

Patient literacy and awareness of medicine safety

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Abstract

Objective To assess public understanding of medicine safety, approach to risks and preferences in accessing safety information.

Methods Qualitative data were obtained from an online survey ($n = 1079$) covering four major themes around side effects and risks of medicines: *willingness to accept side effects of medications, information seeking, sufficiency of information and understanding pharmacovigilance process*. Comparisons were made for age, gender and social/financial status.

Key findings Most respondents acknowledged medications were associated with side effects. If side effects were experienced, most (73%) would seek advice from their doctor or pharmacist. Four in 10 respondents felt doctors and pharmacists do not provide sufficient information about medications, even though many (47%) relied on their doctor to provide this. Although 51% felt that pharmaceutical companies were already providing enough information to patients, 95% responded that extra effort could still be made. Two-thirds of the respondents felt it was the companies' responsibility to educate doctors and pharmacists so they could pass the information on, even though younger respondents preferred direct communication to patients compared to older respondents (<24 years, 36% versus >65 years, 10%; $P < 0.001$). Men were more willing to accept risks, while women were more likely to seek information about their medicines. Understanding of the role of pharmaceutical companies and government in maintaining the safety of medicines was generally poor.

Conclusions There is an ongoing need for consumer education regarding medicine safety. Doctors and pharmacists remain the more trusted source of information. Pharmaceutical companies play an important role in ensuring such information is both accessible and accurate.

Introduction

Patient safety is paramount both during pharmaceutical development and once the medicine becomes available on the market. However, how a patient assesses the risks and benefits of their prescribed medication is poorly understood. Furthermore, patients may lack awareness of the roles pharmaceutical companies and governmental agencies play in ensuring the safety of medicines, and therefore why it is important to report side effects experienced when taking their medicines.

Healthcare professionals

The prescribing doctor and the dispensing pharmacist are important sources of information about the safety of

medicines.^[1,2] In general, patients have a positive attitude towards health information provided by pharmacists^[3,4] and their doctor,^[5] even if some patients may not be aware that pharmacists play an important role in providing such advice.^[1]

Package inserts

Manufacturers provide package inserts with all prescription medicines, and many pharmacist-only medicines, which provide information about the medicine and its use. The quality of information contained in these leaflets varies across different countries, depending on their regulatory requirements,^[6] and patients may find these inserts

difficult to understand.^[7–9] It is unclear how much patients rely on this as a source of information.^[7]

Social media and digital platforms

Since the advent of social media, people have been increasingly accessing information via digital platforms, including information regarding medicines and their health.^[10,11] A review of current literature by Househ *et al.*^[12] described the potential value of social media as a technology to empower and engage patients to improve health, amongst other potential benefits, however also cited little evidence in academic literature to show actual benefits. Misinformation was one of the challenges highlighted as a potential threat to patients.

Given the various potential sources of information, and our lack of understanding on what patients opinions are with regard to safety information, we conducted a survey of consumers to determine attitudes towards medicine safety and information. The purpose of this survey was to investigate consumer understanding of how the safety of medicines is monitored and to determine how patients assess the risks associated with medicines, and how they prefer to receive safety information, in order to identify potential actions to help improve patient safety.

Methods

Qualitative approach

We assumed there was no one ‘single objective reality’ and thus used an interpretivist approach to this research. Qualitative data were obtained from an online survey administered to members of a panel of Australian individuals between 20 and 23 September 2018. These individuals had previously agreed to take part in ongoing surveys. At the time of their recruitment onto the panel, individuals provided written informed consent. This study was conducted in accordance with industry standards and the standards set out in the Australian Market and Social Research Society Code of Professional Behaviour.^[13]

Participants

Potential participants aged 18 years or older were selected randomly from the pool of more than 100 000 available panellists from the YouGov Panellist Omnibus. These potential participants were emailed an invitation to the survey and were provided with a link directing them to the survey. The planned sample size was 1000 participants, with quotas put on the age, sex and region of participants to reflect the broader Australian population. Potential participants were repeatedly approached until

the minimum sample size was met, and then, the survey was closed.

