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Impact of Television Coverage on the Number and Type of Symptoms Reported During a Health Scare: A Retrospective Pre-Post Observational Study

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Running Title: Television Coverage and Health Scare Symptoms

Impact of Television Coverage on the Number and Type of Symptoms Reported During a Health Scare: A Retrospective Pre-Post Observational Study

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ABSTRACT

Objectives: This study investigated the impact of television news coverage on total adverse event reporting rates one month before and after the bulletins during a medication health scare. We further investigated whether individual side effects mentioned in each bulletin were reflected in the adverse event reports following the coverage. **Design:** A retrospective pre-post observational study. **Participants:** Adverse events reported to the New Zealand Centre for Adverse Reactions Monitoring from May to December 2008 relating to Eltroxin formulation change. **Primary and Secondary Outcome Measures:** Primary outcome measure was the total rate of adverse event reporting per day. Secondary outcome measure was the rate of reporting of seven individual symptoms mentioned in the television coverage. **Results:** After story 1 a significant increase in total reporting rates was evident (Med_{Pre} = 0, Med_{Post} = 13.5, U = 2, $p < .001$, r = -0.86) with larger effect sizes for increases in television-mentioned symptoms. Story 2 also showed a significant increase in total adverse event reporting (Med_{Pre} = 6, Med_{Post} = 18.5, U = 86.5, p = .002, r = -0.49) driven by significant increases only in television-reported symptoms. Story 3 did not result in a significant increase in total reporting (Med_{Pre} = 12; Med_{Post} = 15.5; U = 171, p = .432, r = -0.12), and showed a significant increase in reporting rates for only one of the two television-reported symptoms. **Conclusions:** The findings suggest that television news coverage can impact the overall rate of adverse event reporting during a health scare, in part via increased reporting of media-mentioned side effects. The effects of television media coverage on adverse event reporting appear strongest for earlier reports.

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Article Summary

Article focus:

- Media coverage has the capacity to influence health behaviours and anxiety. This study sought to further understand the impact of media coverage on symptom reporting during a medication-related health scare.
- It was hypothesised that the total number of adverse event reports per day will increase significantly from the month before television news segments to the month following.
- It was also hypothesised that side effects specifically mentioned in television news reports will show greater increases from the month before the television news segment to the month following

Key messages:

- Television news coverage of a health scare can significantly increase adverse event reporting in the month following the news bulletin.
- Reported adverse events that are mentioned as possible medication side effects in television news coverage increase more than side effects that are not mentioned in news coverage.
- Early television news coverage has a greater impact on adverse event reporting than bulletins broadcast later in a health scare after previous coverage.

Strengths and limitations of this study:

This study used adverse event report data from a national medicines monitoring database generated during a real-world medication-related health scare and actual television news coverage of the event. Creating a believable scenario of this scale in a laboratory setting

is not feasible, and thus this study provides insight into the real impact of television media coverage on the volume and type of symptoms reported during a health scare. While this approach results in high ecological validity, as with any observational study there is a corresponding reduction in control of potential confounds.

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Introduction

News coverage can influence health behaviour in both positive and negative ways. There is evidence that media coverage can increase public anxiety by spreading fear of illness or contamination and greatly increasing demand for health services. A recent misleading media report in Japan about a "significant complication" in a cancer vaccine trial resulted in patient anxiety and an influx of inquiries which overwhelmed staff and resulted in temporary suspension of clinical trials and hospital services.[1] Intense media coverage of medically-unexplained adverse events following influenza A (H1N1) vaccination of school students in Taiwan spread fear and likely facilitated subsequent symptom clusters, ultimately resulting in sub-optimal levels of vaccination.[2] Similarly, media coverage of a suspected but unsubstantiated gas poisoning in the West Bank in 1983 facilitated the spread of psychogenic symptoms to over 900 people over two weeks.[3 4] There is evidence of media spread of symptoms reported by-proxy where parents of school children thought to be exposed to natural gas leaks reported various symptoms in their children at increased rates following intense media coverage.[5]

Misinformation in reports can also impact on health behaviour. Perhaps the most salient medical media controversy in recent times, media reporting on the MMR vaccine has misled the public about the weight of evidence for the safety of the vaccine.[6-8] The inaccurate reporting has impacted vaccination outcomes, with vaccination rates in England falling following the media coverage,[9] and parents who report getting information about the MMR vaccine from media sources less likely to accept a second dose of the MMR vaccine for their children.[10]

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It should also be noted that media coverage also has the potential have a positive impact on health-related behaviour. When news broke that Kylie Minogue had been diagnosed with breast cancer, mammography appointment bookings in Australia rose 40% overall with a 101% increase in bookings for previously non-screened women.[11] A similar pattern emerged in cervical cancer screening in the United Kingdom following the diagnosis and death of reality television personality Jade Goody.[12] Colonoscopy use increased following Katie Couric's colorectal cancer awareness campaign in the United States.[13] Media coverage has also increased sales of iodised salt following coverage of iodine deficiency disorders.[14] More recently media coverage of research demonstrating increased rates of stroke, coronary heart disease and breast cancer in women taking combination hormone replacement therapy has been linked to declines in the use of hormone therapy,[15] decreased prescriptions [16] and higher discontinuation of treatment.[17] Greater decreases in use were seen in women exposed to more media coverage which linked hormone replacement therapy to higher rates of cancer and heart disease.[18]

One of the difficulties in researching how media reports influence the reporting of symptoms during a health scare is that it is rarely possible to get measures of the level of symptoms prior to a scare. However, a recent medication-related health scare in New Zealand has enabled us to examine the effect of television news reporting on the volume and type of symptoms reported by using data available through New Zealand's national monitoring centre for drug adverse reactions. Moreover, it enabled us to look at whether

mentioning a specific side effect in a television bulletin resulted in an increase in the rates of reporting of that specific symptom to the Centre for Adverse Reactions Monitoring following the bulletin.

In New Zealand prior to 2008 the only publicly funded brand of thyroxine used for thyroid hormone replacement treatment was the Eltroxin brand. During 2007 and 2008 the manufacturers made a change in the formulation of their tablets. While the active ingredient in the tablets remained unchanged, the 100 μg tablets were changed from yellow to white and labelled as levothyroxine rather than thyroxine. Testing of the new tablets revealed that they contained the same levels of active ingredient, were bioequivalent to an older formulation, and contained no unexpected ingredients. However, the change resulted in a dramatic increase in reporting of adverse reactions to the drug to the New Zealand Centre for Adverse Reactions Monitoring. Further details about the response to the medication change and the factors involved in the development of the health scare have been discussed previously.[19]

In this study we examined the effect of three television news stories on the number and type of adverse reaction reports received by the Centre for Adverse Reactions Monitoring. Based on previous research, we predicted that adverse event reporting would occur at a higher rate during the month following a television news story than in the month preceding the story, and that the rates of reporting of media-mentioned symptoms (but not unmentioned symptoms) would be higher during the month following television media coverage than in the month before.

