.2% (n=4,290) were described as scientific meetings (e.g. conferences or congresses).

Costs and hospitality

Reporting companies spent AU$ 286,117,928 on events for health professionals. On average, companies spent AU$ 2,449 per event (SD $15,020) while the median cost was AU$ 263 (IQR $153-$1,195). The median cost per person was AU$ 14 (IQR $10- $68). In 81.7% of the events (n=95,483) the costs were below AU$ 100 per attendee and in 2.1% (n=2,438) the costs were over AU$ 1000 per attendee.

Table 3 shows the median cost per person by characteristics of events. The median total cost per person was significantly higher when the event format was a scientific meeting such as a congress or conference (AU$ 93, IQR $33-659) compared with other event types (p<0.001), for events held overseas (AU$ 710, IQR $91-7,300) compared with events held in Australia (p<0.001) or outside the clinical settings (AU$ 91, IQR $28-154) as compared with events in the clinical setting (p<0.001).

Reported "hospitality or financial support" provided to attendees included registration fees, travel, accommodation, parking and food and beverage. Food was provided at 90.4% (n=105,667) of events: 22.2% included lunches (n=25,935), 17.0% dinners (n=19,873), 12.0% teas (n=14,067), 11.0% breakfasts (n=12,806), 2.7% were all-day events with meals (n=3,113), and for 25.6% (n=29,873), type of food and beverage was unspecified. Total cost of food was more than AU$ 84 million (AU$ 84,862,791), accounting for 29.7% of the total cost of these functions. However, for 65% (n=75,949) of events, the total listed cost for food and beverage was equal to the listed total cost of the event, indicating that the company's sponsorship extended to food and beverage only. The median cost of food per person was AU$ 12 (IQR $8-$20).

The top companies

Of the 42 pharmaceutical companies that provided reports, the top five in terms of the numbers of sponsored events were AstraZeneca, Novartis, Merck Sharp & Dohme, Roche, and Pfizer (Table 4). Boehringer Ingelheim had the highest cost per event with a median cost of AU$ 2,007 (IQR $1,308-$2,654), while Eli Lilly spent the least with a median cost per function of AU$ 145 (IQR $62-$455). Table 4 provides an overview of event sponsorship by the top 20 companies, representing 87.8% of events.

Availability of database

The analysable dataset in CSV file format we have created is available at: doi [to be inserted prior to publication]

Discussion

Pharmaceutical industry-funded events for health professionals were frequent and pervasive with almost three and a half million individual attendances at over 116,000 events in the four-year period between 2011 and 2015. As a frame of reference, in 2014 there were 610,148 registered health professionals in Australia,(10) suggesting that there was wide exposure to these events. Events typically included a broad range of professionals and multidisciplinary teams, including most commonly: medical specialists, nurses, trainees and primary care doctors. Nearly two-thirds of events were held in clinical settings. Average costs per person were modest and the vast majority of events (90.4%) included the provision of food and beverages. Additionally, for most events (65%), the only funding provided was for food and beverages. Thus, our analysis suggests that the new Australian and European transparency rules will decrease transparency because hospitality in the form of food and/or beverages will be exempt from reporting.(1,3)

Although professional education is critical for improving patient care, previous studies of internal pharmaceutical industry documents have shown that sponsored events have been effectively used as a marketing tool.(11,12) A systematic review from 2010 found that with rare exceptions, exposure to pharmaceutical industry information is associated with either no effect on prescribing or with adverse effects such as lower prescribing quality, higher frequency or costs.(13) More recently, analyses of the Open Payments database in the US, have shown that payments for educational training and even the provision of low cost free meals, commonly provided at sponsored events, are associated with increased prescribing of promoted, costly, brand-name medications.(14,15)

Finally, we also found a high prevalence of trainee attendance at these events. Targeting medical trainees can lead to a process of normalisation and enculturation while trainees develop their professional identity. (16) This has been described as an effective strategy “to influence physicians from the bottom up.”(12) Medical school policies limiting trainee-industry interaction have been associated with a shift in

attitude (17) and reduced prescribing of costly new medicines without therapeutic advantages.(18)

Our study has a number of limitations. First, we relied on reports submitted by companies to Medicines Australia and could not verify the accuracy and completeness of data. Second, since the Code of Conduct's transparency reporting requirements applies only to members of Medicines Australia, the available reports likely underestimate the true extent of industry sponsorship of events for health professionals. Our analysis included only 42 Medicines Australia member companies; as a frame of reference there are approximately 140 separate firms listed as suppliers to the Australian Pharmaceutical Benefit Scheme.(19) Moreover, non-member manufacturers of branded prescription medicines, generic medicines, over-the-counter medicines and medical devices are not covered by the Medicines Australia Code. Third, with regard to the coding scheme, the research team identified a set of keywords to define each variable of interest and it is possible that some synonyms were missed due to variability in the data provided. Fourth, we did not assess the content of events due to the unstructured and variable nature of reporting. Fifth, our analysis focuses on industry sponsorship of events and did not examine differences in how event organizers manage potential influences. Finally, costs were not adjusted for inflation as this would likely have a limited impact on the Australian dollar over such a short time period. Notwithstanding these limitations, we have conducted a cross-sectional analysis of the only publicly available data on industry-sponsored events for health professionals.

In conclusion, our findings have several international implications for future research and policy initiatives. While Australian transparency reports are difficult to analyse due to their format, we have created an open-access searchable world-first database with details of more than 100,000 industry-sponsored events, enabling researchers to analyse the intersection of pharmaceutical marketing and medical education. Similarly, individual institutions such as hospitals or universities may use the data to see what industry-sponsored activities are happening within their own backyards, and whether they meet contemporary expectations for transparency and independence.

At the policy level, at a time when new rules are being debated and revised globally, our findings underscore the need for more disclosure, not less. Transparency rules should be as inclusive as possible with regard to the type of companies required to report and also in terms of the scope of payments and categories of health professionals covered. The onus of reporting should not be on the industry only; for example, public sector hospitals as well as universities and professional associations could report meal subsidies from pharmaceutical and device manufacturers. A stronger policy option, already implemented at several academic medical centres in the US, would be to eliminate the provision of free food by manufacturers.(20) In the long term, ways of expanding funding for independent continuing professional education should be explored. There are already case studies showing that independence from industry sponsorship is achievable. For example the University of Michigan, as well as other major medical institutions in the US, no longer accept commercial support for continuing medical education.(21,22) This sets a valuable example that could become a model for other institutions. In the short term, universities and professional associations should make health professionals more aware of the independent sources of information on drugs that are already available (e.g. NPSMedicineWise, the Australian Medicines Handbook and the independent drug bulletins).

Finally, our findings highlight that transparency requirements likely capture only a portion of industry sponsorship of events for health professionals. Changes to the transparency requirements will likely exacerbate this issue by excluding common categories of payments. Thus, decision-makers should be aware of the extent of industry-sponsored activity which will be hidden if “free food” fails to be included in future transparency regimes.

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Contributors: AF, QG, BM, RM, LB conceived of the study. AF, QG, BM, RM, EW designed the coding scheme. AF, QG and SS acquired and analysed all data. AF drafted the manuscript. All the authors contributed to the writing of the paper and approved the final version. AF is the guarantor.

Funding: The work was partially funded via a University of Sydney Faculty of Pharmacy summer scholarship.

Role of the Funder/Sponsor: The funding source had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

Competing interests: All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author). Dr. Mintzes reports that she was an expert witness on behalf of plaintiffs in a Canadian class action suit concerning cardiovascular risks of a testosterone gel. None of the authors received any payments, funding, or other financial support from pharmaceutical manufacturers. The authors declare no other relationships or activities that could appear to have influenced the submitted work.