Survey instrument

This survey was conducted by YouGov Galaxy Online Omnibus. The survey instrument included nine questions on the participant’s attitudes towards medication and pharmacovigilance (Table S1), with additional questions to determine demographic segments (Tables 1 and 2, Question 10). The survey covered four major themes around side effects and risks of medicines: *willingness to accept side effects of medications, information seeking, sufficiency of information and understanding pharmacovigilance process*. Items included single-select, multi-select and a mixture of fixed and exclusive responses. In order to minimise bias in response, the order of possible responses was randomly presented.

Statistical considerations

Responses are presented overall and stratified by sex, age, generation, marital status, children, work status, state, location, household income, whether the participant had previously taken a prescription medicine and whether they had been a carer for someone taking a prescription

Table 1 Demographic data from the surveyed population versus inflated 2016 ABS weighted data

Demographic	Surveyed population, <i>n</i> (%) <i>n</i> = 1079	Weighting based on inflated 2016 ABS data
Sex		
Male	533 (49.4)	48.8
Female	546 (50.6)	51.2
Age, years		
18–24	102 (9.5)	11.8
25–34	197 (18.3)	18.5
35–49	315 (29.2)	26
50–64	261 (24.2)	23.5
65+	204 (18.9)	20.2
Has children	345 (32.0)	30.4
State		
New South Wales	342 (31.7)	32.1
Victoria	263 (24.4)	25.6
Queensland	225 (20.9)	19.9
South Australia	102 (9.5)	7.3
Western Australia	102 (9.5)	10.5
Other states/territories	45 (4.2)	4.6
Income category, AUD\$		
<\$50K	363 (33.6)	34.8
\$50–99K	331 (30.7)	30.3
\$100–149K	184 (17.1)	16.3
\$150K +	83 (7.7)	7.5

Table 2 Survey results overall, and by sex, age and household income

	Sex		Age					Household Income				
	Total	Male	Female	18–24	25–34	35–49	50–64	65+	<\$50k	\$50k–\$99k	\$100k–\$149k	\$150k+
1. When taking any type of medicine there is a risk of side effects. For each of the following, in your opinion, please say whether the risk of side effects is acceptable or not acceptable?												
If the side effects from a medicine are only likely to affect a very small proportion of the population:												
Unweighted base	1079	533	546	102	197	315	261	204	363	331	184	83
Base	19432	9477	9955	2296	3594	5049	4570	3923	6762	5891	3169	1458
Acceptable	47%	52%	43%	49%	46%	47%	47%	48%	43%	46%	53%	60%
Not acceptable	22%	23%	21%	24%	23%	21%	22%	20%	24%	23%	16%	20%
It depends	31%	26%	36%	27%	31%	32%	31%	32%	32%	31%	31%	20%
If the medicine is used to treat a serious condition, such as cancer:												
Unweighted base	1079	533	546	102	197	315	261	204	363	331	184	83
Base	19432	9477	9955	2296	3594	5049	4570	3923	6762	5891	3169	1458
Acceptable	64%	70%	59%	79%	66%	58%	62%	65%	62%	65%	73%	72%
Not acceptable	11%	12%	10%	6%	14%	16%	11%	7%	11%	11%	11%	18%
It depends	24%	18%	30%	15%	20%	27%	27%	28%	27%	24%	16%	10%
If it was a new type of medicine:												
Unweighted base	1079	533	546	102	197	315	261	204	363	331	184	83
Base	19432	9477	9955	2296	3594	5049	4570	3923	6762	5891	3169	1458
Acceptable	28%	32%	24%	41%	35%	28%	23%	19%	24%	31%	28%	42%
Not acceptable	25%	24%	25%	17%	27%	25%	26%	24%	26%	25%	20%	23%
It depends	48%	44%	51%	42%	37%	47%	52%	56%	49%	44%	53%	35%
Non-prescription medicine, such as paracetamol:												
Unweighted base	1079	533	546	102	197	315	261	204	363	331	184	83
Base	19432	9477	9955	2296	3594	5049	4570	3923	6762	5891	3169	1458
Acceptable	40%	42%	39%	43%	40%	35%	41%	43%	43%	37%	38%	48%
Not acceptable	37%	38%	35%	36%	39%	39%	36%	35%	32%	40%	41%	36%
It depends	23%	20%	26%	21%	21%	26%	23%	22%	24%	23%	21%	16%
Medicine for children:												
Unweighted base	1079	533	546	102	197	315	261	204	363	331	184	83
Base	19432	9477	9955	2296	3594	5049	4570	3923	6762	5891	3169	1458
Acceptable	21%	25%	17%	37%	29%	22%	15%	12%	19%	22%	20%	36%
Not acceptable	45%	46%	45%	32%	42%	43%	48%	55%	47%	47%	43%	37%
It depends	33%	29%	38%	31%	29%	35%	37%	33%	34%	31%	37%	27%
2. Who is the first person you speak to or contact when you experience a side effect from medicine? Please select one option only												
Unweighted base	1079	533	546	102	197	315	261	204	363	331	184	83
Base	19432	9477	9955	2296	3594	5049	4570	3923	6762	5891	3169	1458
My doctor or pharmacist	73%	68%	77%	51%	57%	65%	86%	94%	80%	70%	72%	60%
Discuss it on social media, such as Facebook or online forums	2%	3%	2%	3%	7%	2%	1%	1%	1%	4%	2%	3%
Family members or friends	19%	20%	18%	36%	27%	25%	10%	3%	13%	20%	23%	23%