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Methods

Media Coverage

Television news coverage of the formulation change was chosen for assessment because television is a widely viewed news source that has national coverage and is generally viewed by the public on the same date. In order to identify all television news reports available that went to air between May and December 2008, a comprehensive search strategy was used. Searches were conducted on online news databases (Australia / New Zealand Reference Centre, Factiva, Index New Zealand, Newztext Plus), commonly used news websites (stuff.co.nz, nzherald.co.nz), and on the websites of the three free-to-air national television news stations (tvnz.co.nz, 3news.co.nz, primetv.co.nz) using a standard list of search terms (Eltroxin, Goldshield, Synthroid, thyroid, thyroxine, levothyroxine, hypothyroid, hypothyroidism, GSK, Glaxo, GlaxoSmithKline). From these searches, three television news stories were identified [20-22] which went to air on June 17, August 15 and September 10. Videos were retrieved from the relevant website and the clips were transcribed. From these transcripts, a list of all media-reported side effects attributed to Eltroxin was generated.

Adverse Drug Reactions

Adverse drug reaction reporting data was obtained from the Centre for Adverse Reactions Monitoring (CARM) through Medsafe (New Zealand's medicines and medical devices monitoring agency) following an Official Information Act request. CARM collects adverse event reports about medications. These reports are generally made by GPs,

pharmacists, hospitals and pharmaceutical companies, though patients can also report directly to the centre. Data provided included the date that the report was received and processed by CARM and up to five reported symptoms. Reports were anonymous and no identifying information was provided. Data was obtained for May 2008 to December 2008 inclusive, providing adverse event reporting information for the eight months during which the highest rates of reporting occurred. The current research did not require separate ethical approval as the study utilised publicly available data and patients who made the ADR reports remained anonymous to the researchers.

Symptoms

To enable comparisons between the symptoms mentioned in the television media coverage and those mentioned in adverse event reports, all reports were reviewed and media-mentioned symptoms were matched with reported symptoms that best represented them. Symptoms mentioned in at least one of the three television news reports were headache, tiredness, memory problems, nausea, vomiting, vision loss, blurred vision, blindness, light sensitivity, dry eyes, dry mouth, swollen ankles, itching, aches and pains, arthritis, trembles, and unsteadiness. Symptoms that were reported in less than 5% (n = 69) of all Eltroxin-reformulation adverse event reports were excluded (vomiting, light sensitivity, dry eyes, dry mouth, swollen ankles, arthritis and trembles). Because vision symptoms (vision loss, blurred vision and blindness) were reported once each in the three media reports, these were grouped as 'vision problems' for the analyses. The media-reported symptom of 'aches and pains' was considered too broad, with no logical corresponding general 'pain' symptoms in the adverse event report data, so was excluded

from the analyses. 'Unsteadiness' was not easily matched with adverse event report symptoms, but was considered similar to dizziness, faintness, vertigo or ataxia (lack of coordination), which were grouped together for analysis. The media-reported symptoms and their corresponding adverse event report symptoms can be seen in Table 1.

(Insert Table 1 about here)

Statistical Analysis

A period of one month (four weeks) before and after each television segment was used to investigate the impact of media reporting. No adverse event reports were recorded on weekend days, thus analyses were carried out only using data on the number of reports each weekday during each four week total time period, resulting in a total of 20 weekdays before and after each television report being used in the analyses. This time frame was chosen to allow for enough data in order to generate reliable analyses, but was restricted enough to limit overlap between the month after the first television coverage and the month before the second television coverage. Because the third news story went to air less than a month after the second, an overlap of 17 days for these time periods was unavoidable.

The distributions of the daily rates of total adverse event reporting and rates of reporting of individual symptoms were non-normal and non-parametric tests were utilised. Mann-Whitney U tests were used to investigate the number of adverse events reported per day

for both total number of reports and individual symptoms before and after each television news report. Specific media-reported symptoms (headache, itching, memory problems, nausea, tiredness, unsteadiness and vision problems) not mentioned in a given television report were treated as control comparison symptoms.

All tests were two-tailed, $p < .05$ was considered significant.

Results

Adverse Event Reports Per Month

Figure 1 gives an overview of the pattern of adverse event reports made to the Centre for Adverse Reactions Monitoring from January to December 2008. The largest increases in month-by-month reporting came between May and June, and August and September.

(Insert Figure 1 about here)

Total Adverse Event Reports Per Day

The number of reports per day increased significantly from the month before news story 1 (Mdn = 0) to the month after (Mdn = 13.5, U = 2.0, $p < .001$, $r = -0.86$) (see Figure 2). Reporting had not returned to pre-media levels during the month before news story 2 (Mdn = 6). Nonetheless a significant increase in adverse event reporting was also seen from the month before to the month after the second television report (Mdn = 18.5, U = 86.5, $p = .002$, $r = -0.49$). There was a large overlap (17 reporting days) between the month after news story 2 and the month before news story 3. There was not a significant

additional impact of the third television report on the rate of symptom reporting (Mdn_{pre} = 12, Mdn_{post} = 15.5, U = 171, p = .432, r = -0.12).

(Insert Figure 2 about here)

Individual Symptoms Reported Per Day

News Story 1

There was a significant increase in the rate of adverse event reports containing the investigated symptoms from the month before news story 1 to the month after. This was found for all individual symptoms, whether or not they were mentioned in the television news story (see Table 2). The effect size for the increases associated with symptoms mentioned in news story 1 (headache, nausea and vision problems) were notably higher (r = -0.82, -0.75 and -0.78 respectively) than those associated with the unmentioned symptoms (all r values < -0.60).

(Insert Table 2 about here)

News Story 2

Five symptoms (headache, vision loss, itching, memory problems and tiredness) were mentioned in the second television news story. The rate of reporting for all of the mentioned symptoms increased significantly (all p values < .03) from the month before to the month after the media coverage, while the rate of reporting for the two unmentioned

symptoms (nausea and unsteadiness) did not show significant increases (all p values > .09) (see Table 2).

News Story 3

Only two symptoms (vision loss and unsteadiness) were mentioned in the third news story. The rate of reporting for unsteadiness increased significantly from before (Med = 0.5) to after (Med = 2.0) the third television news story (p = .028) (see Table 2). The rate of reporting of vision problems also increased from before (Med = 2.0) to after (Med = 4.5) the television coverage, however this difference was not significant (p = .12). This may be due to the consistent media coverage of vision problems across all three television news stories. In addition, the month before news story 3 had a large overlap with the month after news story 2 in which vision problems were also mentioned, and reporting of vision problems was already elevated. The rates of reporting of the five remaining unmentioned symptoms did not change significantly over this time period (all p values > .17).

Discussion

Television media coverage during the Eltroxin formulation-change health scare impacted both the volume and content of adverse effect reporting from the month before to the month after each of the three news stories, and had a differential impact on adverse event reporting as time went on. News story 1, which was the first television news coverage of the formulation change, had a dramatic impact on total symptom reporting. The rates of reporting for all symptoms assessed increased significantly regardless of whether they

were mentioned in this report or not, although the effect sizes associated with the changes suggest that the effect of the media coverage was strongest for the symptoms that were mentioned. News story 2 also generated a significant increase in the total adverse event reporting. Further investigation of individual symptoms suggests that this increase was primarily driven by significant increases in reporting rates only in symptoms that were mentioned in the second television news coverage. Total symptom reporting rates did not increase significantly following news story 3, and while both symptoms mentioned in the coverage increased, only the symptom that hadn't already been mentioned in the previous television report reached significance.

Increases in symptom reporting are likely to have been caused by at least two different processes. First, exposure to television news coverage about health risks can increase viewers' anxiety about their own health.[23 24] Increased levels of anxiety are consistently associated with increased symptom reporting.[25] This process is likely to be responsible for part of the large increase in symptoms reported as shown by the rise in the overall rate of symptom reporting and increases in all individual symptoms assessed following the first television news report.