Ethical approval: Not required.

Data sharing: Upon acceptance for publication, the full dataset will be made available as a CSV file with a link in the publication.

Access to the data: All authors had full access to all of the data (including statistical reports and tables) in the study and can take responsibility for the integrity of the data and the accuracy of the data analysis.

454

Tables and Boxes

Table 1. Illustrative examples of industry sponsored events*

Company	Date	Event content	Venue	Professional status of attendees	Hospitality provided	Total Cost of Hospitality	Number of attendees	Total costs of function
Astrazeneca	Sep. - 15	Educational Event - Dinner meeting Going for Goal: Optimising Treatment in Type 2 Diabetes and Incretin Based Therapies; and On the Road to Glycemic Control. 2 hours educational content	Hotel Realm Barton, ACT	General Practice Nursing Endocrinology	Dinner with Alcoholic and Non Alcoholic Beverages	$2,087.27	32	$3,305.45 includes 1 speaker fee for $1,218.18
Astrazeneca	Mar. - 15	Educational Event - Lunch meeting Restless Legs. 1 hour educational content	The Golden Horse Footscray, VIC	General Practice Respiratory Medicine	Lunch	$248.82	10	$848.82 includes speaker fee for $600

Novartis	Feb. - 15	Sponsorship of Journal Club on: Chronic Obstructive Pulmonary Disease 1 hr educational content	Gold Coast University Hospital Southport, QLD	Medical Students, Nurses, Pharmacists	Afternoon Tea	$184 includes Food & Beverages for 20 delegates $184	20	$184 includes Total Hospitality : $184
Novartis	Mar. - 14	Sponsorship of Day Seminar on: Immunosuppressant 8 hrs educational content	Alfred Health Melbourne, VIC	Cardiologists, Nurses, Registrars, Renal Physicians, Surgeons, Transplant Physicians	Breakfast, Coffee, Lunch, Afternoon Tea, Light Refreshments, Morning Tea, Non-Alcoholic Beverages	$2,498 includes Food & Beverages for 120 delegates : $2,498	120	$2,665 Includes Total Hospitality : $2,498 Speaker Costs: Meal (for 8 speakers): $167
Merck Sharp & Dohme	Oct. - 11	Oncology Journal Club [hours of education = 1]	Mercy Women's Hospital,	Oncologists, Nurses	Food & beverages	food & bev 19.64, Total	5	Total Costs $19.64

Australia			Heidelberg, VIC			Hospitality 19.64		
Merck Sharp & Dohme Australia	Oct. - 11	Evening educational meeting "Introducing Zoely and other Emerging Trends in Contraception" [hours of education = 2.5]	Boathouse by the Lake, Barton, ACT	Obstetricians and Gynaecologist	Food & beverages	food & bev 1432.72, Total Hospitality 1432.72	25	speaker fee 688.36, speaker food & bev $59.07,Total Cost $2180.15 ,
Roche Products	Apr. - 14	Multi Disciplinary Breast Cancer Clinical Review Meeting Educational Content = 1hr	Royal Adelaide Hospital North Terrace Adelaide, SA	Surgery Doctor Oncology Doctor Oncology Nurse Pathology Doctor	Lunch	247	13	247
Roche Products	Jan. - 13	Grand Rounds Educational Content = 1 hr 15 mins	Bunbury Regional Hospital Bussell Highway	Hospital Healthcare Professionals	Lunch	$272	20	$272

			Bunbury, WA					
Pfizer Australia	Apr. - 13	Pfizer Australia provided Sponsorship for Healthcare Professional to attend The European Congress of Clinical Microbiology and Infectious Disease (ECCMID) 2013. Educational Content - 33.75 hr(s).	International Congress Centrum, Berlin, Germany	Infectious Disease Specialist	Registration Fee (1 attendee $878), Travel (Flights $8,196, Transfers $219), Accommodation (6 Room Nights $1,562)	$10855	1	$10,855.00
Pfizer Australia	Jun. - 15	Journal Club - Chronic Pain, Educational Content - 1 hr(s).	Peter MacCallum Cancer Centre, East	Palliative Care Nurse; Palliative Care Physician	Meal / Drinks	$156	15	$156

			Melbourne, VIC					

*Illustrative examples extracted verbatim from Medicines Australia transparency reports

Table 2. Professional status of attendees and clinical areas of focus for the events (n = 116,845).

Characteristic	Number of events	Percent
Professional status of attendees*		
Medical specialists	80,060	68.5
Nurses	46,214	39.6
Trainees	44,774	38.3
Primary care doctors	24,662	21.1
Pharmacists	9,781	8.4
Clinical areas of focus		
Oncology	22,987	19.7
Surgery	13,306	11.4
Endocrinology	12,655	10.8
Cardiology	9,033	7.7
Haematology	8,200	7.0
Respiratory Medicine	7,659	6.6
Psychiatry	6,252	5.4
Nephrology	6,199	5.3
Gastroenterology	5,643	4.8
Pathology	5,361	4.6
Neurology	4,259	3.6
Urology	4,259	3.6

Radiology	3,667	3.1
Infectious Diseases	3,348	2.9
Geriatrics	3,134	2.7
Anaesthesiology	2,746	2.4
Rheumatology	2,671	2.3
Paediatrics	1,994	1.7
Allergy/Immunology	1,398	1.2
Ophthalmology	1,365	1.2
Palliative Care	1,319	1.1
Intensive Care	1,147	1.0
Sexual Health	955	0.8
Dermatology	913	0.8
Obstetrics/Gynaecology	878	0.8
Emergency	875	0.7
Internal Medicine	418	0.4
Neonatology	363	0.3
Nuclear Medicine	357	0.3
Pharmacology	219	0.2
Otolaryngology	31	0.03
Andrology	18	0.02

*percentages do not add to 100 because multiple types of professionals could attend an event.

Table 3. Characteristics of events and median cost per person

	Number of events n=116,845 n (%)	Median total cost per person*(Interquartile Range) $ AU
Location		
Overseas	2,262 (1.9%)	$ 710 (91-7,300)
Within Australia	114,583 (98.1%)	$ 14 (10-62)
Setting		
Clinical setting	74,998 (64.2%)	$ 12 (9-15)
Non-clinical setting	41,847 (35.8%)	$ 91 (28-154)
Event type		
Scientific meeting (e.g. congress, conferences)	4,920 (4.2%)	$ 93 (33-659)
Other types of events	111,925 (95.8%)	$ 14 (10-60)

*Includes hospitality as well as other costs (e.g. venue hire, speaker honoraria, audiovisual hire)

472 Table 4. The top twenty companies in terms of number of sponsored events.

Company	Number of events	Number of attendees	Total cost of food and beverage (AU$)	Total cost of function* (AU$)	Median total cost per event (IQR) (AU$)
AstraZeneca	13,968	435,686	12,725,027	31,766,776	318 (165-2,261)
Novartis	10,120	244,069	6,600,503	27,467,246	270 (167-1,154)
Merck Sharp & Dohme	9,142	214,621	5,388,247	18,352,116	341 (180-1,182)
Roche	7,383	174,878	2,891,426	16,625,126	186 (129-284)
Pfizer	7,125	188,439	3,740,677	18,464,785	236 (141-573)
Sanofi	6,764	261,089	3,243,420	13,668,127	240 (149-600)
Amgen	5,562	117,767	4,545,874	11,145,245	192 (117-332)
Eli Lilly	5,419	138,765	2,270,896	7,949,786	145 (62-455)
Servier Lab	4,245	145,111	4,347,268	14,002,283	482 (196-2,252)
Mundipharma	4,168	135,517	2,956,613	8,939,046	342 (182-2,394)
Janssen	3,901	140,549	3,168,024	14,643,568	320 (164-1,818)
GlaxoSmithKline	3,706	103,331	2,993,037	6,292,242	254 (161-1,645)
CSL	3,285	138,170	1,337,909	6,000,501	288 (179-1,427)
Bristol Myers Squibb	3,151	138,446	2,492,290	12,755,630	245 (82-1,900)
Bayer	2,964	151,084	1,417,055	8,146,292	396 (194-1,500)
IPSEN	2,802	85,475	984,477	5,163,600	254 (169-454)
Abbott/AbbVie	2,774	59,793	3,291,305	6,437,623	255 (157-1,037)
Boehringer Ingelheim	2,223	56,204	6,050,143	8,724,933	2,007 (1,308-2,654)
Gilead Sciences	2,049	45,510	990,419	7,061,338	245 (160-540)
Merk Serono	1,841	41,809	1,376,023	4,237,372	229 (145-626)