Table 2 Continued

	Sex		Age					Household Income				
	Total		18–24	25–34	35–49	50–64	65+	<\$50k	\$50k–\$99k	\$100K–\$149K	\$150K+	
	Male	Female										
Contact the manufacturer	2%	3%	1%	3%	4%	1%	2%	–	2%	–	5%	
Don't know	4%	6%	3%	7%	6%	6%	2%	3%	4%	3%	9%	
3 What do you think the companies that make medicine do when someone contacts them to report a side effect they have experienced after taking their medicine? Please select all that apply												
Unweighted base	1079	533	546	102	197	315	261	204	363	184	83	
Base	19432	9477	9955	2296	3594	5049	4570	3923	6762	5891	1458	
Use the information to make the medication more safe	28%	30%	25%	31%	32%	25%	26%	27%	28%	29%	24%	
Inform the government body that regulates medicines	21%	23%	19%	23%	25%	21%	17%	20%	22%	18%	25%	
Undertake further research to understand the problem	29%	31%	27%	32%	38%	30%	23%	25%	30%	30%	32%	
Withdraw the medicine from the market	11%	11%	10%	12%	14%	13%	8%	6%	11%	11%	16%	
Store the information on file and only follow up on the problem when they have received a certain number of complaints	39%	36%	41%	38%	42%	36%	40%	38%	37%	41%	39%	
They probably do nothing	18%	21%	16%	12%	11%	16%	24%	26%	20%	19%	8%	
Don't know	11%	9%	13%	10%	13%	14%	10%	7%	10%	12%	11%	
4. Here is an image of a typical information sheet that is supplied with prescription medicine. In situations where you choose not to read the information sheets, please select the reasons for this from the list below. Please select all that apply												
Unweighted base	1079	533	546	102	197	315	261	204	363	331	184	
Base	19432	9477	9955	2296	3594	5049	4570	3923	6762	5891	1458	
The writing is too small	34%	38%	31%	30%	38%	30%	40%	33%	31%	38%	31%	
The risk of side effects is quite low	16%	18%	14%	15%	15%	17%	14%	17%	16%	16%	25%	
My doctor would have advised me of the main points	47%	49%	45%	48%	44%	41%	47%	55%	48%	43%	53%	
If I'm taking a medicine I have used before I don't think I need to	43%	39%	48%	46%	41%	40%	48%	44%	41%	42%	47%	
I find them too hard to understand	22%	27%	16%	21%	27%	20%	23%	18%	19%	23%	22%	
It's just something provided by the manufacturer to cover themselves	28%	33%	23%	22%	28%	31%	30%	26%	23%	32%	24%	
None of the above	10%	9%	11%	8%	8%	12%	11%	10%	11%	10%	9%	
5. What is your preferred way of accessing information about your medicine? Please select one option only												
Unweighted base	1079	533	546	102	197	315	261	204	363	331	184	
Base	19432	9477	9955	2296	3594	5049	4570	3923	6762	5891	1458	
From the package leaflet that comes with the medicine	20%	16%	24%	22%	20%	24%	18%	16%	20%	21%	17%	
Verbally from doctor or pharmacist	53%	52%	53%	43%	42%	41%	63%	71%	54%	49%	50%	
Online from the company website	5%	5%	6%	6%	7%	6%	4%	3%	4%	6%	6%	
Internet search, such as Google or Wikipedia	14%	15%	13%	11%	17%	19%	12%	9%	13%	16%	15%	
Social media such as Twitter, Facebook or user forums	2%	3%	1%	4%	3%	2%	1%	–	2%	3%	2%	
Friends and family	3%	5%	2%	7%	7%	4%	0%	0%	3%	2%	6%	
None of the above	3%	4%	2%	7%	3%	5%	1%	–	4%	2%	1%	
6. What do you think the government does to keep medicines safe? Please select all that apply												
Unweighted base	1079	533	546	102	197	315	261	204	363	331	184	
Base	19432	9477	9955	2296	3594	5049	4570	3923	6762	5891	1458	