Second, television news coverage of selected individuals' specific symptoms is likely to have increased thyroxine patients' expectations of specific side effects. This is likely to have promoted increased attention to the set of symptoms reported in the media. This led to elevated numbers of symptoms specifically mentioned in the television news media, as seen particularly following the second and third television news stories. These results are

in line with previous studies which have found that the awareness of specific potential medication side effects can increase the reporting of those side effects. [26-28]

These findings invite consideration of current health media coverage, which in the case of Eltroxin was often based around dramatic stories told by individual patients about their experiences of extremely unpleasant adverse events following the medication formulation change. More balanced coverage including alternate viewpoints, with input from health professionals and government agencies, and without sensationalised coverage of potentially unrelated individual symptom experiences - which are widely acknowledged to be highly variable - could have been of benefit.

Limitations

The current study focused on adverse events reported to the Centre of Adverse Reactions Monitoring, and thus may not generalise to patients who experienced adverse events but did not report them either to CARM or to a healthcare provider. This limitation may also be viewed as a strength of the study. The data generally came from people who went to the trouble of making a report or talking to a medical professional who then made the report on their behalf. The use of this outcome data likely reduced the impact of the television news media on symptom reporting in comparison to questionnaire-based assessment of side effects, likely making the current findings more robust. While the use of a real-world case study enhances the ecological validity of the current research, this approach also precludes controlling potential confounding variables.

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Conclusions

Television news coverage of a medication-related health scare has the potential to dramatically increase the overall rate of adverse event reporting in the month following a news story, particularly in the early stages of a health scare. This may be because such news coverage increases anxiety in viewers, leading to a general increase in symptoms that people experience. The reporting of symptoms specifically mentioned in television news coverage also increased significantly following the news stories, likely by increasing viewers' expectations that they too would experience similar side effects.

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Competing Interests

None declared.

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Authors' Contributions

KF: Conception and design of the study; analysis and interpretation of data; collection and assembly of data; drafting of the article; critical revision of the article for important intellectual content; final approval of the article.

GG: Analysis and interpretation of data; critical revision of the article for important intellectual content; final approval of the article.

TC: Conception and design of the study; critical revision of the article for important intellectual content; final approval of the article.

KP: Conception and design of the study; collection and assembly of data; drafting of the article; critical revision of the article for important intellectual content; final approval of the article.

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References

1. Yuji K, Narimatsu H, Tanimoto T, Komatsu T, Kami M. Sharing information on adverse events. Lancet 2011;**377**:1654

2. Huang WT, Hsu CC, Lee PI, Chuang JH. Mass psychogenic illness in nationwide in-school vaccination for pandemic influenza A(H1N1) 2009, Taiwan, November 2009-January 2010. Euro Surveill 2010;**15**(21):1-3

3. Modan B, Swartz TA, Tirosh M, et al. The Arjenyattah epidemic a mass phenomenon: spread and triggering factors. Lancet 1983;**31**(1472-1474)

4. Hefez A. The role of the press and the medical community in the epidemic of "mysterious gas poisoning" in the Jordan West Bank. Am J Psychiatry 1985;**142**:833-37

5. Philen RM, Kilbourne EM, McKinley TW, Parrish RG. Mass sociogenic illness by proxy: parentally reported epidemic in an elementary school. Lancet 1989;**334**:1372-76

6. Dobson R. Media misled the public over the MMR vaccine, study says. BMJ 2003;**326**:1107

7. Speers T, Lewis J. Journalists and jabs: media coverage of the MMR vaccine. Commun Med 2004;**1**:171-81

8. Goldacre B. MMR: the scare stories are back. BMJ 2007;**335**:126-27

9. Scanlon TJ. MMR vaccine uptake may be lower than reported because of manipulation of target groups. BMJ 2002;**324**:733

10. Petrovic M, Roberts R, Ramsay M, Charlett A. Parents' attitude towards the second dose of measles, mumps and rubella vaccine: a case-control study. Commun Dis Public Health 2003;**6**:325-29

11. Chapman S, McLeod K, Wakefield M, Holding S. Impact of news of celebrity illness on breast cancer screening: Kylie Minogue's breast cancer diagnosis. MJA 2005;**183**:247-50

12. Bowring J, Walker P. The "Jade Goody effect": what now for cervical cancer prevention? J Fam Plann Reprod Health Care 2010;**36**:51-54

13. Cram P, Fendrick M, Inadomi J, Cowen ME, Carpenter D, Vijan S. The impact of a celebrity promotional campaign on the use of colon cancer screening: the Katie Couric effect. Arch Intern Med 2003;**163**:1601-05

14. Li M, Chapman S, Agho K, Eastman CJ. Can even minimal news coverage influence consumer health-related behaviour? A case study of iodized salt sales, Australia. Health Educ Res 2008;**23**:543-48

15. Haas JS, Kaplan CP, Gerstenberger EP, Kerlikowske K. Changes in the use of postmenopausal hormone therapy after the publication of clinical trials. Ann Intern Med 2004;**140**:184-88

16. Majumdar SR, Almasi EA, Stafford RS. Promotion and prescribing of hormone therapy after report of harm by the Women's Health Initiative. JAMA 2004;**292**:1983-88

17. Lawton B, Rose S, McLeod D, Dowell A. Changes in use of hormone replacement therapy after the report from the Women's Health Initiative: cross sectional survey of users. BMJ 2003;**327**:845-46

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18. Haas JS, Miglioretti DL, Geller B, et al. Average household exposure to newspaper coverage about the harmful effects of hormone therapy and population-based declines in hormone therapy use. JGIM 2007;**22**:68-73

19. Faasse K, Cundy T, Pertie KJ. Thyroxine: anatomy of a health scare. BMJ 2009;**339**:b5613

20. 3 News. Change of drug formula making patients feel worse, 17 June 2008.

21. 3 News. Government to announce alternative drug to Eltroxin, 10 September 2008.

22. TVNZ Close Up. Thyroid, 15 August 2008.

23. Lemal M, Van den Bulck J. Television news exposure is related to fear of breast cancer. Prev Med 2009;**48**:189-92

24. Lemal M, Van den Bulck J. Television news coverage about cervical cancer: impact on female viewers' vulnerability perceptions and fear. Eur J Public Health 2010;**21**:381-86

25. Piccinelli M, Simon G. Gender and cross-cultural differences in somatic symptoms associated with emotional distress: an international study in primary care. Psychol Med 1997;**27**:433-44

26. Cocco G. Erectile dysfunction after therapy with Metoprolol: the Hawthorne Effect. Cardiology 2009;**112**:174-77

27. Myers MG, Cairns JA, Singer J. The consent form as a possible cause of side effects. Clin Pharmacol Ther 1987;**42**:250-53

28. Silvestri A, Galetta P, Cerquetani E, et al. Report of erectile dysfunction after therapy with beta-blockers is related to patient knowledge of side effects and is reversed by placebo. Eur Heart J 2003;**24**:1928-32

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Figure 1. Bar graph showing the number of individual adverse events reported by month during 2008.