Total – Top 20	102,592	3,016,313	72,810,634	247,843,635	262 (152-1,199)
All companies	116,845	3,481,750	84,862,792	286,117,928	263 (153-1,195)

Abbreviations: IQR, interquartile range

* Includes food and drink as well as other costs (e.g. venue hire, speaker honoraria, audiovisual hire)

Supplementary File 1. Keywords for coding

Variable name	Keyword search
COMPANY	A. Menarini Australia Pty Ltd; Abbott Australasia Pty Ltd OR AbbVie Pty Ltd; Actelion Pharmaceuticals Australia Pty Ltd; Alexion Pharmaceuticals Australasia PTY LTD; Allergan Australia Pty Ltd; Amgen Australia; Astellas Pharma Australia Pty Ltd; Astrazeneca Pty Ltd; Baxter Healthcare Pty Ltd; Bayer Australia Ltd; Besins Healthcare Australia; BioCeuticals; Biogen Idec Australia Pty Limited; Boehringer Ingelheim Pty Limited; Bristol-Myers Squibb Australia Pty Limited; Celgene Pty Ltd; CSL (includes also bioCSL Australia Pty Ltd and CSL Behring); Eisai Australia Pty Ltd; Eli Lilly Australia Pty Ltd; Fresenius Kabi Australia; Gilead Sciences Pty.; GlaxoSmithKline Australia Pty Ltd; iNova Pharmaceuticals (Aus) Pty Ltd; IPSEN Pty Ltd; Janssen; LEO Pharma Pty Ltd; Lundbeck Australia; Merck Serono Australia Pty Ltd; MSD Australia Pty Ltd; Mundipharma Pty Ltd; Mylan EPD; Norgine Pty Limited; Novartis Pharmaceuticals Australia Pty Limited (includes also Alcon Laboratories); Novo Nordisk

	Pharmaceuticals; Pfizer Australia; Roche Products Pty Limited; Sanofi/Sanofi Aventis Australia Pty Ltd; Servier Laboratories (Australia) Pty Ltd; Shire Australia; Takeda Pharmaceuticals Australia Pty Ltd (includes also Nycomed Pty Ltd Report); UCB Pharma; Vifor Pharma Pty Ltd
LOCATION	
New South Wales	NSW, New South Wales, Sydney, other cities or suburbs, and postal codes of NSW*
Victoria	VIC, Victoria, Melbourne, other cities or suburbs and postal codes of VIC*
Australian Capital Territory	ACT, Australian Capital Territory, Canberra, other cities or suburbs, and postal codes of ACT*
Western Australia	WA, Western Australia, Perth, other cities or suburbs, and postal codes of WA*
South Australia	SA, South Australia, Adelaide, other cities or suburbs, and postal codes of SA*
North Territory	NT, North Territory, other cities or suburbs, and postal codes of NT*
Tasmania	TAS, Tasmania, Hobart, other cities or suburbs, and postal codes of Tasmania*
Overseas	Overseas: outside of Australia**
*Where the state or capital was not listed, events were hand coded based on postal codes, cities or suburbs **Events not taking place in an Australian state were hand-coded	

MEALS	
• Lunch	Lunch
• Dinner	Dinner
• Breakfast	Breakfast
• Tea	Afternoon tea, morning tea, light refreshments, light meals, sandwiches & drinks, coffee cart, snack and beverage, sushi
• All day events with meals	Day delegate package*; conference package**
• Food unspecified	food & beverages, meals, drinks, in hospital catering, beverages, wine
• No meals provided	Sponsorship/accommodation only, no hospitality provided, travel/accommodation only (domestic events)
*Note: "day delegate package" consisted of entries where multiple meals were listed ((Lunch, tea), (Breakfast, tea), (Dinner, tea), (Breakfast, lunch, tea)) **Note: "conference package" consisted of events lasting multiple days and typically included a day delegate package, often accommodation (food and beverage not reported separately), registration (food and beverage not reported separately), or travel (including flights, registration, airfares, accommodation and food and beverages not reported separately)	
EVENTS HELD IN CLINICAL SETTING	Hospital; clinic; practice; medicare local; health centre; surgery; medical centre; medical; health care centre; specialist centre; cancer centre; cancer care centre; heart centre; medical and dental centre;

	endocrine centre; radiotherapy centre; radiation centre; optical centre; eye centre; renal unit; ward; department; dept; community health; family planning; education centre.
PROFESSIONAL STATUS	
• Primary care doctors	GP; general practitioner; family medicine.
• Nurses	Nurse
• Pharmacists	Pharmacist
• Trainees	Registrar; resident; intern; student; advanced trainee; RMO; resident medical officer; JHO; SHO; senior house officer; PHO; principal house officer; fellow
• Specialty care	Specialist; consultant; senior medical officer; SMO; visiting medical officer; VMO; general medicine; general physician; *ology physician; *ology doctor; allergist; allergy physician; anesthesiologist; anesthetist; anaesthesiologist; anaesthetist; andrologist; cardiologist; dermatologist, diabetologist; emergency physician; emergency medicine physician; endocrinologist; epileptologist; gastroenterologist; geriatrician; getriatric physician; gynaecologist; obstetrician; OB/GYN; haematologist; hematologist; hepatologist; immunologist; infectious

	disease physician; infectious disease doctor; internal medicine physician; microbiologist; neonatologist; neurologist; nuclear medicine physician; nephrologist; renal physician; renal doctor; urologist; oncologist; pharmacologist; pulmonologist; psychogeriatrician; ophthalmologist; rheumatologist; radiologist; respiratory physician; respiratory medicine physician; respiratory medicine doctor; palliative care physician; pathologist; sexual health physician; sexual health doctor; psychiatrist; psychiatry doctor; paediatrician; surgeon; surgery doctor; intensive care doctor; intensivist; intensive care physician; cardiothoracic
CLINICAL FOCUS	
• Allergy/Immunology	Allergist; allergy; immunologist; immunology
• Anaesthesiology	Anesthesiologist; anesthetist; anaesthesiologist; anaesthetist; anaesthesiology
• Andrology	Andrologist
• Cardiology	Cardiologist; cardiology
• Dermatology	Dermatologist; dermatology
• Emergency	Emergency
• Endocrinology	endocrinologist; endocrinology; diabetologist; diabetology; diabetes
• Gastroenterology	Gastroenterologist; gastroenterology; Hepatologist; hepatology