Table 2 Continued

	Total		Sex					Age					Household Income			
	Base	29%	Male	Female	18–24	25–34	35–49	50–64	65+	<\$50k	\$50k–\$99k	\$100k–\$149k	\$150k+			
			30%	27%	29%	29%	26%	27%	34%	28%	35%	24%	23%			
They check all the research and only allow 100% safe medicines to have a license	29%	29%	30%	27%	29%	29%	26%	27%	34%	28%	35%	24%	23%			
They check all the research and give a license if the benefit of the drug is more than the risk of harm	40%	40%	38%	42%	40%	39%	37%	42%	42%	37%	44%	36%	46%			
They have laws that companies that make medicine have to follow	56%	56%	56%	55%	62%	49%	53%	57%	62%	53%	58%	54%	58%			
They check up on the companies that make medicine to make sure they are following the law	32%	32%	35%	30%	37%	40%	32%	29%	26%	28%	39%	30%	28%			
Nothing	12%	12%	13%	11%	5%	14%	13%	16%	7%	14%	10%	12%	5%			
7. Currently, companies that make medicine provide information to patients through a variety of ways, including package information leaflets, patient booklets, medical information hotlines etc. In your opinion, is this sufficient safety information or should they be providing more information about the medicines they produce? Please select one option only																
Unweighted base	1079	1079	533	546	102	197	315	261	204	363	331	184	83			
Base	19432	19432	9477	9955	2296	3594	5049	4570	3923	6762	5891	3169	1458			
Already provide sufficient information	51%	51%	51%	51%	50%	55%	50%	47%	56%	52%	51%	53%	59%			
Should provide more information	34%	34%	35%	33%	31%	33%	31%	39%	34%	33%	35%	35%	28%			
Don't know	15%	15%	14%	16%	19%	13%	19%	14%	11%	15%	14%	12%	13%			
8. Do you think doctors and pharmacists provide patients with sufficient safety information about medicines or should they be providing more information? Please select one option only																
Unweighted base	1079	1079	533	546	102	197	315	261	204	363	331	184	83			
Base	19432	19432	9477	9955	2296	3594	5049	4570	3923	6762	5891	3169	1458			
Already provide sufficient information	48%	48%	51%	44%	41%	41%	47%	47%	59%	50%	44%	54%	52%			
Should provide more information	42%	42%	40%	44%	50%	46%	39%	43%	35%	40%	45%	39%	38%			
Don't know	10%	10%	9%	12%	9%	13%	13%	9%	5%	10%	12%	7%	10%			
9. What do companies that make medicine need to do to ensure patients have all the information needed to make a decision about taking their medicines? Please select one option only																
Unweighted base	1079	1079	533	546	102	197	315	261	204	363	331	184	83			
Base	19432	19432	9477	9955	2296	3594	5049	4570	3923	6762	5891	3169	1458			
Education campaigns and social media to inform patients directly	19%	19%	20%	17%	36%	30%	17%	11%	10%	16%	21%	21%	19%			
Educate doctors and pharmacists to inform patients	67%	67%	63%	71%	49%	55%	62%	78%	81%	70%	65%	65%	65%			
No extra effort needed	5%	5%	8%	3%	7%	5%	6%	5%	5%	5%	6%	6%	7%			
Don't know	9%	9%	9%	9%	9%	10%	15%	6%	4%	8%	8%	8%	9%			
10. As an adult, have you ever taken or been a carer for someone who has taken medicine prescribed by a doctor? Please select all that apply																
Unweighted base	1079	1079	533	546	102	197	315	261	204	363	331	184	83			
Base	19432	19432	9477	9955	2296	3594	5049	4570	3923	6762	5891	3169	1458			
I have taken medicine prescribed by a doctor	79%	79%	76%	82%	74%	71%	77%	86%	85%	78%	80%	79%	78%			
I have been a carer for someone who has taken medicine prescribed by a doctor	32%	32%	26%	37%	28%	31%	33%	33%	32%	30%	33%	33%	35%			
Neither of the above	13%	13%	16%	9%	14%	18%	15%	8%	9%	13%	14%	11%	8%			