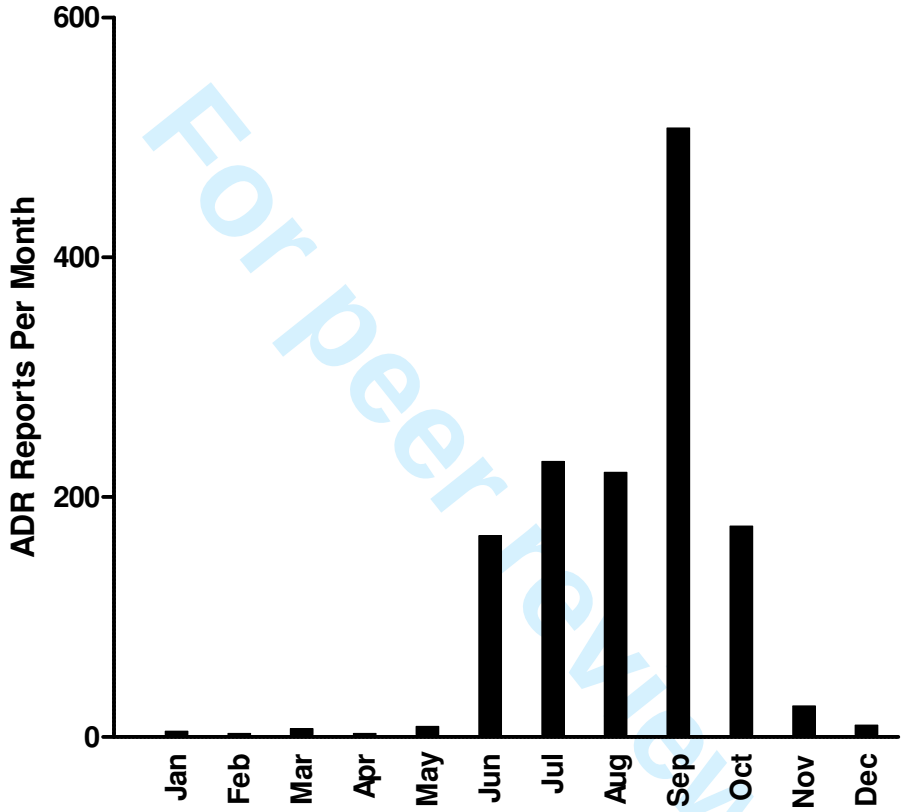

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Figure 2. Box and whisker plots showing median (with inter-quartile range and total range) number of adverse event reports per day for the month before and after each of the three television news stories.

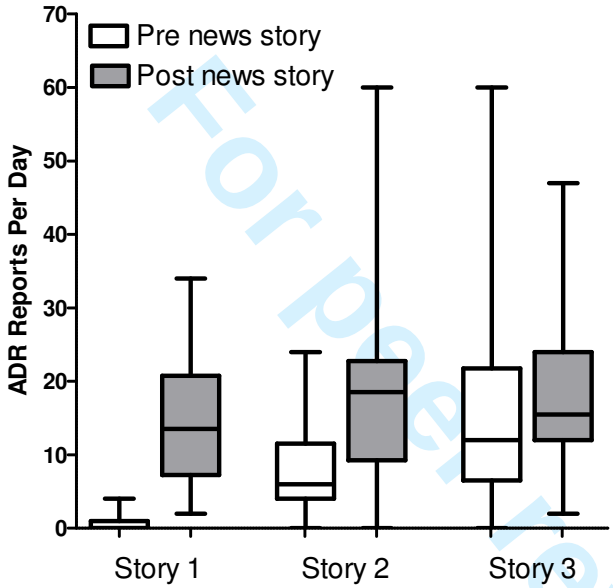

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Table 1. Side effects mentioned in television news coverage and corresponding symptoms in Centre for Adverse Reactions Monitoring data.

News Story	Television-mentioned symptoms	Corresponding adverse reactions in CARM database
Story 1	Headache	Headache
	Nausea	Nausea
	Vision problems	Vision blurred, Vision abnormal, Visual disturbance
Story 2	Headache	Headache
	Vision problems	Vision blurred, Vision abnormal, Visual disturbance
	Itching	Pruritus
	Tired	Tiredness
	Memory problems	Memory disturbance, Memory impairment, Memory loss
Story 3	Vision problems	Vision blurred, Vision abnormal, Visual disturbance
	Unsteadiness	Dizzy, Vertigo, Faintness, Ataxia

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Table 2. Mann-Whitney U analyses of reporting rates of television-mentioned symptoms in the month before and after television media coverage.

Symptom	TV Report	Television Mention	Median Pre (IQR)	Median Post (IQR)	U	P value	r
Headache	1	Yes	0.0 (0.0)	5.0 (5.0)	22.0	<.001	-0.82
	2	Yes	2.0 (2.0)	7.0 (7.5)	76.0	.001	-0.53
	3	No	4.5 (7.25)	5.5 (6.0)	180.5	.597	-0.08
Itching	1	No	0.0 (0.0)	0.0 (1.0)	129.5	.009	-0.42
	2	Yes	0.0 (0.75)	2.0 (2.75)	77.0	<.001	-0.56
	3	No	1.5 (3.0)	3.0 (4.0)	151.0	.175	-0.21
Memory	1	No	0.0 (0.0)	0.0 (1.0)	126.0	.011	-0.40
Problems	2	Yes	0.0 (1.0)	2.0 (3.0)	48.5	<.001	-0.68
	3	No	1.0 (2.0)	2.0 (4.75)	185.0	.679	-0.07
Nausea	1	Yes	0.0 (0.0)	2.0 (2.0)	38.0	<.001	-0.75
	2	No	1.0 (1.75)	1.0 (1.75)	141.0	.097	-0.26
	3	No	1.0 (2.75)	2.0 (2.0)	155.5	.217	-0.20
Tiredness	1	No	0.0 (0.0)	1.0 (2.0)	86.5	<.001	-0.59
	2	Yes	1.0 (1.0)	3.0 (1.75)	73.0	<.001	-0.56
	3	No	2.5 (2.0)	2.0 (2.75)	187.0	.721	-0.07
Unsteadiness	1	No	0.0 (0.0)	0.0 (1.75)	120.0	.002	-0.49
	2	No	0.0 (1.0)	1.0 (1.75)	160.5	.240	-0.19
	3	Yes	0.5 (1.0)	2.0 (2.75)	119.0	.023	-0.36
Vision	1	Yes	0.0 (0.0)	2.0 (3.5)	27.5	<.001	-0.78
Problems	2	Yes	1.0 (1.0)	3.0 (4.5)	120.5	.028	-0.35
	3	Yes	2.0 (2.75)	4.5 (4.0)	143.0	.120	-0.25

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ABSTRACT

Objectives: This study investigated the impact of television news coverage on total adverse event reporting rates one month before and after the bulletins during a medication health scare. We further investigated whether individual side effects mentioned in each bulletin were reflected in the adverse event reports following the coverage. **Design:** A retrospective pre-post observational study. **Setting:** New Zealand Centre for Adverse Reactions Monitoring. **Participants:** Adverse events reported from May to December 2008 relating to Eltroxin formulation change. **Primary and Secondary Outcome Measures:** Primary outcome measure was the total rate of adverse event reporting per day. Secondary outcome measure was the rate of reporting of seven individual symptoms mentioned in the television coverage. **Results:** After story 1 a significant increase in total reporting rates was evident ($Med_{Pre} = 0$, $Med_{Post} = 13.5$, $U = 2$, $p < .001$, $r = -0.86$) with larger effect sizes for increases in television-mentioned symptoms. Story 2 also showed a significant increase in total adverse event reporting ($Med_{Pre} = 6$, $Med_{Post} = 18.5$, $U = 86.5$, $p = .002$, $r = -0.49$) driven by significant increases only in television-reported symptoms. Story 3 did not result in a significant increase in total reporting ($Med_{Pre} = 12$; $Med_{Post} = 15.5$; $U = 171$, $p = .432$, $r = -0.12$), and showed a significant increase in reporting rates for only one of the two television-reported symptoms. **Conclusions:** The findings suggest that television news coverage can impact the overall rate of adverse event reporting during a health scare, in part via increased reporting of media-mentioned side effects. The effects of television media coverage on adverse event reporting appear strongest for earlier reports.