• Geriatrics	Geriatrician; geriatric; psychogeriatrician; elderly
• Haematology	Haematologist; haematology; hematology; hematologist
• Infectious Diseases	Infectious disease; microbiologist; microbiology
• Internal Medicine	Internal medicine
• Intensive care	Intensive care; intensivist; critical care
• Neonatology	Neonatologist; neonatology; NICU; neonatal
• Nuclear medicine	Nuclear medicine
• Nephrology	Nephrologist, nephrology; renal; kidney
• Neurology	Neurologist; neurology; epileptologist
• Obstetrics/Gynaecology	Gynaecologist; gynaecology; obstetrician; OB/GYN; obstetrics
• Oncology	Oncologist; oncology; cancer
• Ophthalmology	Ophthalmologist; ophthalmology
• Otolaryngology	Otolaryngology
• Palliative care	Palliative care
• Pathology	Pathologist; pathology
• Pharmacology	Pharmacologist; pharmacology
• Paediatrics	Paediatrician; paediatric*; pediatric*
• Psychiatry	Psychiatrist; psychiatry; mental health
• Radiology	Radiologist; radiology
• Rheumatology	Rheumatologist; rheumatology
• Respiratory medicine	Lung specialist; respiratory; pulmonologist
• Sexual health	Sexual health
• Surgery	Surgeon; surgery; surgical; operating theatre
• Urology	Urologist; urology
*Note: the clinical focus is a proxy variable based on clinical specialty of attendees	

and/or event description.	
EVENT TYPE	
• Meeting (all inclusive/NOS)	Search for generic word "meeting"
• Journal club	Journal club; journalclub
• Inservice	Inservice
• Workshop	Workshop
• Grand rounds	Grand round; grandround
• Scientific meeting	scientific meeting; congress; conference AND NOT videoconference/teleconference
• Clinical meeting	internal meeting; departmental meeting; clinical meeting; case review, case conference; case study meeting; case study conference
• Multidisciplinary meeting	Multidisciplinary meeting

STROBE—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Page 1, 2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Page 2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Page 4, 5
Objectives	3	State specific objectives, including any prespecified hypotheses	Page 5
Methods			
Study design	4	Present key elements of study design early in the paper	Page 5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Page 5
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	Page 5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Page 5,6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Page 5,6
Bias	9	Describe any efforts to address potential sources of bias	Methods: page 5, 6
Study size	10	Explain how the study size was arrived at	Page 5,6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Page 6
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Page 6
		(*b*) Describe any methods used to examine subgroups and interactions	N/A
		(*c*) Explain how missing data were addressed	N/A
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	N/A
		(*e*) Describe any sensitivity analyses	N/A

Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Page 7
		(b) Give reasons for non-participation at each stage	N/A
		(c) Consider use of a flow diagram	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Page 7
		(b) Indicate number of participants with missing data for each variable of interest	N/A
Outcome data	15*	Report numbers of outcome events or summary measures	7-9
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	N/A
		(*b*) Report category boundaries when continuous variables were categorized	N/A
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N/A
Discussion			
Key results	18	Summarise key results with reference to study objectives	Page 10
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Page 11
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Page 10-12
Generalisability	21	Discuss the generalisability (external validity) of the study results	Page 10-12
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Page 15

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

A cross-sectional analysis of pharmaceutical industry-funded events for health professionals in Australia

Journal:	*BMJ Open*
Manuscript ID	bmjopen-2017-016701.R2
Article Type:	Research
Date Submitted by the Author:	10-May-2017
Complete List of Authors:	Fabbri, Alice; Universita degli Studi dell\'Insubria, Centre of Research in Medical Pharmacology; The University of Sydney, Charles Perkins Centre and Faculty of Pharmacy Grundy, Quinn; The University of Sydney, Charles Perkins Centre and Faculty of Pharmacy Mintzes, Barbara; The University of Sydney, Charles Perkins Centre and Faculty of Pharmacy Swandari, Swestika; The University of Sydney, Charles Perkins Centre and Faculty of Pharmacy Moynihan, Ray; Bond University, Faculty of Health Sciences and Medicine; The University of Sydney, Sydney Medical School Walkom, Emily; University of Newcastle, Bero, Lisa; The University of Sydney, Charles Perkins Centre and Faculty of Pharmacy
Primary Subject Heading:	Public health
Secondary Subject Heading:	Health policy, Public health
Keywords:	Health policy < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, PUBLIC HEALTH, EDUCATION & TRAINING (see Medical Education & Training)

A cross-sectional analysis of pharmaceutical industry-funded events for health professionals in Australia

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Word count: 2522

Abstract

Objectives To analyse patterns and characteristics of pharmaceutical industry sponsorship of events for Australian health professionals and to understand the implications of recent changes in transparency provisions that no longer require reporting of payments for food and beverages.

Design Cross-sectional analysis.

Participants and Setting 301 publicly available company transparency reports downloaded from the website of Medicines Australia, the pharmaceutical industry trade association, covering the period from October 2011 to September 2015.

Results Forty-two companies sponsored 116,845 events for health professionals, on average 608 per week with 30 attendees per event. Events typically included a broad range of health professionals: 82.0% included medical doctors, including specialists and primary care doctors, and 38.3% trainees. Oncology, surgery and endocrinology were the most frequent clinical areas of focus. Most events (64.2%) were held in a clinical setting. The median cost per event was AU$ 263 (Interquartile range $153-$1,195) and over 90% included food and beverages.

Conclusions Over this four-year period, industry-sponsored events were widespread and pharmaceutical companies maintained a high frequency of contact with health professionals. Most events were held in clinical settings, suggesting a pervasive commercial presence in everyday clinical practice. Food and beverages, known to be associated with changes to prescribing practice, were almost always provided. New Australian transparency provisions explicitly exclude meals from the reporting requirements, thus a large proportion of potentially influential payments from pharmaceutical companies to health professionals will disappear from public view.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- From publicly available reports released under Australian transparency rules, we have created a searchable world-first database with details of more than 100,000 industry-sponsored events for health professionals, enabling researchers to analyse the intersection of pharmaceutical marketing and medical education.
- In order to analyse the database, we iteratively identified a set of keywords for each variable of interest, however it is possible that some synonyms were missed.
- We relied upon data as presented in the Medicines Australia transparency reports and we did not verify the accuracy and completeness of data.
- Transparency requirements apply only to member companies, excluding manufacturers of generics, over-the-counter and non-member prescription medicine manufacturers, thus our analysis likely underestimates the true extent of industry sponsorship of events for health professionals.

Introduction

Full disclosure of financial relationships between the pharmaceutical industry and health professionals is a key strategy adopted to make these interactions more transparent. Many jurisdictions have recently introduced transparency provisions, including the Unites States (US) and the European Union, but the extent of the disclosure obligation varies. For example, meals and drinks fall outside the scope of disclosure obligations under new voluntary transparency provisions introduced by the European Federation of Pharmaceutical Industry Associations.(1) At the same time, in the US, over 100 medical societies recently backed a bill that would exempt pharmaceutical and medical device companies from reporting an entire category of payments to doctors: those related to continuing medical education.(2)

Australia was one of the first countries to move towards public reporting of these payments. Since 2007, Medicines Australia, the trade association of the prescription medicines industry, has required member companies to provide detailed reports of sponsorship of events for health professionals, which include company-initiated events, sponsored events organised by a third party, trade displays at educational events and sponsorship of healthcare professionals to attend events both in Australia and overseas.(3) The reports are published on the Medicines Australia website and include events for all registered healthcare professionals, making Australia one of the few countries with transparency extending to non-physicians.(4,5) These disclosure provisions were a condition for approval of Medicines Australia's Code of Conduct by the Australian Competition and Consumer Commission and were upheld following a legal appeal by industry.(6) Changes to this policy were introduced in 2015, with the focus on events replaced by disclosure of payments to individuals.(3) The reports detailing event sponsorship and aggregate payments to health professionals have been discontinued, and replaced with reports of payments to named individuals, similar to the Open Payments database in the US. Moreover, the new Code no longer requires reporting of payments for food and beverages.