medicine. All percentages were weighted by age, sex and region to reflect the Australian Bureau of Statistics (ABS) 2016 population estimates, inflated by 6.825% to reflect the increase in population between the time of the 2016 population estimate and the time of the study ('base weighted population'). Differences in responses based on the 'base weighted population' were explored using chi-squared tests, with P values of <0.05 considered statistically significant. Data were analysed in Microsoft Excel using the Dimensions Table Object Module, a market research industry standard software. Hypothesis testing was conducted in Stata MP v16 for Mac (StataCorp, College Station, TX, USA).

Results

Participants

There were a total of 1079 respondents, with almost equal proportions of men and women. Almost half were aged 35–64 years of age, and two-thirds did not have children (Table 1). Most respondents had previously taken a prescription medication or been a carer for someone who had taken a medicine prescribed by a doctor, with only 13% of respondents having no prior experience of either (Table 2, Question 10).

Survey responses

Willingness to accept side effects of medications

The majority of respondents acknowledged that medications were associated with side effects; however, their willingness to accept side effects differed depending on the scenario presented (Table 2, Question 1). There was greater acceptance of side effects for serious conditions, such as cancer. Males were more willing to accept risks in all of the proposed scenarios ($P < 0.001$), as were those in a higher income bracket ($P < 0.001$). A greater proportion of respondents in younger age groups were willing to accept side effects for new medications, compared to those in older age groups ($P < 0.001$).

Information seeking

If a respondent experienced a side effect from a medication, most (73%) would seek advice from their doctor or pharmacist (Table 2, Question 2). The proportion of those preferring to do so increased with age ($P < 0.001$) and decreasing income ($P < 0.001$). Women respondents reported a higher likelihood of seeking advice from a healthcare professional compared to men ($P < 0.001$). Overall, only a small number of respondents said they

would seek advice online (2%) or contact the manufacturer of the medicine (2%). Similarly, more than half preferred to obtain information about their medicines directly from their doctor or pharmacist (Table 2, Question 5). Only one in five would obtain this information by reading the package leaflet that comes with the medicine, with women more likely to do so than men ($P < 0.001$).

Sufficiency of information

Four in 10 respondents (42%) felt that doctors and pharmacists do not provide sufficient information about medications (Table 2, Question 8). However, confidence in the role that these health professionals play in information provision increased with increasing age ($P < 0.001$). Many participants felt that their doctor would provide the necessary information regarding their medication, and felt it was the responsibility of companies to educate their doctor and pharmacist so they could pass the information on (Table 2, Question 9). This was particularly true in older age groups. In comparison, the younger the age group, the more likely they were to prefer educational campaigns targeting patients directly ($P < 0.001$).

In exploring possible reasons why only one in five patients used the package information leaflet that comes with medications, almost half believed that their doctor would advise them of the main points, with 43% believing they did not need to if they had taken the medicine before (Table 2, Question 4). One-third of respondents reported that the writing in consumer medicines information sheets was too small to read. Only half of respondents felt that companies provided sufficient medicines information to patients (Table 2, Question 7), and one in five felt that companies should make more use of education campaigns and social media to inform patients directly.

Understanding of the pharmacovigilance process

Generally speaking, respondent understanding of the pharmacovigilance process was poor. Almost four in 10 respondents felt that pharmaceutical companies only followed up on safety information once a certain number of complaints had been received; two in 10 reported they thought pharmaceutical companies did not do anything with the information received (Table 2, Question 3). On the other hand, over a quarter of respondents had confidence that companies used the reported safety information to make medicines safer (28%) and to undertake further research to understand the problem (29%). In terms of government involvement, while most respondents (88%) accepted that governments have a role in assessing the safety of medicine, smaller proportions knew how they achieved this (Table 2, Question 6). For

example, just over half (56%) of respondents knew that governments produced legislation that companies have to follow and one-third (32%) knew that governments check up on companies to ensure they are complying with the law. Interestingly, while four out of 10 respondents understood the concept of weighing up the benefit of drug compared to the risk of harm, approximately one-third (29%) of respondents believed that governments only issue a license when a medication is 100% safe. Note that the concept of '100% safe' was subject to interpretation. A small proportion of respondents (12%) believed that the government played no role in keeping medicines safe for the public.