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Article Summary

Article focus:

- This study sought to understand the impact of media coverage on symptom reporting during a medication-related health scare.
- It was hypothesised that the rate of adverse event reporting would increase following television news coverage.
- It was also hypothesised that side effects specifically mentioned in television news reports would show greater increases following the news segments.

Key messages:

- Television news coverage of a health scare can significantly increase adverse event reporting in the month following the news bulletin.
- Reported adverse events that are mentioned as possible medication side effects in television news coverage increase more than side effects that are not mentioned in news coverage.
- Early television news coverage has a greater impact on adverse event reporting than bulletins broadcast later in a health scare after previous coverage.

Strengths and limitations of this study:

This study used adverse event report data from a national medicines monitoring database generated during a real-world medication-related health scare and actual television news coverage of the event. Creating a believable scenario of this scale in a laboratory setting is not feasible, and thus this study provides insight into the real impact of television media coverage on the volume and type of symptoms reported during a health scare.

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While this approach results in high ecological validity, as with any observational study there is a corresponding reduction in control of potential confounds.

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Introduction

News coverage can influence health behaviour in both positive and negative ways. There is evidence that media coverage can increase public anxiety by spreading fear of illness or contamination and greatly increasing demand for health services. A recent misleading media report in Japan about a "significant complication" in a cancer vaccine trial resulted in patient anxiety and an influx of inquiries which overwhelmed staff and resulted in temporary suspension of clinical trials and hospital services.[1] Intense media coverage of medically-unexplained adverse events following influenza A(H1N1) vaccination of school students in Taiwan spread fear and likely facilitated subsequent symptom clusters, ultimately resulting in sub-optimal levels of vaccination.[2] Similarly, media coverage of a suspected but unsubstantiated gas poisoning in the West Bank in 1983 facilitated the spread of psychogenic symptoms to over 900 people over two weeks.[3 4] There is evidence of media spread of symptoms reported by-proxy where parents of school children thought to be exposed to natural gas leaks reported various symptoms in their children at increased rates following intense media coverage.[5]

Misinformation in reports can also impact on health behaviour. Perhaps the most salient medical media controversy in recent times, media reporting on the MMR vaccine has misled the public about the weight of evidence for the safety of the vaccine.[6-8] The inaccurate reporting has impacted vaccination outcomes, with vaccination rates in England falling following the media coverage,[9] and parents who report getting information about the MMR vaccine from media sources less likely to accept a second dose of the MMR vaccine for their children.[10]

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It should also be noted that media coverage also has the potential have a positive impact on health-related behaviour. When news broke that Kylie Minogue had been diagnosed with breast cancer, mammography appointment bookings in Australia rose 40% overall with a 101% increase in bookings for previously non-screened women.[11] A similar pattern emerged in cervical cancer screening in the United Kingdom following the diagnosis and death of reality television personality Jade Goody.[12] Colonoscopy use increased following Katie Couric's colorectal cancer awareness campaign in the United States.[13] Media coverage has also increased sales of iodised salt following coverage of iodine deficiency disorders.[14] More recently media coverage of research demonstrating increased rates of stroke, coronary heart disease and breast cancer in women taking combination hormone replacement therapy has been linked to declines in the use of hormone therapy,[15] decreased prescriptions [16] and higher discontinuation of treatment.[17] Greater decreases in use were seen in women exposed to more media coverage which linked hormone replacement therapy to higher rates of cancer and heart disease.[18]

One of the difficulties in researching how media reports influence the reporting of symptoms during a health scare is that it is rarely possible to get measures of the level of symptoms prior to a scare. However, a recent medication-related health scare in New Zealand has enabled us to examine the effect of television news reporting on the volume and type of symptoms reported by using data available through New Zealand's national monitoring centre for drug adverse reactions. Moreover, it enabled us to look at whether

mentioning a specific side effect in a television bulletin resulted in an increase in the rates of reporting of that specific symptom to the Centre for Adverse Reactions Monitoring following the bulletin.

In New Zealand prior to 2008 the only publicly funded brand of thyroxine used for thyroid hormone replacement treatment was the Eltroxin brand. During 2007 and 2008 the manufacturers made a change in the formulation of their tablets. While the active ingredient in the tablets remained unchanged, the 100 μg tablets were changed from yellow to white and labelled as levothyroxine rather than thyroxine. Testing of the new tablets revealed that they contained the same levels of active ingredient, were bioequivalent to an older formulation, and contained no unexpected ingredients. However, the change resulted in a dramatic increase in reporting of adverse reactions to the drug to the New Zealand Centre for Adverse Reactions Monitoring. Further details about the response to the medication change and the factors involved in the development of the health scare have been discussed previously.[19]

In this study we examined the effect of three television news stories on the number and type of adverse reaction reports received by the Centre for Adverse Reactions Monitoring. Based on previous research, we predicted that adverse event reporting would occur at a higher rate during the month following a television news story than in the month preceding the story, and that the rates of reporting of media-mentioned symptoms (but not unmentioned symptoms) would be higher during the month following television media coverage than in the month before.

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Methods

Media Coverage

Television news coverage of the formulation change was chosen for assessment because television is a widely viewed news source that has national coverage and is generally viewed by the public on the same date. In order to identify all television news reports available that went to air between May and December 2008, a comprehensive search strategy was used. Searches were conducted on online news databases (Australia / New Zealand Reference Centre, Factiva, Index New Zealand, Newztext Plus), commonly used news websites (stuff.co.nz, nzherald.co.nz), and on the websites of the three free-to-air national television news stations (tvnz.co.nz, 3news.co.nz, primetv.co.nz) using a standard list of search terms (Eltroxin, Goldshield, Synthroid, thyroid, thyroxine, levothyroxine, hypothyroid, hypothyroidism, GSK, Glaxo, GlaxoSmithKline). From these searches, three television news stories were identified [20-22] which went to air on June 17, August 15 and September 10. These were the only television news segments related to the Eltroxin formulation change identified in our extensive search process that went to air during the time period under investigation. Videos were retrieved from the relevant website and the clips were transcribed. From these transcripts, a list of all media-reported side effects attributed to Eltroxin was generated.

Adverse Drug Reactions

Adverse drug reaction reporting data were obtained from the Centre for Adverse Reactions Monitoring (CARM) through Medsafe (New Zealand's medicines and medical

devices monitoring agency) following an Official Information Act request. CARM collects adverse event reports about medications. These reports are generally made by GPs, pharmacists, hospitals and pharmaceutical companies, though patients can also report directly to the centre. Data provided included the date that the reports were received and processed by CARM and up to five reported symptoms. Reports were anonymous and no identifying information was provided. Data were obtained for May 2008 to December 2008 inclusive, providing adverse event reporting information for the eight months during which the highest rates of reporting occurred. The current research did not require separate ethical approval as the study utilised publicly available data and patients who made the ADR reports remained anonymous to the researchers.