At a time when disclosure policies are being debated and revised in several settings,(1,2,3) Australian data can provide valuable insights into patterns of industry sponsorship and on characteristics of transparency provisions that are needed to capture expenditures of pharmaceutical companies on health professionals. Apart from two analyses of data from the first six months of the Australian disclosure scheme,(4,7) and one brief report on events involving nurses,(5) no comprehensive longer-term analyses have been conducted.

The objectives of this cross-sectional analysis are: to describe the nature and frequency of events for health professionals sponsored by pharmaceutical companies that are members of Medicines Australia; to create an open-access searchable database of these events; and to estimate the information that will be lost under newly introduced reporting standards.

Methods

Data Sources

We downloaded all the available reports from the Medicines Australia website (www.medicinesaustralia.com.au) in PDF format. The 301 PDF reports of approximately 15,000 pages covered the period October 2011 to September 2015. The PDFs had been originally created in Microsoft Excel. We requested the original Excel files from Medicines Australia but were refused on the basis that member companies had not given permission for their release. We converted the PDF files into Excel format using free, online converter programs, cleaned the data to address errors introduced during file conversion, and ensured consistency of reporting in each column.

The reports cover information on the sponsoring company, timing, venue type, number and profession of participants, hospitality and travel for attendees, room rentals and equipment, and speaker honoraria.(3)

Over this four-year period, 47 pharmaceutical companies issued transparency reports and we grouped them based on mergers and acquisitions as of March 31st 2016. Therefore our analysis included 42 Medicines Australia member companies; as a frame of reference there are approximately 140 separate companies listed as suppliers to the Australian Pharmaceutical Benefit Scheme.(8)

Coding

We designed a coding scheme based on the available data and variables of theoretical interest based on the literature on industry-professional interactions(9,10) and on two previous analyses of data from the first six months of the Australian disclosure scheme.(4,7) The research team iteratively developed a set of keywords to define each variable of interest (Supplementary File 1). Using Excel's filter function, we used the keywords to search the unstructured descriptive text and to dichotomously code event features as "present/absent", for the following variables:

- sponsoring companies, grouped based on mergers and acquisitions as of March 31st 2016;
- geographical location by Australian state or overseas location;
- professional status of attendees (e.g. specialists, nurses, trainees);
- clinical focus based on clinical specialty of attendees and event description (e.g. oncology, endocrinology, cardiology);
- type of event (e.g. journal club, workshop, in-services);
- type of hospitality provided (e.g. breakfast, lunch, dinner)

Statistical analysis

We present frequency tables for the characteristics of the events, and median spending levels per event and company. Cost variables are reported in AU$. As the data were not normally distributed, we used Mann-Whitney U tests for the differences between medians. Analyses were performed using SPSS-Version 22.

Results

General Overview

From October 2011 to September 2015, 42 pharmaceutical companies in Australia sponsored 116,845 events involving health professionals. On average, there were 2,434 events per month and 608 events per week. Each year, the number of events sharply decreased in December through February, likely reflecting the holiday season.

Table 1 provides illustrative examples of sponsored events as presented verbatim in the company reports, chosen to reflect variations in reporting and event type. Events varied greatly in scope and intensity, ranging from a half hour journal club with sandwiches in a hospital meeting room, to a several day conference with overseas flight, accommodation and hospitality provided. The professional status was sometimes described generically as "healthcare professionals" or contained a list of the professions in attendees. The level of detail companies reported regarding the program's content and the extent of explicit product promotion also varied; most of the event descriptions were disease-focused (e.g. "Journal Club on Chronic Obstructive Pulmonary Disease") but in some cases the events mentioned specific drug names (e.g. "Introducing Zoely and other Emerging Trends in Contraception").

Attendees

Over this four-year period, there were 3,481,750 individual attendances at industry-sponsored events. The median number of event attendees was 18 (interquartile range (IQR) 12-25); 97.2% (n=113,595) of the events had fewer than 100 attendees and 0.2% (n=210) had more than 1000 participants. Over 40% (n=47,084) of events included participants from multiple professions. Table 2 lists the professional status of attendees and the most frequent clinical areas of focus for the events. Events were most frequently oncology-related, while otolaryngology and andrology were least represented.

Location and characteristics of sponsored events

Three quarters of events were held in the three Australian states with the largest populations: New South Wales (30.7%, n=35,888), Victoria (26.9%, n=31,448), and Queensland (18.8%, n= 21,963), and few were held overseas (1.9%, n= 2,262). Nearly two thirds of events (64.2%, n=74,998) were held in a clinical setting, such as hospitals, clinics or doctors' offices. Non-clinical venues included restaurants, hotels and convention centres. One third of the events were described as a generic "meeting" (37.5%, n=43,810) while others were described as journal clubs (28.5%, n=33,281), clinical meetings (3%, n=3,533), grand rounds (3.8%, n=4,472), in-services (2.6%, n=3,038), or workshops (2.6%, n=3,029). Only 4.2% (n=4,290) were described as scientific meetings (e.g. conferences or congresses).

Costs and hospitality

Reporting companies spent AU$ 286,117,928 on events for health professionals. On average, companies spent AU$ 2,449 per event (SD $15,020) while the median cost was AU$ 263 (IQR $153-$1,195). The median cost per person was AU$ 14 (IQR $10- $68). In 81.7% of the events (n=95,483) the costs were below AU$ 100 per attendee and in 2.1% (n=2,438) the costs were over AU$ 1000 per attendee.

Table 3 shows the median cost per person by characteristics of events. The median total cost per person was significantly higher when the event format was a scientific meeting such as a congress or conference (AU$ 93, IQR $33-659) compared with other event types (p<0.001), for events held overseas (AU$ 710, IQR $91-7,300) compared with events held in Australia (p<0.001) or outside the clinical settings (AU$ 91, IQR $28-154) as compared with events in the clinical setting (p<0.001).

Reported "hospitality or financial support" provided to attendees included registration fees, travel, accommodation, parking and food and beverage. Food was provided at 90.4% (n=105,667) of events: 22.2% included lunches (n=25,935), 17.0% dinners (n=19,873), 12.0% teas (n=14,067), 11.0% breakfasts (n=12,806), 2.7% were all-day events with meals (n=3,113), and for 25.6% (n=29,873), type of food and beverage was unspecified. Total cost of food was more than AU$ 84 million (AU$ 84,862,791), accounting for 29.7% of the total cost of these functions. However, for 65% (n=75,949) of events, the total listed cost for food and beverage was equal to the listed total cost of the event, indicating that the company's sponsorship extended to food and beverage only. The median cost of food per person was AU$ 12 (IQR $8-$20).

The top companies

Of the 42 pharmaceutical companies that provided reports, the top five in terms of the numbers of sponsored events were AstraZeneca, Novartis, Merck Sharp & Dohme, Roche, and Pfizer (Table 4). Boehringer Ingelheim had the highest cost per event with a median cost of AU$ 2,007 (IQR $1,308-$2,654), while Eli Lilly spent the least with a median cost per function of AU$ 145 (IQR $62-$455). Table 4 provides an overview of event sponsorship by the top 20 companies, representing 87.8% of events.