Discussion

Our study has provided a broad overview of patient attitudes to medicine safety information. Much of the research in this field to date has had a single research area focus, for example consumer use of the package insert,^[7,9,14] consumer attitudes towards pharmacist-delivered health services and health information^[1] or the public perception of the pharmaceutical industry.^[15]

Willingness to accept side effects of medication

Our study reinforced that patients do appear to be willing to accept side effects of medication, especially in older age.^[5] Perhaps unsurprisingly, their acceptance of adverse effects differed depending on the purpose and intended recipient of the medication. Gender differences in willingness to accept side effects of medications may reflect differences in risk assessment between men and women.^[16] However, the interplay between risk assessment and medication aversion are still the subject of much debate.

Information seeking

There appears to be an association between information seeking, concerns about treatment^[17] and treatment adherence. Almost three-quarters of respondents in our study reported they would seek advice from their doctor or pharmacist if they experienced a side effect. Others have suggested patients trust their doctor's advice for general medicine information^[18] and for information in the event side effects occur.^[5] Our study also showed a clear difference in information seeking behaviour between women and men.

There was interest, particularly in younger people, to access medicines information online. Given the inaccuracies of health information that may be accessed online,^[19,20] it is important that processes are in place to

educate patients about where appropriate information might be accessed, in order to minimise misinformation.

Sufficiency of information

Respondents expected medicines information to come from healthcare professionals, and some of the responses shows a prevailing level of scepticism about the pharmaceutical industry.

Given the time constraints of medical appointments, healthcare professionals must curate the information provided to patients about possible side effects of medications. Despite this, most patients expect that *all* information on *all* possible side effects is delivered by their doctor.^[21] From a practical sense, this is unlikely to be possible, so alternative methods of information delivery that compliments the consultation must be considered. Package information leaflets may not provide information on medication side effects at an appropriately accessible level.^[9,22–25] Indeed, we may require a tailored approach to information dissemination that takes into account the nature of the side effect, its likelihood and the patient demographics.^[14,16,25–27]

Understanding pharmacovigilance process

Our study suggests that there is poor understanding of the regulatory requirements around adverse event reporting, which concurs with other reports.^[28,29] Respondents typically trusted governments over pharmaceutical companies, which may correlate to a low level of health literacy.^[30] There is a need to empower patients to appropriately report side effects of medications.^[31] Novel strategies for two-way risk communication using Applications software are being investigated in Europe. To date, there is high interest amongst both healthcare professionals and patients in these systems.^[32] Such systems might be particularly beneficial given the complementary nature of information derived from patients and healthcare professionals on the severity and impact of medication side effects,^[33] and may provide a simple solution to 'how' to report events.

Limitations

This study has some limitations. Firstly, the respondents were a group of people who had enrolled as YouGov panellists. These respondents are likely to have a high level of engagement regardless of the survey topic, and therefore, results may not be generalisable to the entire population. Secondly, it is difficult to determine from the survey results how many of the respondents that may suffer from a chronic health condition, with complex medication needs. Such patients may have a different attitude to medication risk. Finally, hypothesis testing was not

planned *a priori*, and no adjustment for multiple comparisons has been made.

Conclusion

This study has provided an overview of patient attitudes towards medication safety in terms of sourcing information, identifying risks and reporting events. There is an ongoing need for patient education in this regard. Given the time constraints of healthcare professionals, there is an opportunity for industry- or government-run education campaigns on medication safety. Such programs could improve health literacy and build trust between the public and the pharmaceutical industry. Patient segmentation should also be considered in order to have a more targeted and patient-centric approach towards increasing the impact of such programs.

Declarations

Conflict of interest

The Author(s) declare(s) that they have no conflicts of interest to disclose.

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Author contributions

MS made a substantial contribution to the conception and design of the survey. BB provided statistical advice and analysis. All authors contributed to the interpretation of the data. All authors critically revised the manuscript for important intellectual content and approved the final version to be published. All authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriate investigated and resolved.

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Supporting information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

Table S1. Bayer patient safety study question text and responses.