Symptoms

To enable comparisons between the symptoms mentioned in the television media coverage and those mentioned in adverse event reports, all reports were reviewed and media-mentioned symptoms were matched with reported symptoms that best represented them. Symptoms mentioned in at least one of the three television news reports were headache, tiredness, memory problems, nausea, vomiting, vision loss, blurred vision, blindness, light sensitivity, dry eyes, dry mouth, swollen ankles, itching, aches and pains, arthritis, trembles, and unsteadiness. Symptoms that were reported in less than 5% (n = 69) of all Eltroxin-reformulation adverse event reports were excluded (vomiting, light sensitivity, dry eyes, dry mouth, swollen ankles, arthritis and trembles). Because vision symptoms (vision loss, blurred vision and blindness) were reported once each in the three media reports, these were grouped as 'vision problems' for the analyses. The media-

reported symptom of 'aches and pains' was considered too broad, with no logical corresponding general 'pain' symptoms in the adverse event report data, so was excluded from the analyses. 'Unsteadiness' was not easily matched with adverse event report symptoms, but was considered similar to dizziness, faintness, vertigo or ataxia (lack of coordination), which were grouped together for analysis. The media-reported symptoms and their corresponding adverse event report symptoms can be seen in Table 1.

(Insert Table 1 about here)

Statistical Analysis

A period of one month (four weeks) before and after each television segment was used to investigate the impact of media reporting. No adverse event reports were recorded on weekend days, thus analyses were carried out only using data on the number of reports each weekday during each four week total time period, resulting in a total of 20 weekdays before and after each television report being used in the analyses. This time frame was chosen to allow for enough data in order to generate reliable analyses, but was restricted enough to limit overlap between the month after the first television coverage and the month before the second television coverage. Because the third news story went to air less than a month after the second, an overlap of 17 days for these time periods was unavoidable.

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The distributions of the daily rates of total Eltroxin-related adverse event reporting and rates of reporting of individual symptoms were non-normal and non-parametric tests were utilised. Mann-Whitney U tests were used to investigate the number of adverse events reported per day for both total number of reports and individual symptoms before and after each television news report. Specific media-reported symptoms (headache, itching, memory problems, nausea, tiredness, unsteadiness and vision problems) not mentioned in a given television report were treated as control comparison symptoms.

All tests were two-tailed, $p < .05$ was considered significant.

Results

Adverse Event Reports Per Month

Figure 1 gives an overview of the pattern of adverse event reports made to the Centre for Adverse Reactions Monitoring from January to December 2008. The largest increases in month-by-month reporting came between May and June, and August and September.

(Insert Figure 1 about here)

Total Adverse Event Reports Per Day

The number of reports per day increased significantly from the month before news story 1 (Mdn = 0) to the month after (Mdn = 13.5, U = 2.0, $p < .001$, r = -0.86) (see Figure 2). Reporting had not returned to pre-media levels during the month before news story 2 (Mdn = 6). Nonetheless a significant increase in adverse event reporting was also seen

from the month before to the month after the second television report (Mdn = 18.5, U = 86.5, p = .002, r = -0.49). There was a large overlap (17 reporting days) between the month after news story 2 and the month before news story 3. There was not a significant additional impact of the third television report on the rate of symptom reporting (Mdn_{pre} = 12, Mdn_{post} = 15.5, U = 171, p = .432, r = -0.12).

(Insert Figure 2 about here)

Individual Symptoms Reported Per Day

News Story 1

There was a significant increase in the rate of adverse event reports containing the investigated symptoms from the month before news story 1 to the month after. This was found for all individual symptoms, whether or not they were mentioned in the television news story (see Table 2). The effect size for the increases associated with symptoms mentioned in news story 1 (headache, nausea and vision problems) were notably higher (r = -0.82, -0.75 and -0.78 respectively) than those associated with the unmentioned symptoms (all r values < -0.60).

(Insert Table 2 about here)

News Story 2

Five symptoms (headache, vision loss, itching, memory problems and tiredness) were mentioned in the second television news story. The rate of reporting for all of the

mentioned symptoms increased significantly (all p values < .03) from the month before to the month after the media coverage, while the rate of reporting for the two unmentioned symptoms (nausea and unsteadiness) did not show significant increases (all p values > .09) (see Table 2).

News Story 3

Only two symptoms (vision loss and unsteadiness) were mentioned in the third news story. The rate of reporting for unsteadiness increased significantly from before (Med = 0.5) to after (Med = 2.0) the third television news story (p = .028) (see Table 2). The rate of reporting of vision problems also increased from before (Med = 2.0) to after (Med = 4.5) the television coverage, however this difference was not significant (p = .12). This may be due to the consistent media coverage of vision problems across all three television news stories. In addition, the month before news story 3 had a large overlap with the month after news story 2 in which vision problems were also mentioned, and reporting of vision problems was already elevated. The rates of reporting of the five remaining unmentioned symptoms did not change significantly over this time period (all p values > .17).

Discussion

Television media coverage during the Eltroxin formulation-change health scare impacted both the volume and content of adverse effect reporting from the month before to the month after each of the three news stories, and had a differential impact on adverse event reporting as time went on. News story 1, which was the first television news coverage of

the formulation change, had a dramatic impact on total symptom reporting. The rates of reporting for all symptoms assessed increased significantly regardless of whether they were mentioned in this report or not, although the effect sizes associated with the changes suggest that the effect of the media coverage was strongest for the symptoms that were mentioned. News story 2 also generated a significant increase in the total Eltroxin-related adverse event reporting. Further investigation of individual symptoms suggests that this increase was primarily driven by significant increases in reporting rates only in symptoms that were mentioned in the second television news coverage. Total symptom reporting rates did not increase significantly following news story 3, and while both symptoms mentioned in the coverage increased, only the symptom that hadn't already been mentioned in the previous television report reached significance.

Increases in symptom reporting are likely to have been caused by at least three different processes. First, exposure to television news coverage about health risks can increase viewers' anxiety about their own health.[23 24] Increased levels of anxiety are consistently associated with increased symptom reporting.[25] This process is likely to be responsible for part of the large increase in symptoms reported as shown by the rise in the overall rate of symptom reporting and increases in all individual symptoms assessed following the first television news report.

Second, television news coverage of selected individuals' specific symptoms is likely to have increased thyroxine patients' expectations of specific side effects. This is likely to have promoted increased attention to the set of symptoms reported in the media. This led

to elevated numbers of symptoms specifically mentioned in the television news media, as seen particularly following the second and third television news stories. These results are in line with previous studies which have found that the awareness of specific potential medication side effects can increase the reporting of those side effects. [26-28]

Finally, it is also probable that the media coverage of the Eltroxin formulation change increased the likelihood that patients themselves would make adverse event reports, and that health professionals would also enquire about or notice these symptoms in their patients, attribute them to the medication and report these symptoms as adverse drug reactions. Media coverage has previously been shown to increase reports of adverse drug reactions.[29] Medsafe, New Zealand's medicines and medical devices monitoring agency, has noted that the Eltroxin health scare generated an unusually large amount of adverse event reports directly from the public.[30] The media coverage of the formulation change is likely to have influenced anxiety levels and symptom expectations, as well as encouraging both individual patients and health care professionals to report these symptoms as adverse events.