Availability of database

The analysable dataset in CSV file format we have created is available at: doi [to be inserted prior to publication]

Discussion

Pharmaceutical industry-funded events for health professionals were frequent and pervasive with almost three and a half million individual attendances at over 116,000 events in the four-year period between 2011 and 2015. As a frame of reference, in 2014 there were 610,148 registered health professionals in Australia,(11) suggesting that there was wide exposure to these events. Events typically included a broad range of professionals and multidisciplinary teams, including most commonly: medical specialists, nurses, trainees and primary care doctors. Nearly two-thirds of events were held in clinical settings. Average costs per person were modest and the vast majority of events (90.4%) included the provision of food and beverages. Additionally, for most events (65%), the only funding provided was for food and beverages. Thus, our analysis suggests that the new Australian and European transparency rules will decrease transparency because hospitality in the form of food and/or beverages will be exempt from reporting.(1,3)

Although professional education is critical for improving patient care, previous studies of internal pharmaceutical industry documents have shown that sponsored events have been effectively used as a marketing tool.(12,13) A systematic review from 2010 found that with rare exceptions, exposure to pharmaceutical industry information is associated with either no effect on prescribing or with adverse effects such as lower prescribing quality, higher frequency or costs.(14) More recently, analyses of the Open Payments database in the US, have shown that payments for educational training and even the provision of low cost free meals, commonly provided at sponsored events, are associated with increased prescribing of promoted, costly, brand-name medications.(15,16)

Finally, we also found a high prevalence of trainee attendance at these events. Targeting medical trainees can lead to a process of normalisation and enculturation while trainees develop their professional identity.(17) This has been described as an effective strategy “to influence physicians from the bottom up.”(13) Medical school policies limiting trainee-industry interaction have been associated with a shift in

attitude (18) and reduced prescribing of costly new medicines without therapeutic advantages.(19)

Our study has a number of limitations. First, we relied on reports submitted by companies to Medicines Australia and could not verify the accuracy and completeness of data. Second, since the Code of Conduct's transparency reporting requirements applies only to members of Medicines Australia, the available reports likely underestimate the true extent of industry sponsorship of events for health professionals. Our analysis included only 42 Medicines Australia member companies; as a frame of reference approximately 140 manufacturers are listed as suppliers to the Australian Pharmaceutical Benefit Scheme.(8) Moreover, non-member manufacturers of branded prescription medicines, generic medicines, over-the-counter medicines and medical devices are not covered by the Medicines Australia Code. Third, with regard to the coding scheme, the research team identified a set of keywords to define each variable of interest and it is possible that some synonyms were missed due to variability in the data provided. Fourth, we did not assess the content of events due to the unstructured and variable nature of reporting. Fifth, our analysis focuses on industry sponsorship of events and did not examine differences in how event organizers manage potential influences. Finally, costs were not adjusted for inflation as this would likely have a limited impact on the Australian dollar over such a short time period. Notwithstanding these limitations, we have conducted a cross-sectional analysis of the only publicly available data on industry-sponsored events for health professionals.

In conclusion, our findings have several international implications for future research and policy initiatives. While Australian transparency reports are difficult to analyse due to their format, we have created an open-access searchable world-first database with details of more than 100,000 industry-sponsored events, enabling researchers to analyse the intersection of pharmaceutical marketing and medical education. Although the data included in this analysis are from Australia, pharmaceutical companies are transnational corporations whose practices are likely to be similar across different countries. Moreover, individual institutions such as hospitals or universities may use these data to see what industry-sponsored activities are

happening within their own backyards, and whether they meet contemporary expectations for transparency and independence.

At the policy level, at a time when new rules are being debated and revised globally, our findings underscore the need for more disclosure, not less. Transparency rules should be as inclusive as possible with regard to the type of companies required to report and also in terms of the scope of payments and categories of health professionals covered. The onus of reporting should not be on the industry only; for example, public sector hospitals as well as universities and professional associations could report meal subsidies from pharmaceutical and device manufacturers. A stronger policy option, already implemented at several academic medical centres in the US, would be to eliminate the provision of free food by manufacturers.(20) In the long term, ways of expanding funding for independent continuing professional education should be explored. There are already case studies showing that independence from industry sponsorship is achievable. For example the University of Michigan, as well as other major medical institutions in the US, no longer accept commercial support for continuing medical education.(21,22) This sets a valuable example that could become a model for other institutions. In the short term, universities and professional associations should make health professionals more aware of the independent sources of information on drugs that are already available (e.g. NPSMedicineWise, the Australian Medicines Handbook and the independent drug bulletins).

Finally, our findings highlight that transparency requirements likely capture only a portion of industry sponsorship of events for health professionals. Changes to the transparency requirements will likely exacerbate this issue by excluding common categories of payments. Thus, decision-makers should be aware of the extent of industry-sponsored activity which will be hidden if “free food” fails to be included in future transparency regimes.

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Contributors: AF, QG, BM, RM, LB conceived of the study. AF, QG, BM, RM, EW designed the coding scheme. AF, QG and SS acquired and analysed all data. AF drafted the manuscript. All the authors contributed to the writing of the paper and approved the final version. AF is the guarantor.

Funding: The work was partially funded via a University of Sydney Faculty of Pharmacy summer scholarship.

Role of the Funder/Sponsor: The funding source had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

Competing interests: All authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author). Dr. Mintzes reports that she was an expert witness on behalf of plaintiffs in a Canadian class action suit concerning cardiovascular risks of a testosterone gel. None of the authors received any payments, funding, or other financial support from pharmaceutical manufacturers. The authors declare no other relationships or activities that could appear to have influenced the submitted work.

Ethical approval: Not required.

Data sharing: Upon acceptance for publication, the full dataset will be made available as a CSV file with a link in the publication.

Access to the data: All authors had full access to all of the data (including statistical reports and tables) in the study and can take responsibility for the integrity of the data and the accuracy of the data analysis.

464

465

Tables and Boxes

Table 1. Illustrative examples of industry sponsored events*

Company	Date	Event content	Venue	Professional status of attendees	Hospitality provided	Total Cost of Hospitality	Number of attendees	Total costs of function
Astrazeneca	Sep. - 15	Educational Event - Dinner meeting Going for Goal: Optimising Treatment in Type 2 Diabetes and Incretin Based Therapies; and On the Road to Glycemic Control. 2 hours educational content	Hotel Realm Barton, ACT	General Practice Nursing Endocrinology	Dinner with Alcoholic and Non Alcoholic Beverages	$2,087.27	32	$3,305.45 includes 1 speaker fee for $1,218.18
Astrazeneca	Mar. - 15	Educational Event - Lunch meeting Restless Legs. 1 hour educational content	The Golden Horse Footscray, VIC	General Practice Respiratory Medicine	Lunch	$248.82	10	$848.82 includes speaker fee for $600

Novartis	Feb. - 15	Sponsorship of Journal Club on: Chronic Obstructive Pulmonary Disease 1 hr educational content	Gold Coast University Hospital Southport, QLD	Medical Students, Nurses, Pharmacists	Afternoon Tea	$184 includes Food & Beverages for 20 delegates $184	20	$184 includes Total Hospitality : $184
Novartis	Mar. - 14	Sponsorship of Day Seminar on: Immunosuppressant 8 hrs educational content	Alfred Health Melbourne, VIC	Cardiologists, Nurses, Registrars, Renal Physicians, Surgeons, Transplant Physicians	Breakfast, Coffee, Lunch, Afternoon Tea, Light Refreshments, Morning Tea, Non-Alcoholic Beverages	$2,498 includes Food & Beverages for 120 delegates : $2,498	120	$2,665 Includes Total Hospitality : $2,498 Speaker Costs: Meal (for 8 speakers): $167
Merck Sharp & Dohme	Oct. - 11	Oncology Journal Club [hours of education = 1]	Mercy Women's Hospital,	Oncologists, Nurses	Food & beverages	food & bev 19.64, Total	5	Total Costs $19.64

Australia			Heidelberg, VIC			Hospitality 19.64		
Merck Sharp & Dohme Australia	Oct. - 11	Evening educational meeting "Introducing Zoely and other Emerging Trends in Contraception" [hours of education = 2.5]	Boathouse by the Lake, Barton, ACT	Obstetricians and Gynaecologist	Food & beverages	food & bev 1432.72, Total Hospitality 1432.72	25	speaker fee 688.36, speaker food & bev $59.07,Total Cost $2180.15 ,
Roche Products	Apr. - 14	Multi Disciplinary Breast Cancer Clinical Review Meeting Educational Content = 1hr	Royal Adelaide Hospital North Terrace Adelaide, SA	Surgery Doctor Oncology Doctor Oncology Nurse Pathology Doctor	Lunch	247	13	247
Roche Products	Jan. - 13	Grand Rounds Educational Content = 1 hr 15 mins	Bunbury Regional Hospital Bussell Highway	Hospital Healthcare Professionals	Lunch	$272	20	$272

			Bunbury, WA					
Pfizer Australia	Apr. - 13	Pfizer Australia provided Sponsorship for Healthcare Professional to attend The European Congress of Clinical Microbiology and Infectious Disease (ECCMID) 2013. Educational Content - 33.75 hr(s).	International Congress Centrum, Berlin, Germany	Infectious Disease Specialist	Registration Fee (1 attendee $878), Travel (Flights $8,196, Transfers $219), Accommodation (6 Room Nights $1,562)	$10855	1	$10,855.00
Pfizer Australia	Jun. - 15	Journal Club - Chronic Pain, Educational Content - 1 hr(s).	Peter MacCallum Cancer Centre, East	Palliative Care Nurse; Palliative Care Physician	Meal / Drinks	$156	15	$156

			Melbourne, VIC					

*Illustrative examples extracted verbatim from Medicines Australia transparency reports

Table 2. Professional status of attendees and clinical areas of focus for the events (n = 116,845).

Characteristic	Number of events	Percent
Professional status of attendees*		
Medical specialists	80,060	68.5
Nurses	46,214	39.6
Trainees	44,774	38.3
Primary care doctors	24,662	21.1
Pharmacists	9,781	8.4
Clinical areas of focus		
Oncology	22,987	19.7
Surgery	13,306	11.4
Endocrinology	12,655	10.8
Cardiology	9,033	7.7
Haematology	8,200	7.0
Respiratory Medicine	7,659	6.6
Psychiatry	6,252	5.4
Nephrology	6,199	5.3
Gastroenterology	5,643	4.8
Pathology	5,361	4.6
Neurology	4,259	3.6
Urology	4,259	3.6

Radiology	3,667	3.1
Infectious Diseases	3,348	2.9
Geriatrics	3,134	2.7
Anaesthesiology	2,746	2.4
Rheumatology	2,671	2.3
Paediatrics	1,994	1.7
Allergy/Immunology	1,398	1.2
Ophthalmology	1,365	1.2
Palliative Care	1,319	1.1
Intensive Care	1,147	1.0
Sexual Health	955	0.8
Dermatology	913	0.8
Obstetrics/Gynaecology	878	0.8
Emergency	875	0.7
Internal Medicine	418	0.4
Neonatology	363	0.3
Nuclear Medicine	357	0.3
Pharmacology	219	0.2
Otolaryngology	31	0.03
Andrology	18	0.02

*percentages do not add to 100 because multiple types of professionals could attend an event.

Table 3. Characteristics of events and median cost per person

	Number of events n=116,845 n (%)	Median total cost per person*(Interquartile Range) $ AU
Location		
Overseas	2,262 (1.9%)	$ 710 (91-7,300)
Within Australia	114,583 (98.1%)	$ 14 (10-62)
Setting		
Clinical setting	74,998 (64.2%)	$ 12 (9-15)
Non-clinical setting	41,847 (35.8%)	$ 91 (28-154)
Event type		
Scientific meeting (e.g. congress, conferences)	4,920 (4.2%)	$ 93 (33-659)
Other types of events	111,925 (95.8%)	$ 14 (10-60)

*Includes hospitality as well as other costs (e.g. venue hire, speaker honoraria, audiovisual hire)

483 Table 4. The top twenty companies in terms of number of sponsored events.

Company	Number of events	Number of attendees	Total cost of food and beverage (AU$)	Total cost of function* (AU$)	Median total cost per event (IQR) (AU$)
AstraZeneca	13,968	435,686	12,725,027	31,766,776	318 (165-2,261)
Novartis	10,120	244,069	6,600,503	27,467,246	270 (167-1,154)
Merck Sharp & Dohme	9,142	214,621	5,388,247	18,352,116	341 (180-1,182)
Roche	7,383	174,878	2,891,426	16,625,126	186 (129-284)
Pfizer	7,125	188,439	3,740,677	18,464,785	236 (141-573)
Sanofi	6,764	261,089	3,243,420	13,668,127	240 (149-600)
Amgen	5,562	117,767	4,545,874	11,145,245	192 (117-332)
Eli Lilly	5,419	138,765	2,270,896	7,949,786	145 (62-455)
Servier Lab	4,245	145,111	4,347,268	14,002,283	482 (196-2,252)
Mundipharma	4,168	135,517	2,956,613	8,939,046	342 (182-2,394)
Janssen	3,901	140,549	3,168,024	14,643,568	320 (164-1,818)
GlaxoSmithKline	3,706	103,331	2,993,037	6,292,242	254 (161-1,645)
CSL	3,285	138,170	1,337,909	6,000,501	288 (179-1,427)
Bristol Myers Squibb	3,151	138,446	2,492,290	12,755,630	245 (82-1,900)
Bayer	2,964	151,084	1,417,055	8,146,292	396 (194-1,500)
IPSEN	2,802	85,475	984,477	5,163,600	254 (169-454)
Abbott/AbbVie	2,774	59,793	3,291,305	6,437,623	255 (157-1,037)
Boehringer Ingelheim	2,223	56,204	6,050,143	8,724,933	2,007 (1,308-2,654)
Gilead Sciences	2,049	45,510	990,419	7,061,338	245 (160-540)
Merk Serono	1,841	41,809	1,376,023	4,237,372	229 (145-626)

Total – Top 20	102,592	3,016,313	72,810,634	247,843,635	262 (152-1,199)
All companies	116,845	3,481,750	84,862,792	286,117,928	263 (153-1,195)

Abbreviations: IQR, interquartile range

* Includes food and drink as well as other costs (e.g. venue hire, speaker honoraria, audiovisual hire)

Supplementary File 1. Keywords for coding

Variable name	Keyword search
COMPANY	A. Menarini Australia Pty Ltd; Abbott Australasia Pty Ltd OR AbbVie Pty Ltd; Actelion Pharmaceuticals Australia Pty Ltd; Alexion Pharmaceuticals Australasia PTY LTD; Allergan Australia Pty Ltd; Amgen Australia; Astellas Pharma Australia Pty Ltd; Astrazeneca Pty Ltd; Baxter Healthcare Pty Ltd; Bayer Australia Ltd; Besins Healthcare Australia; BioCeuticals; Biogen Idec Australia Pty Limited; Boehringer Ingelheim Pty Limited; Bristol-Myers Squibb Australia Pty Limited; Celgene Pty Ltd; CSL (includes also bioCSL Australia Pty Ltd and CSL Behring); Eisai Australia Pty Ltd; Eli Lilly Australia Pty Ltd; Fresenius Kabi Australia; Gilead Sciences Pty.; GlaxoSmithKline Australia Pty Ltd; iNova Pharmaceuticals (Aus) Pty Ltd; IPSEN Pty Ltd; Janssen; LEO Pharma Pty Ltd; Lundbeck Australia; Merck Serono Australia Pty Ltd; MSD Australia Pty Ltd; Mundipharma Pty Ltd; Mylan EPD; Norgine Pty Limited; Novartis Pharmaceuticals Australia Pty Limited (includes also Alcon Laboratories); Novo Nordisk