These findings invite consideration of current health media coverage, which in the case of Eltroxin was often based around dramatic stories told by individual patients about their experiences of extremely unpleasant adverse events following the medication formulation change. More balanced coverage including alternate viewpoints, with input from health professionals and government agencies, and without sensationalised coverage of

potentially unrelated individual symptom experiences - which are widely acknowledged to be highly variable - could have been of benefit.

Limitations

The current study focused on adverse events reported to the Centre of Adverse Reactions Monitoring, and thus may not generalise to patients who experienced adverse events but did not report them either to CARM or to a healthcare provider. This limitation may also be viewed as a strength of the study. The data generally came from people who went to the trouble of making a report or talking to a medical professional who then made the report on their behalf. The use of this outcome data likely reduced the impact of the television news media on symptom reporting in comparison to questionnaire-based assessment of side effects, likely making the current findings more robust. While the use of a real-world case study enhances the ecological validity of the current research, this approach also precludes controlling potential confounding variables such as underlying trait anxiety, patients' beliefs about medications, level of exposure to Eltroxin-related media coverage, and participation in thyroid support or discussion groups either online or face-to-face.

While unlikely, overall reporting of adverse events from all causes may have also increased over the study period. The possibility of reverse causation must also be considered. It is feasible that the media coverage of the Eltroxin formulation change was driven by the number of adverse event reports received by CARM, rather than the media coverage driving adverse event reporting. However it seems more likely that television

media coverage preceded symptom reporting given the current results. First, the increase in overall Eltroxin-related adverse event reports rose dramatically following television coverage, particularly after the first news segment. Second, the symptoms that are mentioned in the adverse event reports are also influenced by the content of the television stories, with side effects discussed in the media tending to be reported more frequently following the news segments.

Conclusions

Television news coverage of a medication-related health scare has the potential to dramatically increase the overall rate of adverse event reporting in the month following a news story, particularly in the early stages of a health scare. This may be because such news coverage increases anxiety in viewers, leading to a general increase in symptoms that people experience. The reporting of symptoms specifically mentioned in television news coverage also increased significantly following the news stories, likely by increasing viewers' expectations that they too would experience similar side effects.

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Competing Interests

None declared.

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Authors' Contributions

KF: Conception and design of the study; analysis and interpretation of data; collection and assembly of data; drafting of the article; critical revision of the article for important intellectual content; final approval of the article.

GG: Analysis and interpretation of data; critical revision of the article for important intellectual content; final approval of the article.

TC: Conception and design of the study; critical revision of the article for important intellectual content; final approval of the article.

KP: Conception and design of the study; collection and assembly of data; drafting of the article; critical revision of the article for important intellectual content; final approval of the article.

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References

1. Yuji K, Narimatsu H, Tanimoto T, et al. Sharing information on adverse events. Lancet 2011;**377**:1654
2. Huang WT, Hsu CC, Lee PI, et al. Mass psychogenic illness in nationwide in-school vaccination for pandemic influenza A(H1N1) 2009, Taiwan, November 2009-January 2010. Euro Surveill 2010;**15**(21):1-3
3. Modan B, Swartz TA, Tirosh M, et al. The Arjenyattah epidemic a mass phenomenon: spread and triggering factors. Lancet 1983;**31**(1472-1474)
4. Hefez A. The role of the press and the medical community in the epidemic of "mysterious gas poisoning" in the Jordan West Bank. Am J Psychiatry 1985;**142**:833-37
5. Philen RM, Kilbourne EM, McKinley TW, et al. Mass sociogenic illness by proxy: parentally reported epidemic in an elementary school. Lancet 1989;**334**:1372-76
6. Dobson R. Media misled the public over the MMR vaccine, study says. BMJ 2003;**326**:1107
7. Speers T, Lewis J. Journalists and jabs: media coverage of the MMR vaccine. Commun Med 2004;**1**:171-81
8. Goldacre B. MMR: the scare stories are back. BMJ 2007;**335**:126-27
9. Scanlon TJ. MMR vaccine uptake may be lower than reported because of manipulation of target groups. BMJ 2002;**324**:733
10. Petrovic M, Roberts R, Ramsay M, et al. Parents' attitude towards the second dose of measles, mumps and rubella vaccine: a case-control study. Commun Dis Public Health 2003;**6**:325-29
11. Chapman S, McLeod K, Wakefield M, et al. Impact of news of celebrity illness on breast cancer screening: Kylie Minogue's breast cancer diagnosis. MJA 2005;**183**:247-50
12. Bowring J, Walker P. The "Jade Goody effect": what now for cervical cancer prevention? J Fam Plann Reprod Health Care 2010;**36**:51-54
13. Cram P, Fendrick M, Inadomi J, et al. The impact of a celebrity promotional campaign on the use of colon cancer screening: the Katie Couric effect. Arch Intern Med 2003;**163**:1601-05
14. Li M, Chapman S, Agho K, et al. Can even minimal news coverage influence consumer health-related behaviour? A case study of iodized salt sales, Australia. Health Educ Res 2008;**23**:543-48
15. Haas JS, Kaplan CP, Gerstenberger EP, et al. Changes in the use of postmenopausal hormone therapy after the publication of clinical trials. Ann Intern Med 2004;**140**:184-88
16. Majumdar SR, Almasi EA, Stafford RS. Promotion and prescribing of hormone therapy after report of harm by the Women's Health Initiative. JAMA 2004;**292**:1983-88
17. Lawton B, Rose S, McLeod D, et al. Changes in use of hormone replacement therapy after the report from the Women's Health Initiative: cross sectional survey of users. BMJ 2003;**327**:845-46

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18. Haas JS, Miglioretti DL, Geller B, et al. Average household exposure to newspaper coverage about the harmful effects of hormone therapy and population-based declines in hormone therapy use. JGIM 2007;**22**:68-73
19. Faasse K, Cundy T, Pertie KJ. Thyroxine: anatomy of a health scare. BMJ 2009;**339**:b5613
20. 3 News. Change of drug formula making patients feel worse, 17 June 2008.
21. 3 News. Government to announce alternative drug to Eltroxin, 10 September 2008.
22. TVNZ Close Up. Thyroid, 15 August 2008.
23. Lemal M, Van den Bulck J. Television news exposure is related to fear of breast cancer. Prev Med 2009;**48**:189-92
24. Lemal M, Van den Bulck J. Television news coverage about cervical cancer: impact on female viewers' vulnerability perceptions and fear. Eur J Public Health 2010;**21**:381-86
25. Piccinelli M, Simon G. Gender and cross-cultural differences in somatic symptoms associated with emotional distress: an international study in primary care. Psychol Med 1997;**27**:433-44
26. Cocco G. Erectile dysfunction after therapy with Metoprolol: the Hawthorne Effect. Cardiology 2009;**112**:174-77
27. Myers MG, Cairns JA, Singer J. The consent form as a possible cause of side effects. Clin Pharmacol Ther 1987;**42**:250-53
28. Silvestri A, Galetta P, Cerquetani E, et al. Report of erectile dysfunction after therapy with beta-blockers is related to patient knowledge of side effects and is reversed by placebo. Eur Heart J 2003;**24**:1928-32
29. Martin RM, May M, Gunnell D. Did intense adverse media publicity impact on prescribing of paroxetine and the notification of suspected adverse drug reactions? Analysis of routine databases, 2001-2004. Br J Clin Pharmacol 2005;**61**:224-28
30. Eltroxin (levothyroxine) formulation change. BPAC 2008;**15**:48-50

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Table 1. Side effects mentioned in television news coverage and corresponding symptoms in Centre for Adverse Reactions Monitoring data.