	Pharmaceuticals; Pfizer Australia; Roche Products Pty Limited; Sanofi/Sanofi Aventis Australia Pty Ltd; Servier Laboratories (Australia) Pty Ltd; Shire Australia; Takeda Pharmaceuticals Australia Pty Ltd (includes also Nycomed Pty Ltd Report); UCB Pharma; Vifor Pharma Pty Ltd
LOCATION	
New South Wales	NSW, New South Wales, Sydney, other cities or suburbs, and postal codes of NSW*
Victoria	VIC, Victoria, Melbourne, other cities or suburbs and postal codes of VIC*
Australian Capital Territory	ACT, Australian Capital Territory, Canberra, other cities or suburbs, and postal codes of ACT*
Western Australia	WA, Western Australia, Perth, other cities or suburbs, and postal codes of WA*
South Australia	SA, South Australia, Adelaide, other cities or suburbs, and postal codes of SA*
North Territory	NT, North Territory, other cities or suburbs, and postal codes of NT*
Tasmania	TAS, Tasmania, Hobart, other cities or suburbs, and postal codes of Tasmania*
Overseas	Overseas: outside of Australia**
*Where the state or capital was not listed, events were hand coded based on postal codes, cities or suburbs **Events not taking place in an Australian state were hand-coded	

MEALS	
• Lunch	Lunch
• Dinner	Dinner
• Breakfast	Breakfast
• Tea	Afternoon tea, morning tea, light refreshments, light meals, sandwiches & drinks, coffee cart, snack and beverage, sushi
• All day events with meals	Day delegate package*; conference package**
• Food unspecified	food & beverages, meals, drinks, in hospital catering, beverages, wine
• No meals provided	Sponsorship/accommodation only, no hospitality provided, travel/accommodation only (domestic events)
*Note: "day delegate package" consisted of entries where multiple meals were listed ((Lunch, tea), (Breakfast, tea), (Dinner, tea), (Breakfast, lunch, tea)) **Note: "conference package" consisted of events lasting multiple days and typically included a day delegate package, often accommodation (food and beverage not reported separately), registration (food and beverage not reported separately), or travel (including flights, registration, airfares, accommodation and food and beverages not reported separately)	
EVENTS HELD IN CLINICAL SETTING	Hospital; clinic; practice; medicare local; health centre; surgery; medical centre; medical; health care centre; specialist centre; cancer centre; cancer care centre; heart centre; medical and dental centre;

	endocrine centre; radiotherapy centre; radiation centre; optical centre; eye centre; renal unit; ward; department; dept; community health; family planning; education centre.
PROFESSIONAL STATUS	
• Primary care doctors	GP; general practitioner; family medicine.
• Nurses	Nurse
• Pharmacists	Pharmacist
• Trainees	Registrar; resident; intern; student; advanced trainee; RMO; resident medical officer; JHO; SHO; senior house officer; PHO; principal house officer; fellow
• Specialty care	Specialist; consultant; senior medical officer; SMO; visiting medical officer; VMO; general medicine; general physician; *ology physician; *ology doctor; allergist; allergy physician; anesthesiologist; anesthetist; anaesthesiologist; anaesthetist; andrologist; cardiologist; dermatologist, diabetologist; emergency physician; emergency medicine physician; endocrinologist; epileptologist; gastroenterologist; geriatrician; getriatric physician; gynaecologist; obstetrician; OB/GYN; haematologist; hematologist; hepatologist; immunologist; infectious

	disease physician; infectious disease doctor; internal medicine physician; microbiologist; neonatologist; neurologist; nuclear medicine physician; nephrologist; renal physician; renal doctor; urologist; oncologist; pharmacologist; pulmonologist; psychogeriatrician; ophthalmologist; rheumatologist; radiologist; respiratory physician; respiratory medicine physician; respiratory medicine doctor; palliative care physician; pathologist; sexual health physician; sexual health doctor; psychiatrist; psychiatry doctor; paediatrician; surgeon; surgery doctor; intensive care doctor; intensivist; intensive care physician; cardiothoracic
CLINICAL FOCUS	
• Allergy/Immunology	Allergist; allergy; immunologist; immunology
• Anaesthesiology	Anesthesiologist; anesthetist; anaesthesiologist; anaesthetist; anaesthesiology
• Andrology	Andrologist
• Cardiology	Cardiologist; cardiology
• Dermatology	Dermatologist; dermatology
• Emergency	Emergency
• Endocrinology	endocrinologist; endocrinology; diabetologist; diabetology; diabetes
• Gastroenterology	Gastroenterologist; gastroenterology; Hepatologist; hepatology

• Geriatrics	Geriatrician; geriatric; psychogeriatrician; elderly
• Haematology	Haematologist; haematology; hematology; hematologist
• Infectious Diseases	Infectious disease; microbiologist; microbiology
• Internal Medicine	Internal medicine
• Intensive care	Intensive care; intensivist; critical care
• Neonatology	Neonatologist; neonatology; NICU; neonatal
• Nuclear medicine	Nuclear medicine
• Nephrology	Nephrologist, nephrology; renal; kidney
• Neurology	Neurologist; neurology; epileptologist
• Obstetrics/Gynaecology	Gynaecologist; gynaecology; obstetrician; OB/GYN; obstetrics
• Oncology	Oncologist; oncology; cancer
• Ophthalmology	Ophthalmologist; ophthalmology
• Otolaryngology	Otolaryngology
• Palliative care	Palliative care
• Pathology	Pathologist; pathology
• Pharmacology	Pharmacologist; pharmacology
• Paediatrics	Paediatrician; paediatric*; pediatric*
• Psychiatry	Psychiatrist; psychiatry; mental health
• Radiology	Radiologist; radiology
• Rheumatology	Rheumatologist; rheumatology
• Respiratory medicine	Lung specialist; respiratory; pulmonologist
• Sexual health	Sexual health
• Surgery	Surgeon; surgery; surgical; operating theatre
• Urology	Urologist; urology
*Note: the clinical focus is a proxy variable based on clinical specialty of attendees	

and/or event description.	
EVENT TYPE	
• Meeting (all inclusive/NOS)	Search for generic word "meeting"
• Journal club	Journal club; journalclub
• Inservice	Inservice
• Workshop	Workshop
• Grand rounds	Grand round; grandround
• Scientific meeting	scientific meeting; congress; conference AND NOT videoconference/teleconference
• Clinical meeting	internal meeting; departmental meeting; clinical meeting; case review, case conference; case study meeting; case study conference
• Multidisciplinary meeting	Multidisciplinary meeting

STROBE—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Page 1, 2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Page 2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Page 4, 5
Objectives	3	State specific objectives, including any prespecified hypotheses	Page 5
Methods			
Study design	4	Present key elements of study design early in the paper	Page 5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Page 5
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	Page 5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Page 5,6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Page 6
Bias	9	Describe any efforts to address potential sources of bias	Methods: page 5, 6 (cleaning of data and filter function)
Study size	10	Explain how the study size was arrived at	Page 5 (all available reports)
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Page 6
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Page 6
		(*b*) Describe any methods used to examine subgroups and interactions	N/A

		(*c*) Explain how missing data were addressed	N/A
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	N/A
		(*e*) Describe any sensitivity analyses	N/A
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Page 7
		(b) Give reasons for non-participation at each stage	N/A
		(c) Consider use of a flow diagram	N/A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Page 7
		(b) Indicate number of participants with missing data for each variable of interest	N/A
Outcome data	15*	Report numbers of outcome events or summary measures	7-9
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	N/A
		(*b*) Report category boundaries when continuous variables were categorized	N/A
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N/A
Discussion			
Key results	18	Summarise key results with reference to study objectives	Page 10
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Page 11
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Page 10-12
Generalisability	21	Discuss the generalisability (external validity) of the study results	Page 10-12
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Page 15

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.