News Story	Television-mentioned symptoms	Corresponding adverse reactions in CARM database
Story 1	Headache	Headache
	Nausea	Nausea
	Vision problems	Vision blurred, Vision abnormal, Visual disturbance
Story 2	Headache	Headache
	Vision problems	Vision blurred, Vision abnormal, Visual disturbance
	Itching	Pruritus
	Tired	Tiredness
	Memory problems	Memory disturbance, Memory impairment, Memory loss
Story 3	Vision problems	Vision blurred, Vision abnormal, Visual disturbance
	Unsteadiness	Dizzy, Vertigo, Faintness, Ataxia

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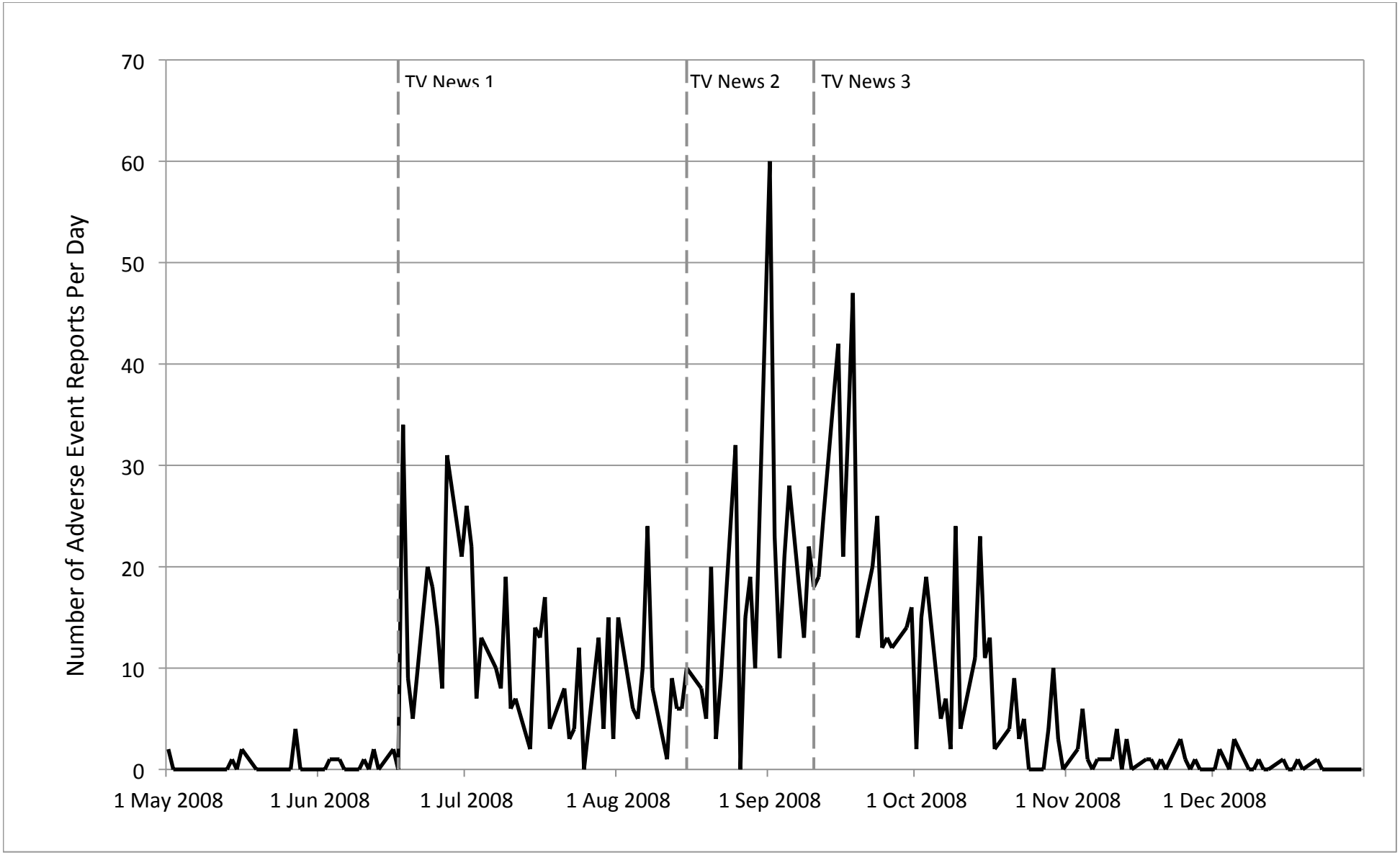
Table 2. Mann-Whitney U analyses of reporting rates of television-mentioned symptoms in the month before and after television media coverage.

Symptom	TV Report	Television Mention	Median Pre (IQR)	Median Post (IQR)	U	P value	r
Headache	1	Yes	0.0 (0.0)	5.0 (5.0)	22.0	<.001	-0.82
	2	Yes	2.0 (2.0)	7.0 (7.5)	76.0	.001	-0.53
	3	No	4.5 (7.25)	5.5 (6.0)	180.5	.597	-0.08
Itching	1	No	0.0 (0.0)	0.0 (1.0)	129.5	.009	-0.42
	2	Yes	0.0 (0.75)	2.0 (2.75)	77.0	<.001	-0.56
	3	No	1.5 (3.0)	3.0 (4.0)	151.0	.175	-0.21
Memory	1	No	0.0 (0.0)	0.0 (1.0)	126.0	.011	-0.40
Problems	2	Yes	0.0 (1.0)	2.0 (3.0)	48.5	<.001	-0.68
	3	No	1.0 (2.0)	2.0 (4.75)	185.0	.679	-0.07
Nausea	1	Yes	0.0 (0.0)	2.0 (2.0)	38.0	<.001	-0.75
	2	No	1.0 (1.75)	1.0 (1.75)	141.0	.097	-0.26
	3	No	1.0 (2.75)	2.0 (2.0)	155.5	.217	-0.20
Tiredness	1	No	0.0 (0.0)	1.0 (2.0)	86.5	<.001	-0.59
	2	Yes	1.0 (1.0)	3.0 (1.75)	73.0	<.001	-0.56
	3	No	2.5 (2.0)	2.0 (2.75)	187.0	.721	-0.07
Unsteadiness	1	No	0.0 (0.0)	0.0 (1.75)	120.0	.002	-0.49
	2	No	0.0 (1.0)	1.0 (1.75)	160.5	.240	-0.19
	3	Yes	0.5 (1.0)	2.0 (2.75)	119.0	.023	-0.36
Vision	1	Yes	0.0 (0.0)	2.0 (3.5)	27.5	<.001	-0.78
Problems	2	Yes	1.0 (1.0)	3.0 (4.5)	120.5	.028	-0.35
	3	Yes	2.0 (2.75)	4.5 (4.0)	143.0	.120	-0.25


70
60
50
40
30
20
10
0
Number of Adverse Event Reports Per Day
TV News 1
TV News 2
TV News 3
1 May 2008
1 Jun 2008
1 Jul 2008
1 Aug 2008
1 Sep 2008
1 Oct 2008
1 Nov 2008
1 Dec 2008